ADITYA ENGINEERING COLLEGE

An Autonomous Institutuion

Approved by AICTE • Permanently Affiliated to JNTUK • Accredited by NAAC with 'A' Grade

Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956

Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Program Name : B.Tech. inCivil Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	171HS1T01	English - I	0
2	I	171BS1T01	Mathematics - I	0
3	I	171HS1T02	Environmental Studies	0
4	I	171BS1T03	Engineering Chemistry	0
5	I	171ES1T02	Engineering Mechanics	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab - I	0
8	I	171BS1L01	Engineering Chemistry Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English - II	0
11	II	171BS2T02	Mathematics - II	0
12	II	171BS2T06	Mathematics - III	0
13	II	171BS2T07	Engineering Physics	0
14	II	171ES2T03	Engineering Drawing	0
15	II	171ES2T04	Basic Mechanical Engineering	0
16	II	171HS2L02	English Communication Skills Lab - II	0
17	II	171BS2L02	Engineering Physics Lab	0
18	II	171ES2L02	Engineering Workshop and IT Workshop	0

19	III	171BS3T10	Probability and Statistics	25
20	III	171ES3T05	Basic Electrical and Electronics Engineering	8
21	III	171ES3T09	Strength of Materials - I	0
22	III	171CE3T01	Building Materials and Construction	17
23	III	171CE3T02	Surveying	33
24	III	171CE3T03	Fluid Mechanics	0
25	III	171CE3L01	Surveying Lab	50
26	III	171ES3L03	Strength of Materials Lab	50
27	III	171HS3A09	Professional Ethics and Human Values	0
28	III	171HS3A10	Employability Skills - I	100
29	IV	171CE4T04	Building Planning and Computer Aided Drawing	0
30	IV	171CE4T05	Concrete Technology	0
31	IV	171CE4T06	Engineering Geology	0
32	IV	171CE4T07	Hydraulics and Hydraulic Machinery	17
33	IV	171CE4T08	Strength of Materials – II	0
34	IV	171CE4T09	Structural Analysis - I	0
35	IV	171CE4L02	Fluid Mechanics and Hydraulic Machinery Lab	50
36	IV	171CE4L03	Concrete Technology Lab	0
37	IV	171HS4A08	Intellectual property rights and patents	0
38	IV	171HS4A11	Employability Skills - II	100
39	IV	171HS4A04	Managerial Economics and Financial Analysis	24
40	V	R1631011	Management Science	100
41	V	R1631012	Engineering Geology	0
42	V	R1631013	Structural Analysis -II	0

43	V	R1631014	Design & Drawing of Reinforced Concrete Structures	0
44	V	R1631015	Transportation Engineering - II	0
45	V	R1631016	Concrete Technology Lab	0
46	V	R1631017	Geology Lab	0
47	V	R1631018	Transportation Engineering Lab	0
48	VI	R1632011	Design & Drawing of Steel Structures	0
49	VI	R1632012	Geotechnical Engineering - I	0
50	VI	R1632013	Environmental Engineering -I	0
51	VI	R1632014	Water Resource Engineering -I	0
52	VI	R1632015A	Electronic Instrumentation	100
53	VI	R1632015B	Data Base Management Systems	100
54	VI	R163201C	Alternative Energy Sources	100
55	VI	R163201D	Waste water Management	0
56	VI	R163227B	Fundamentals of Liquefied Natural Gas	100
57	VI	RT41016F	Green Fuel Technologies	100
58	VI	R163201C	Geotechnical Engineering Lab	0
59	VI	R1632017	Environmental Engineering Lab	0
60	VI	R1632018	Computer Aided Engineering Lab	0
61	VII	RT41011	Environmental Engineering – II	0
62	VII	RT41012	Prestressed Concrete	0
63	VII	RT41013	Construction Technology and Management	0
64	VII	RT41014	Water Resources Engineering-II	0
65	VII	RT41015	Remote Sensing and GIS Applications	0
66	VII	RT41016	(ELECTIVE - I) Ground Improvement Techniques	0

67	VII	RT41017	Air Pollution and Control	0
68	VII	RT41018	Matrix methods of Structural Analysis	0
69	VII	RT41019	Urban Hydrology	0
70	VII	RT4101A	Advanced Surveying	0
71	VII	RT4101B	Interior Designs and Decorations	0
72	VII	RT4101L	Environmental Engineering Lab	0
73	VII	RT4101M	GIS & CAD Lab	0
74	VIII	RT42011	Estimating, Specifications & Contracts	0
75	VIII	RT42012A	(ELECTIVE –II) Engineering with Geo-synthetics	0
76	VIII	RT42012B	Environmental Impact Assessment and Management	0
77	VIII	RT42012C	Advanced Structural Engineering	0
78	VIII	RT42012D	Ground Water Development and Management	0
79	VIII	RT42012E	Traffic Engineering	0
80	VIII	RT42012F	Infrastructure Management	0
81	VIII	RT42013A	Elective-III: Advanced foundation Engineering	0
82	VIII	RT42013B	Solid waste Management	0
83	VIII	RT42013C	Earthquake Resistant Design	0
84	VIII	RT42013D	Water Shed Management	0
85	VIII	RT42013E	Pavement Analysis and Design	0
86	VIII	RT42013F	Green Buildings	0
87	VIII	RT42014A	Elective-IV: Soil Dynamics and Machine Foundations	0
88	VIII	RT42014B	Environmental and Industrial Hygiene	0
89	VIII	RT42014C	Repair and Rehabilitation of Structures	0
90	VIII	RT42014D	Water Resources System Planning and Management	0

91	VIII	RT42014E	Urban Transportation Planning Safety Engineering	0
92	VIII	RT42014G	Bridge Engineering	0
93	VIII	RT42015	Project Work	0
Total number of courses in the academic year 2018-2019				= 93
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				= 14
Percentage of syllabus revision carried out in the academic year 2018-2019 = (14/93)*100				= 15.05 %

Program Coordinator

Head of the Department

Head of the Department
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AR17

2018-19

PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS1T01	English - I	HSS	3	1	0	4	3
171BS1T01	Mathematics - I	BS	3	1	2	6	3
171HS1T02	Environmental Studies	HSS	2	1	0	3	2
171BS1T03	Engineering Chemistry	BS	3	1	0	4	3
171ES1T02	Engineering Mechanics	ES	3	1	0	4	3
171ES1T01	Computer Programming	ES	3	1	0	4	3
171HS1L01	English Communication Skills Lab - I	HSS	0	0	3	3	2
171BS1L01	Engineering Chemistry Lab	BS	0	0	3	3	2
171ES1L01	Computer Programming Lab	ES	0	0	3	3	2
		TOTAL	**17**	**6**	**11**	**34**	**23**

II SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS2T03	English - II	HSS	3	1	0	4	3
171BS2T02	Mathematics - II	BS	3	1	0	4	3
171BS2T06	Mathematics - III	BS	3	1	2	6	3
171BS2T07	Engineering Physics	BS	3	1	0	4	3
171ES2T03	Engineering Drawing	ES	3	1	0	4	3
171ES2T04	Basic Mechanical Engineering	ES	3	1	0	4	3
171HS2L02	English Communication Skills Lab - II	HS	0	0	3	3	2
171BS2L02	Engineering Physics Lab	BS	0	0	3	3	2
171ES2L02	Engineering Workshop and IT Workshop	ES	0	0	3	3	2
		TOTAL	**18**	**6**	**11**	**35**	**24**

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core;PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

AR-17

III SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171BS3T10	Probability and Statistics	BS	3	1	0	4	3
171ES3T05	Basic Electrical and Electronics Engineering	ES	3	1	0	4	3
171ES3T09	Strength of Materials - I	ES	3	1	0	4	3
171CE3T01	Building Materials and Construction	PC	3	1	0	4	3
171CE3T02	Surveying	PC	3	1	0	4	3
171CE3T03	Fluid Mechanics	PC	3	1	0	4	3
171CE3L01	Surveying Lab	PC	0	0	3	3	2
171ES3L03	Strength of Materials Lab	ES	0	0	3	3	2
171HS3A09	Professional Ethics and Human Values	HSS	2	0	0	2	0
171HS3A10	Employability Skills - I	HSS	0	0	2	2	0
		TOTAL	20	6	8	34	22

IV SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CE4T04	Building Planning and Computer Aided Drawing	PC	3	1	2	6	3
171CE4T05	Concrete Technology	PC	3	1	0	4	3
171CE4T06	Engineering Geology	PC	3	1	0	4	3
171CE4T07	Hydraulics and Hydraulic Machinery	PC	3	1	0	4	3
171CE4T08	Strength of Materials – II	PC	3	1	0	4	3
171CE4T09	Structural Analysis - I	PC	3	1	0	4	3
171CE4L02	Fluid Mechanics and Hydraulic Machinery Lab	PC	0	0	3	3	2
171CE4L03	Concrete Technology Lab	PC	0	0	3	3	2
171HS4A08	Intellectual property rights and patents	HSS	2	0	0	2	0
171HS4A11	Employability Skills – II	HSS	0	0	2	2	0
171HS4A04	Managerial Economics and Financial Analysis	HSS	2	0	0	2	0
		TOTAL	22	6	10	38	22

Head of the Department

R16

III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Management Science	4	--	--	3
2	Engineering Geology	4	--	--	3
3	Structural Analysis -II	4	--	--	3
4	Design & Drawing of Reinforced Concrete Structures	4	2	--	3
5	Transportation Engineering - II	4	--	--	3
6	Concrete Technology Lab	--	--	3	2
7	Geology Lab	--	--	3	2
8	Transportation Engineering Lab	--	--	3	2
	Total Credits				**21**

III Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Design & Drawing of Steel Structures	4	2	--	3
2	Geotechnical Engineering - I	4	--	--	3
3	Environmental Engineering -I	4	--	--	3
4	Water Resource Engineering -I	4	--	--	3
5	**OPEN ELECTIVE** i. Electronic Instrumentation ii. Data Base Management Systems iii. Alternative Energy Sources iv. Waste water Management v. Fundamentals of Liquefied Natural Gas vi. Green Fuel Technologies	4	--	--	3
6	Geotechnical Engineering Lab	--	--	3	2
7	Environmental Engineering Lab	--	--	3	2
8	Computer Aided Engineering Lab	--	--	3	2
	Total Credits				**21**

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IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Environmental Engineering – II	3+1*	--	3
2	Prestressed Concrete	3+1*	--	3
3	Construction Technology and Management	3+1*	--	3
4	Water Resources Engineering–II	3+1*	--	3
5	Remote Sensing and GIS Applications	3+1*	--	3
6	**ELECTIVE - I**	3+1*	--	3
7	Environmental Engineering Lab	--	3	2
8	GIS & CAD Lab	--	3	2
Total Credits				**22**

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Estimating, Specifications & Contracts	3+1*	--	3
2	**ELECTIVE –II**	3+1*	--	3
3	**ELECTIVE – III**	3+1*	--	3
4	**ELECTIVE – IV**	3+1*	--	3
5	Project Work			9
Total Credits				**21**

OPEN ELECTIVE:

a) Environmental Pollution and Control
b) Disaster Management
c) Industrial Water & Waste Water Management
d) Architecture and Town Planning
e) Finite Element Method
f) Green Technologies

Elective-I:

a) Ground Improvement Techniques
b) Air Pollution and Control
c) Matrix methods of Structural Analysis
d) Urban Hydrology
e) Advanced Surveying
f) Interior Designs and Decorations

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Elective-II:

a. Engineering with Geo-synthetics
b. Environmental Impact Assessment and Management
c. Advanced Structural Engineering
d. Ground Water Development and Management
e. Traffic Engineering
f. Infrastructure Management

Elective-III:

a) Advanced foundation Engineering
b) Solid waste Management
c) Earthquake Resistant Design
d) Water Shed Management
e) Pavement Analysis and Design
f) Green Buildings

Elective-IV:

a) Soil Dynamics and Machine Foundations
b) Environmental and Industrial Hygiene
c) Repair and Rehabilitation of Structures
d) Water Resources System Planning and Management
e) Urban Transportation Planning
f) Safety Engineering
g) Bridge Engineering

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PROBABILITY AND STATISTICS
(Common to CE& Min.E)

III SEMESTER	**L**	**T**	**P**	**C**
Course Code: 171BS3T10	**3**	**1**	**0**	**3**

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1: Apply various Probability distributions for both discrete and continuous random variables.
- CO 2: Compute mean and variance of sample means with replacement and without replacement.
- CO 3: Apply various tests to test the hypothesis concerning mean, Proportion, variance and perform ANOVA test.
- CO 4: Apply the concepts of correlation and regression to the given statistical data.
- CO 5: Examine quality of the product using control charts.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

UNIT I: Random variables and Distributions
Review of elementary probability, Random variables- Discrete and Continuous Random variable-Distribution function-Expectation, variance, Moment Generating function –Discrete Distributions- Binomial, Poisson Continuous Distributions -Normal Distribution.

UNIT II: Sampling Theory
Introduction - Population and samples- Sampling distribution of means (known and unknown), proportion, sampling distribution of sums and difference-Central limit theorem-Point and interval estimation for means and proportions.

UNIT III: Tests of Hypothesis
Introduction –Statistical hypothesis-Errors of sampling, level of significance - One tail and two-tail tests- Testing of hypothesis concerning single mean, proportion, two means and two proportions using Z-test. Testing of hypothesis concerning single mean, two means using t-test. Independence of attributes by

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χ^2–test-ANOVA for one-way and two-way classified data.

UNIT IV: Correlation and Regression
Introduction – Simple correlation-properties-Pearson and rank correlation Regression – straight line and quadratic curve by method of least squares.

UNIT V: Statistical Quality Control Methods
Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts.

Text Books:

1. Probability and Statistics for Engineering and the Sciences, Jay L.Devore, 8th edition, Cengage.
2. Probability, Statistics and Random processes, T.B.Veeraju, TMH

Reference Books:

1. Probability and Statistics Engineers and the Scientists, Shron L.Myers, Keying Ye, Ronald E Walpole, 8th Edition, Pearson 2007.
2. Introduction to probability and statistics, William Menden Hall, Robert J. Bever and Barbara Bever, Cengage learning.2009
3. Introduction to probability and statistics Engineers and the Scientists, Sheldon, M. Rosss, 4th edition, Academic Foundation, 2011
4. Applied statistics for Engineers and Physical Scientists, Johannes Ledolter and Robert V.Hogg, 3rd Edition, Pearson, 2010
5. Probability and Statistics for Engineering, Richards A Johnson, Irvin Miller and Johnson E Freund. 9th Edition,PHI.
6. Probability and statistics by T.K.V.Iyengar, S.Chand publishers.

Web Links:

1. http://nptel.ac.in/courses/111105041/1
2. http://mathworld.wolfram.com/Statistics.html
3. http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html
4. http://mathworld.wolfram.com/topics/Probability.html

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SURVEYING

III Semester
CourseCode:171CE3T02

L	T	P	C
3	1	0	3

Course Outcomes:

At The end of the Course, Student will be able to:

CO 1: Survey the linear and angular distances using chain, compass instruments.
CO 2: Make use of appropriate techniques in order to estimate the level of existing ground.
CO 3: Solve height and distances problems using Theodolite and Tachometry.
CO 4: Utilize various advanced surveying equipment for large projects.
CO 5: Determine regular, irregular areas and volumes of given field

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO /PSO	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	2	-	-
CO3	1	-	-
CO4	3	-	-
CO5	2	-	-

UNITI

Introduction

Definition-uses of surveying – objectives-principles, classifications–divisions, units of measurements, conventional symbols, errors in survey measurements.

Chain surveying: uses–chain triangulation-survey stations, survey lines-instruments used in chain survey-folding, unfolding- ranging, obstacles-field book-errors in chain survey.

Compass Surveying: direction of measurements- purpose, principle-prismatic compass and surveyor's compass – bearings – meridian – declination – local attraction - computation of angle-traversing-types, traverse adjustments.

UNIT II

Planetable Surveying

Purpose-principle-accessories-orientation-methods of plane tabling-errors.

Leveling and Contouring: Concept and Terminology, Leveling Instruments and their Temporary and permanent adjustments - method of leveling. Characteristics and Uses of contours-methods of conducting contour surveys.

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UNIT III

The odolite

The odolite, description, principles-uses and adjustments–temporary and permanent, measurement of horizontal and vertical angles. Trigonometrically leveling.

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNITIV

Advanced Surveying

Total station, electronic distance measurements (EDM)-principles of electro optical EDM -Global positioning system-introduction to geodetic surveying.

Curves: Types of curves, design and setting out simple circular curves by linear and angular methods-introduction to compound curves.

UNITV

Computation of Areas and Volumes

Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section-determination of the capacity of reservoir, volume of barrow pits.

Text Books:

1. Surveying (VolNo.1,2&3), B.C.Punmia, Ashok Kumar Jainand Arun Kumar Jain, Laxmi Publications (P) ltd.
2. Advance Surveying, Satish Gopi, R.SathiKumar and N.Madhu, Pearson Publications.
3. Textbook of Surveying, C.Venkataramaiah, University press, India(P)limited.

Reference Books:

1. Text book of Surveying, S.K. Duggal(VolNo.1&2), Tata Mc Graw Hill Publishing Co. Ltd.
2. Textbook of Surveying, Arora (VolNo.1&2), Standard Book House.
3. Higher Surveying, A.M.Chandra, New Age International Pvt ltd.
4. Fundamentals of surveying, S.K. Roy, PHI learning(P) Ltd.

Web Links:

1. http://nptel.ac.in/courses/105104101/
2. http://www.nptelvideos.in/2012/11/surveying.html
3. http://nptel.ac.in/courses/105107158/17
4. http://nptel.ac.in/courses/105107122/20

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SURVEYING LAB

III Semester L T P C
Course Code:171CE3L01 0 0 3 2

Course Outcomes:
At the end of the Course, Student will be able to:

CO1: Develop the plan or map showing the ground features from data obtained By surveying.
CO2: Develop graphical field work and prepare reports.
CO3: Estimate the levels of existing ground and prepare contour plan.
CO4: Solve height and distances problems using different principles.
CO5: Produce layout curves for roads and computation of areas and volumes.
CO6: Calculate areas and distances by total station.

Mapping of Course Out comes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	-	-	1	2	-	-	-	-	-	-	-
CO2	3	-	-	1	2	-	-	-	-	-	-	-
CO3	1	-	-	2	1	-	-	-	-	-	-	-
CO4	2	-	-	1	2	-	-	-	-	-	-	-
CO5	3	-	-	1	2	-	-	-	-	-	-	-
CO6	3	-	-	1	2	-	-	-	-	-	-	-

Mapping of Course Out comes with Program Specific Outcomes:

CO /PSO	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	3	-	-
CO4	2	-	-
CO5	2	-	-
CO6	2	-	-

List of field works

WEEK1: To find the area by chain survey (closed circuit).

WEEK2: To find the area of the given boundary using compass (closed traverse).

WEEK3: To find the area of given boundary by method of radiation (plane table survey).

WEEK4: To find the level difference by height of instrument method or rise and fall method (differential leveling).

WEEK5: To find the level difference along the length of the road (longitudinal section)and draw given road profile(fly leveling).

WEEK6: To determine the horizontal and vertical angles by method of repetition (the odolite survey).

WEEK7: To find the distance between two in accessible points by the odolite survey & the height and distance problem (Trigonometric leveling).
WEEK8: To find Height and distance problems using Tachometric principles (Tachometric survey).
WEEK9: To set out a simple circular curve by linear method.
WEEK10: To prepare a contour map by grid method.
WEEK11: To study introduction to total station and practicing, setting up, leveling up, and elimination of parallax error & find the Distance between two in accessible points and determination of remote height (total station).
WEEK12:To determine the area using total station.

List of Augmented Experiments:(Week13–Week16)
(Any two of the following experiments can be performed)
WEEK 13: To find the area of given boundary by method of intersection (plane table survey).
WEEK 14: To determine the horizontal angles by method of reiteration (the odolite survey).
WEEK 15: To find the distance between two inaccessible points by compass survey.
WEEK16: To find the level difference between two points (simple leveling).To find the Tacheometric constants by tacheometric survey.
WEEK 17: To prepare a contour map by using total station.

ReferenceBooks:

1. Surveying (Vol No.1, 2 &3), B.C.Punmia, Ashok Kumar Jain and Arun KumarJain,LaxmiPublications (P) ltd, New Delhi.
2. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, PearsonPublications.
3. PlaneSurveying,Alakde, S.Chand& Company,NewDelhi.

WebLinks:

1. http://www.nptelvideos.in/2012/11/surveying.html
2. http://nptel.ac.in/courses/105107122/home.htm
3. http://nptel.ac.in/courses/105107158/20
4. https://onlinecourses.nptel.ac.in/noc18_ce03/unit?unit=38&lesson=42
5. https://onlinecourses.nptel.ac.in/noc18_ce03/unit?unit=46&lesson=52

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STRENGTH OF MATERIALS LAB

III Semester
Course Code: 171ES3L03

L	T	P	C
0	0	3	2

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Illustrate the stress-strain relationship for mild steel/ hysd bars.
CO 2: Determine modulus of rigidity of spring.
CO 3: Find the hardness of metals by bhn, rockwell &vicker's apparatus.
CO 4: Estimate the impact resistance of materials by charpy & izod tests.
CO 5: Distinguish between simply supported beam and cantilever beam and determine the young's modulus of beam material.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	-	-	3	-	-	-	-	2	-	-	-
CO3	3	-	-	1	-	-	-	-	2	-	-	-
CO4	3	-	-	2	-	-	-	-	2	-	-	-
CO5	3	-	-	2	-	-	-	-	2	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	1	-	-
CO2	3	-	-
CO3	2	-	-
CO4	3	-	-
CO5	3	-	-

List of Experiments

WEEK1: 1.To estimates the mechanical properties of Mild Steel specimen under tensile load by Direct Tension.

WEEK2: 2.To estimate the young's modulus of simply supported beam.

WEEK3: 3.To estimate young's modulus of cantilever beam.

WEEK4: 4.To determine the Rigidity modulus of mild steel specimen by performing Torsion test.

WEEK5: 5.To determine the Brinell & Rockwell hardness number of the given specimen.

WEEK6: 6.To determine the spring properties (stiffness and rigidity modulus) under tensile and compressive loads.

WEEK7: 7.To find the Compressive strength of given wood orc oncrete.

WEEK8: 8.To find the impact strength of mild steel specimen by performing IZOD and Charpy Impact test

WEEK9: 9.To determine the ultimate shear strength of mild steel specimen test.

WEEK-10: 10.To find the strain of given sample by using electrical resistance strain gauge.

WEEK-11: 11.To determine young's modulus of different continuous beams.

WEEK-12: 12.To study non destructive testing methods on various materials (Demonstration).

List of Augmented Experiments: (Weeks 13 – Week 16)

(Any two of the following experiments can be performed)

13. To compare compressive strength of clay brick and reinforced cement concrete cube.
14. To verify of Maxwell's Reciprocal theorem on beams.
15. To perform shear test on given specimen.
16. Leaf spring test (Demonstration).
17. To prepare and study the micro structure of pure metals mild steel, low carbon steel and high carbon steel

Reference Books:

1. Introduction to Strength of Materials, Jindal, Galgotia Publications, 2010.
2. Strength of materials, R.Subrahmanyam, Oxford university press, 2011.

Web links:

1. http://nptel.ac.in/courses/105105108/2
2. http://www.citchennai.edu.in/wp-content/uploads/2015/02/SOM.pdf
3. http://www.ace-edu.in/wp-content/uploads/2017/02/LM_SomLab.pdf
4. https://home.iitm.ac.in/kramesh/Strength%20of%20Materials%20Laboratory%20Manual.pdf
5. http://smec.ac.in/sites/default/files/lab1/Strength%20of%20Materials%20Lab.pdf

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FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

IV Semester
Course Code: 171CE4L02

L	T	P	C
0	0	3	2

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 : Examine the calibration of different flow meters.
CO 2 : Illustrate flow measuring devices used in pipes, channels and tanks.
CO 3 : Determine major and minor losses in pipes.
CO 4 : Analyze energy equation for problems on flow through pipes.
CO 5 : Identify the flow behavior in open channels.
CO 6 : Examine the performance characteristics of turbines and pumps.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	-	-	2	-	-	-	-	-	-	-	-
CO2	2	-	-	3	-	-	-	-	-	-	-	-
CO3	3	-	-	2	-	-	-	-	-	-	-	-
CO4	3	-	-	2	-	-	-	-	-	-	-	-
CO5	3	-	-	1	-	-	-	-	-	-	-	-
CO6	3	-	-	2	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	3	-	-
CO2	1	-	-
CO3	3	-	-
CO4	3	-	-
CO5	2	-	-
CO6	3	-	-

List of Experiments

WEEK-1: Calibration of Venturi meter & Orifice meter.
WEEK-2: To determine the Coefficient of discharge for a small orifice by a constant head method.
WEEK-3: Calibration of contracted Rectangular Notch and /or Triangular Notch.
WEEK-4: To determine the Coefficient of loss of head in a sudden contraction and friction factor.
WEEK-5: To verify the Bernoulli's equation.
WEEK-6: To study the impact of jet on various vanes.
WEEK-7: To determine the height of jump and head loss in hydraulic jump.
WEEK-8: Performance test on Pelton wheel turbine.
WEEK-9: Performance test on Francis turbine.
WEEK-10: To conduct efficiency test on centrifugal pump.
WEEK-11: To conduct efficiency test on reciprocating pump.
WEEK-12: Performance test on Kaplan turbine.

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List of Augmented Experiments: (Week 13 – Week 16)

(Any 2 experiments to be conducted from the following)

13. To study the flow phenomenon by using Reynolds's experiment.
14. Calibration of Rotameter.
15. To determinethemetacentric height of a floating body.
16. To determine the Coefficient of discharge for an external mouth piece by variable head method.
17. To measure the velocity at a point by using pitot tube apparatus.

Reference Books:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS.
2. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.
4. A text book of Fluid mechanics and hydraulic machines, R. K. Bansal, Laxmi Publications New Delhi.

Web Links:

1. http://nptel.ac.in/courses/105106114/
2. http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/machine/ui/Course_home-1.htm
3. https://smartaau.files.wordpress.com/2014/03/lecture-note-ch-4-uniform-flow.pdf
4. http://web.itu.edu.tr/~bulu/hydraulics_files/lecture_notes_05.pdf
5. https://lecturenotes.in/subject/95/fluid-mechanics-and-hydraulic-machines
6. http://geeta.edu.in/Mechanical_Data/labmanual/Fluid%20Mechanics%20lab%20manual.pdf.
7. http://www.cittumkur.org/manuals/mech/FM_lab.pdf.
8. http://www.rpsinstitutions.org/downloads/lab%20manual/fluid%20mechanics.pdf

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

IV Semester L T P C
Course Code: 171HS4A04 2 0 0 0

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Explain the Managerial Economic concepts for decision making and forward planning.
CO 2: Illustrate the law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
CO 3: Identify the cost behaviour, costs useful for managerial decision making and Break Even Point (BEP) of an enterprise.
CO 4: Outline the different types of business organizations along with basic knowledge on business cycle.
CO 5: Make use of the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise.
CO 6: Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	2	-	-
CO 3	1	1	-	-	-	-	-	-	-	-	1	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-
CO 5	1	1	-	-	-	-	-	-	-	3	-	-
CO 6	1	1	-	-	-	-	-	-	-	-	2	-

Mapping of Course Outcomes with Program Specific Outcomes:

OC/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	-	-
CO 2	-	-	-
CO 3	-	-	-
CO 4	-	-	-
CO 5	-	-	-
CO 6	-	-	-

UNIT-I
Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting

UNIT – II
Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function – Law of Variable proportions-Isoquants and Iso costs and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT – III

Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT – IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1. Managerial Economics and Financial Analysis, A R Aryasri, TMH Publication, 4th Edition, 2012.
2. Managerial Economics and Financial Analysis, S A Siddiqui & A. S. Siddiqui, New Age Publishers, 1st Edition, 2012.

Reference Books:

1. Managerial Economics: Principles and Worldwide Applications, Dominick Salvatore, Oxford University Press, 7th Edition, 2012.
2. Financial Accounting for Management, Ramachandran N, Ram Kumar Kakani, Pearson Education, 2nd Edition, 2007.
3. Managerial Economics, D N Dwivedi, PHI Publication, 8th Edition, 2010.

Web links:

1. www.managementstudyguide.com
2. www.tutorialspoint.com

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Syllabus revision Index for the Academic Year 2018-2019 B.Tech Civil Engineering

S.No	Name of the course	Percentage of syllabus change
1	Probability and Statistics	25
2	Surveying	33.2
3	Surveying Lab	50
4	Strength of Materials Lab	50
5	Fluid Mechanics and Hydraulic Machinery Lab	50
6	Managerial Economics and Financial Analysis	24

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Probability & Statistics	• Probability & Statistics
Course Code	R1621011/R1622271	171BS3T10/171BS4T10
Syllabus	UNIT I: Discrete Random variables and Distributions: Introduction-Random variables- Discrete Random variable-Distribution function Expectation-Moment Generating function-Moments and properties. Discrete distributions: Binomial, Poisson and Geometric distributions and their fitting to data.	UNIT I: Random variables and Distributions Review of elementary probability, Random variables- Discrete and Continuous Random variable-Distribution function-Expectation, variance, Moment Generating function – Discrete Distributions- Binomial, Poisson Continuous Distributions -Normal Distribution.
	UNIT II: Continuous Random variable and distributions: Introduction-Continuous Random variable-Distribution function-Expectation-Moment Generating function-Moments and properties. Continuous distribution: Uniform, Exponential and Normal distributions, Normal approximation to Binomial distribution -Weibull, Gamma distribution.	UNIT II: Sampling Theory Introduction - Population and samples- Sampling distribution of means (known and unknown), proportion, sampling distribution of sums and difference-Central limit theorem. Point and interval estimation for means and proportions.
	UNIT III: Sampling Theory: Introduction - Population and samples- Sampling distribution of means (σ known)-Central limit theorem- t-distribution- Sampling distribution of means (σ unknown)- Sampling distribution of variances – χ^2 and F-distributions- Point estimation- Maximum error of estimate - Interval estimation.	UNIT III: Tests of Hypothesis Introduction – Statistical hypothesis-Errors of sampling, level of significance - One tail and two-tail tests- Testing of hypothesis concerning single mean, proportion, two means and two proportions using Z-test. Testing of hypothesis concerning single mean, two means using t test. Independence of attributes by χ 2 –test-ANOVA for one-way and two-way classified data.
	UNIT IV: Tests of Hypothesis: Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean	UNIT IV: Correlation and Regression Introduction – Simple correlation-properties-Pearson and rank correlation Regression – straight line and quadratic curve by method of least squares.

	and proportion, two means- Proportions and their differences- ANOVA for one-way and two-way classified data.	
	UNIT V: Curve fitting and Correlation: Introduction - Fitting a straight line – Second degree curve-exponential curve-power curve by method of least squares-Goodness of fit. Correlation and Regression – Properties.	UNIT V: Statistical Quality Control Methods Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts
	UNIT VI: Statistical Quality Control Methods: Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Surveying	SURVEYING
Course Code	R1621015	171CE3T02
Syllabus	UNIT – I, Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements	UNITI Introduction Definition-uses of surveying–objectives-principles, classifications–divisions, units of measurements, conventional symbols, errors in survey measurements. Chain surveying: uses–chain triangulation-survey stations, survey linesinstruments used in chain survey-folding, unfolding- ranging, obstacles-field book errors in chain survey. Compass Surveying: direction of measurements-purpose, principle-prismatic compassandsurveyor'scompass-bearings-meridian-declination-localattraction computation of angle-traversing-types, traverse adjustments
	UNIT – II Distances And Direction: Electronic distance measurements (EDM)- principles of electro optical EDM-Errors and corrections to linear measurements- Compass surveyMeridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction omitted measurements	UNITII Plane table Surveying Purpose-principle-accessories-orientation-methodsofplanetabling-errors. Leveling and Contouring: Concept and Terminology, Leveling Instruments and their Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours-methods of conducting contour surveys.

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	UNIT – III Leveling And Contouring: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys.	UNIT III Theodolite Theodolite, description, principles-uses and adjustments– temporary and permanent, measurement of horizontal and vertical angles. Trigonometrically leveling. Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.
	UNIT – IV Theodolite: Description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrical leveling,. Tachometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.	UNIT IV Advanced Surveying Total station, electronic distance measurements (EDM)-principles of electrooptical EDM -Global positioning system-introduction to geo detic surveying. Curves: Types of curves, design and setting out simple circular curves by linear and angular methods-introduction to compound curves.
	UNIT – V Curves: Types of curves, design and setting out – simple and compound curvesIntroduction to geodetic surveying, Total St	UNIT V Computation of Areas and Volumes Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level sectiondetermination of the capacity of reservoir, volume of barrow pits
	UNIT – VI Computation Of Areas And Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	SURVEYING FIELD WORK-I	Surveying Lab
Course Code	R1621017	171CE3L01
Syllabus	List of Field Works: 1. Survey by chain survey of road profile with offsets in case of road widening. 2. Survey in an area by chain survey (Closed circuit) 3. Determination of distance between two inaccessible points by using compass. 4. Finding the area of the given boundary using compass (Closed Traverse) 5. Plane table survey; finding the area of a given boundary by the method of Radiation 6. Plane table survey; finding the area of a given boundary by the method of intersection. 7. Two Point Problem by the plane table survey. 8. Fly levelling: Height of the instrument method (differential levelling) 9. Fly levelling: rise and fall method. 10. Fly levelling: closed circuit/ open circuit. 11. Fly levelling; Longitudinal Section and Cross sections of a given road profile. Note: Any 10 field work assignments must be completed.	List of field works WEEK1: To find the area by chain survey (closed circuit). WEEK2: To find the area of the given boundary using compass (closed traverse). WEEK3: To find the area of given boundary by method of radiation (plane table survey). WEEK4: To find the level difference by height of instrument methodorrise and fall method (differential leveling). WEEK5: Tofind thelevel difference along the length of the road (longitudinalsection)and draw given road profile(fly leveling). WEEK6: To determine the horizontal and vertical angles by method of repetition (theodolite survey). WEEK7: To find the distance between two in accessible points by theodolite survey & the height and distance problem (Trigonometric leveling). WEEK8: To find Height and distance problems using Tacheometric principles (Tacheometric survey). WEEK9: To set out a simple circular curve by linear method. WEEK10: To prepare a contour map by grid method. WEEK11: To study introduction to total station and practicing, setting up, leveling up, and elimination of parallax error & find the Distance between two in accessible points and determination of remote height (total station). WEEK12: To determine the area using total station. List of Augmented Experiments:(Week13–Week16) (Any two of the following experiments can be performed) WEEK 13: To find the area of given boundary by method of intersection (plane table survey). WEEK 14: To determine the horizontal angles by method of reiteration (theodolite survey). WEEK 15: To find the distance between two in accessible points by compass survey. WEEK16: To find the level difference between two points (simple leveling). To find the Tacheometric constants by tacheometric survey. WEEK 17: To prepare a contour map by using total station

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Strength of Materials Lab	STRENGTH OF MATERIALS LAB
Course Code	R1621018	171ES3L03
Syllabus	List of Experiments 1. Tension test on Steel bar 2. Bending test on (Steel / Wood) Cantilever beam. 3. Bending test on simple support beam. 4. Torsion test 5. Hardness test 6. Spring test 7. Compression test on wood or concrete 8. Impact test 9. Shear test 10. Verification of Maxwell's Reciprocal theorem on beams. 11. Use of Electrical resistance strain gauges 12. Continuous beam – deflection test.	List of Experiments WEEK1: 1.To estimates the mechanical properties of Mild Steel specimen under tensile load by Direct Tension. WEEK2: 2.To estimate the young's modulus of simply supported beam. WEEK3: 3.To estimate young's modulus of cantilever beam. WEEK4: 4.To determine the Rigidity modulus of mild steel specimen by performing Torsion test. WEEK5: 5.To determine the Brinell & Rockwell hardness number of the given specimen. WEEK6: 6.To determine the spring properties (stiffness and rigidity modulus) under tensile and compressive loads. WEEK7: 7.To find the Compressive strength of given wood or concrete. WEEK8: 8.To find the impact strength of mild steel specimen by performing IZOD and Charpy Impact test WEEK9: 9.To determine the ultimate shear strength of mild steel specimen test. WEEK-10: 10.To find the strain of given sample by using electrical resistance straingauge. WEEK-11: 11.To determine young's modulus of different continuousbeams. WEEK-12: 12.To study non destructive testing methods on various materials (Demonstration). List of Augmented Experiments: (Weeks 13 – Week 16) (Any two of the following experiments can be performed) 13. To compare compressive strength of clay brick and reinforced cement concretecube. 14. To verify of Maxwell's Reciprocal theorem onbeams. 15. To perform shear test on givenspecimen. 16. Leaf spring test (Demonstration). 17. To prepare and study the micro structure of pure metals mild steel, low carbon steel and high carbonsteel

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Fluid Mechanics and Hydraulic Machinery Lab	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB
Course Code	R1622017	171CE4L02
Syllabus	List of Experiments 1. Calibration of Venturi meter & Orifice meter 2. Determination of Coefficient of discharge for a small orifice by a constant head method. 3. Determination of Coefficient of discharge for an external mouth piece by variable head method. 4. Calibration of contracted Rectangular Notch and /or Triangular Notch 5. Determination of Coefficient of loss of head in a sudden contraction and friction factor. 6. Verification of Bernoulli's equation. 7. Impact of jet on vanes 8. Study of Hydraulic jump. 9. Performance test on Pelton wheel turbine 10. Performance test on Francis turbine. 11. Efficiency test on centrifugal pump. 12. Efficiency test on reciprocating pump.	List of Experiments WEEK-1: 1.Calibration of Venturi meter & Orifice meter. WEEK-2: 2.To determine the Coefficient of discharge for a small orifice by a constant head method. WEEK-3: 3.Calibration of contracted Rectangular Notch and /or Triangular Notch. WEEK-4: 4.To determine the Coefficient of loss of head in a sudden contraction and friction factor. WEEK-5: 5.To verify the Bernoulli's equation. WEEK-6: 6.To study the impact of jet on various vanes. WEEK-7: 7.To determine the height of jump and head loss in hydraulic jump. WEEK-8: 8.Performance test on Pelton wheel turbine. WEEK-9: 9.Performance test on Francis turbine. WEEK-10: 10.To conduct efficiency test on centrifugal pump. WEEK-11: 11.To conduct efficiency test on reciprocating pump. WEEK-12: 12.Performance test on Kaplan turbine. IV Semester L T P C Course Code: 171CE4L02 0 0 3 2 List of Augmented Experiments: (Week 13 – Week 16) (Any 2 experiments to be conducted from the following) 13. To study the flow phenomenon by using Reynolds's experiment. 14. Calibration of Rotameter. 15. To determine the metacentric height of a floating body. 16. To determine the Coefficient of discharge for an external mouth piece by variable head method. 17. To measure the velocity at a point by using pitot tube apparatus

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Managerial Economics and Financial Analysis	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Course Code	R1622019	171HS4A04
Syllabus	UNIT-I Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics – Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of DemandDemand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.	UNIT-I Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting
	UNIT – II: Production and Cost Analysis: Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.	UNIT – II Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function – Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.
	UNIT – III: Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of	UNIT – III Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination

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	firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.	– Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.
	UNIT – IV: Types of Business Organization and Business Cycles: Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.	UNIT – IV Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis
	UNIT – V: Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)	UNIT – V Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-CapitalizationMeaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)
	UNIT – VI: Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-CapitalizationMeaning of Capital Budgeting-Time value of money-Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)	

Signature of the course coordinator

Signature of the HOD

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Program Name : B.Tech. in Electrical and Electronics Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	171HS1T01	English - I	0
2	I	171BS1T01	Mathematics - I	0
3	I	171HS1T02	Environmental Studies	0
4	I	171BS1T05	Applied Chemistry	0
5	I	171ES1T02	Engineering Mechanics	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab - I	0
8	I	171BS1L03	Applied Chemistry Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English - II	0
11	II	171BS2T02	Mathematics - II	0
12	II	171BS2T06	Mathematics - III	0
13	II	171BS2T04	Applied Physics	0
14	II	171ES2T03	Engineering Drawing	0
15	II	171EE2T01	Electrical Circuit Analysis - I	0
16	II	171HS2L02	English Communication Skills Lab - I	0
17	II	171BS2L04	Applied Physics Lab	0
18	II	171ES2L02	Engineering Workshop and IT Workshop	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
19	III	171EE3T02	Electrical Circuit Analysis - II	40
20	III	171EE3T03	Electrical Machines – I	10
21	III	171EE3T04	Basic Electronics Devices and Circuits	10
22	III	171EE3T05	Electromagnetic Fields	5
23	III	171ES3T10	Thermal and Hydro Prime Movers	42
24	III	171HS3T04	Managerial Economics and Financial Analysis	5
25	III	171ES3L04	Thermal and Hydro Prime Movers Lab	5
26	III	171EE3L01	Electrical Circuits Lab	8
27	III	171HS3A09	Professional Ethics and Human Values	15
28	III	171HS3A10	Employability Skills - I	100
29	IV	171EE4T06	Electrical Measurements	15
30	IV	171EE4T07	Electrical Machines - II	5
31	IV	171ES4T24	Digital Circuits and Logic Design	5
32	IV	171EE4T08	Control Systems	15
33	IV	171EE4T09	Power Systems – I	15
34	IV	171HS4T05	Management Science	15
35	IV	171EE4L02	Electronic Devices and Circuits Lab	10
36	IV	171EE4L03	Electrical Machines - I Lab	35
37	IV	171HS4A11	Employability Skills - II	100
38	V	R1631021	Power Systems-II	0
39	V	R1631022	Renewable Energy Sources	0
40	V	R1631023	Signals and Systems	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
41	V	R1631024	Pulse & Digital Circuits	25
42	V	R1631025	Power Electronics	30
43	V	R1631026	Electrical Machines-II Laboratory	30
44	V	R1631027	Control Systems Laboratory	0
45	V	R1631028	Electrical Measurements Laboratory	0
46	V	R1631029	IPR & Patents	0
47	VI	R1632021	Power Electronic Controllers & Drives	5
48	VI	R1632022	Power System Analysis	15
49	VI	R1632023	Micro Processors and Micro controllers	40
50	VI	R1632024	Data Structures	100
51	VI	R163202A	Unix and Shell Programming	0
52	VI	R163204A	OOPS Through JAVA	0
53	VI	R163202B	VLSI Design	0
54	VI	R163202D	Robotics	100
55	VI	R163202E	Neural Networks &Fuzzy Logic	100
56	VI	R163202F	Energy Audit and Conservation& Management	0
57	VI	R1632026	Power Electronics Laboratory	40
58	VI	R1632027	Micro Processors and Micro controllers Laboratory	0
59	VI	R1632028	Data Structures Laboratory	100
60	VI	R1632029	Professional Ethics & Human Values	100
61	VII	RT41021	Renewable Energy Sources and Systems	0
62	VII	RT41022	HVAC & DC Transmission	0
63	VII	RT41023	Power System Operation & Control	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
64	VII	RT41024	Energy Audit, Conservation and Management	0
65	VII	RT41025	Instrumentation	0
66	VII	RT41026	Non Conventional Sources of Energy	0
67	VII	RT41027	Optimization Techniques	0
68	VII	RT41028	VLSI Design	0
69	VII	RT41029	Electrical Distribution Systems	0
70	VII	RT41030	Optimization Techniques	0
71	VII	RT4102L	Microprocessors & Microcontrollers Lab	0
72	VII	RT4102M	Electrical Simulation Lab	0
73	VII	RT4102N	Power systems lab	0
74	VIII	RT42021	Digital Control Systems	0
75	VIII	RT42022A	Advanced Control Systems	0
76	VIII	RT42022B	Extra High Voltage Transmission	0
77	VIII	RT42022C	Special Electrical Machines	0
78	VIII	RT42023A	Electric Power Quality	0
79	VIII	RT42023B	Digital Signal Processing	0
80	VIII	RT42023C	FACTS: Flexible Alternating Current Transmission Syst	0
81	VIII	RT42024A	OOPS Through Java	0
82	VIII	RT42024B	UNIX and Shell Programming	0
83	VIII	RT42024C	AI Techniques	0
84	VIII	RT42024D	Power System Reforms	0
85	VIII	RT42024E	Systems Engineering	0
86	VIII	RT42025	Project	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
Total number of courses in the academic year 2018-2019				= 86
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				= 15
Percentage of syllabus revision carried out in the academic year 2018-2019 = (15/86)*100				= 17.44%

Program Coordinator

Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS1T01	English - I	HSS	3	1	0	4	3
171BS1T01	Mathematics - I	BS	3	1	2	6	3
171HS1T02	Environmental Studies	HSS	2	1	0	3	2
171BS1T05	Applied Chemistry	BS	3	1	0	4	3
171ES1T02	Engineering Mechanics	ES	3	1	0	4	3
171ES1T01	Computer Programming	ES	3	1	0	4	3
171HS1L01	English Communication Skills Lab - I	HSS	0	0	3	3	2
171BS1L03	Applied Chemistry Lab	BS	0	0	3	3	2
171ES1L01	Computer Programming Lab	ES	0	0	3	3	2
		TOTAL	17	6	11	34	23

II SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS2T03	English - II	HSS	3	1	0	4	3
171BS2T02	Mathematics - II	BS	3	1	0	4	3
171BS2T06	Mathematics - III	BS	3	1	2	6	3
171BS2T04	Applied Physics	BS	3	1	0	4	3
171ES2T03	Engineering Drawing	ES	3	0	3	6	3
171EE2T01	Electrical Circuit Analysis - I	PC	3	1	0	4	3
171HS2L02	English Communication Skills Lab - II	HSS	0	0	3	3	2
171BS2L04	Applied Physics Lab	BS	0	0	3	3	2
171ES2L02	Engineering Workshop and IT Workshop	ES	0	0	3	3	2
		TOTAL	18	5	14	37	24

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III SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171EE3T02	Electrical Circuit Analysis - II	PC	3	1	0	4	3
171EE3T03	Electrical Machines – I	PC	3	1	0	4	3
171EE3T04	Basic Electronics Devices and Circuits	PC	3	1	0	4	3
171EE3T05	Electromagnetic Fields	PC	3	1	0	4	3
171ES3T10	Thermal and Hydro Prime Movers	ES	3	1	0	4	3
171HS3T04	Managerial Economics and Financial Analysis	HSS	3	1	0	4	3
171ES3L04	Thermal and Hydro Prime Movers Lab	ES	0	0	3	3	2
171EE3L01	Electrical Circuits Lab	PC	0	0	3	3	2
171HS3A09	Professional Ethics and Human Values	HSS	2	0	0	2	0
171HS3A10	Employability Skills - I	HSS	0	0	2	2	0
		TOTAL	**20**	**6**	**8**	**34**	**22**

IV SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171EE4T06	Electrical Measurements	PC	3	1	0	4	3
171EE4T07	Electrical Machines - II	PC	3	1	0	4	3
171ES4T24	Digital Circuits and Logic Design	ES	3	1	0	4	3
171EE4T08	Control Systems	PC	3	1	0	4	3
171EE4T09	Power Systems – I	PC	3	1	0	4	3
171HS4T05	Management Science	HSS	3	1	0	4	3
171EE4L02	Electronic Devices and Circuits Lab	PC	0	0	3	3	2
171EE4L03	Electrical Machines - I Lab	PC	0	0	3	3	2
171HS4A11	Employability Skills - II	HSS	0	0	2	2	0
		TOTAL	**18**	**6**	**8**	**32**	**22**

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III Year – I Semester

S. No	Subjects	L	T	P	Credits
1	Power Systems-II	4	--	--	3
2	Renewable Energy Sources	4	--	--	3
3	Signals and Systems	4	--	--	3
4	Pulse & Digital Circuits	4	--	--	3
5	Power Electronics	4	--	--	3
6	Electrical Machines-II Laboratory	---	--	3	2
7	Control Systems Laboratory	--	--	3	2
8	Electrical Measurements Laboratory	--	--	3	2
9-MC	IPR & Patents	--	2	--	--
	Total Credits				**21**

III Year – II Semester

S. No	Subjects	L	T	P	Credits
1	Power Electronic Controllers & Drives	4	--	--	3
2	Power System Analysis	4	--	--	3
3	Micro Processors and Micro controllers	4	--	--	3
4	Data Structures	4	--	--	3
5	Open Elective 1. Unix and Shell Programming 2. OOPS Through JAVA 3. VLSI Design 4. Robotics 5. Neural Networks &Fuzzy Logic 6. Energy Audit and Conservation& Management	4	--	--	3
6	Power Electronics Laboratory	--	--	3	2
7	Microprocessors & Microcontrollers Laboratory	--	--	3	2
8	Data Structures Laboratory	--	--	3	2
9-MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

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IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Renewable Energy Sources and Systems	3+1	-	3
2	HVAC & DC Transmission	3+1	-	3
3	Power System Operation & Control	3+1	-	3
4	**Open Elective**	3+1	-	3
5	**Elective – I**	3+1	-	3
6	Microprocessors & Microcontrollers Lab	-	3	2
7	Electrical Simulation Lab	-	3	2
8	Power systems lab		3	2
Total Credits				**21**

Open Elective:

1. Energy Audit, Conservation and Management
2. Instrumentation
3. Non Conventional Sources of Energy
4. Optimization Techniques

Elective – I:

1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

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IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Digital Control Systems	3+1	-	3
2	**Elective – II**	3+1	-	3
3	**Elective – III**	3+1	-	3
4	**Elective – IV**	3+1	-	3
5	Project	-	-	9
Total Credits				**21**

Elective – II:

1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

Elective – III:

1. Electric Power Quality
2. Digital Signal Processing
3. FACTS: Flexible Alternating Current Transmission Systems.

Elective-IV:

1. OOPS Through Java
2. UNIX and Shell Programming
3. AI Techniques
4. Power System Reforms
5. Systems Engineering

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ELECTRICAL CIRCUIT ANALYSIS-II

III Semester L T P C
Course Code: 171EE3T02 3 1 0 3

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1: Explain the importance of three phase circuits with Star& Delta connected balanced and unbalanced loads.
- CO 2: Analyse the transient behaviour of electrical networks for DC excitations.
- CO 3: Analyse the transient behaviour of electrical networks for AC excitations.
- CO 4: Analyse the various networks parameters for the given two port networks.
- CO 5: Apply the electrical networks into different forms.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	3	1	1	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	2	1	3	1	-	-	-	-	-	-	-	-
CO4	2	2	1	3	-	-	-	-	-	-	-	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO 2
CO1	3	-
CO2	2	-
CO3	2	-
CO4	1	-
CO5	2	-

UNIT-I

Three Phase circuits: Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power. Analysis of three phase unbalanced circuits: Loop method, Star-Delta transformation technique, Millman's Theorem, Two wattmeter methods for measurement of three phase power.

UNIT-II

Transient Analysis in DC circuits: Transient response of R-L, R-C, and R-L circuits of DC excitation, Solutions using Differential equations and Laplace Transforms.

UNIT-III

Transient Analysis in AC circuits: Transient response of R-L, R-C, and R-L circuits of AC excitation, Solutions using Differential equations and Laplace Transforms.

UNIT-IV

Two Port Networks: Two Port Network Parameters-Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks. Poles and zeros of network functions.

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UNIT-V

Network Synthesis: Positive real functions, Hurwitz polynomials, Realization of passive RL, RC and LC networks using Foster and Cauer forms.

Text Books:

1. Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku, McGraw-Hill Publications, 6th Edition, July 2017.
2. Engineering Circuit Analysis by Hayt, W. H, Kemmerly J. E. & Durbin, McGraw Hill Publications, 8th Edition, August 2013.

Reference Books:

1. Electric Çircuits - Schaum's Outline Series, Joseph. A. Edminister, McGraw-Hill Publications, 5th Edition, July 2017.
2. Network Analysis and Synthesis, Ravish R Singh, McGraw-Hill publications, July,2017
3. Network Theory: Analysis and Synthesis, Smarajit Ghosh, PHI publications, July 2005.
4. Circuit Theory: Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat rai &co, January 2017.
5. Electrical circuit theory and Technology, John Bird, Routledge, March 2017.

Web links:

1. https://www.electrical4u.com/three-phase-circuit-star-and-delta-system.
2. https://www.electrical4u.com/relationship-of-line-and-phase-voltages-and-currents-in-a-star.
3. https://www.electrical4u.com/advantages-of-three-phase-system-over-single-phase-system.
4. https://www.electrical4u.com/electric-power-single-and-three-phase.
5. https://www.electrical4u.com/measurement-of-three-phase-power.

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THERMAL AND HYDRO PRIME MOVERS

III Semester L T P C
Course Code: 171ES3T10 3 1 0 3

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the working principles and basic functioning of I.C. engines and their performances.
CO 2: Evaluate the functioning and performance of thermal power plant.
CO 3: Distinguish the advantage of Gas turbines over various other prime movers.
CO 4: Discuss the working principles of different types of hydraulic turbines.
CO 5: Illustrate the working principle of centrifugal and reciprocating pumps.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	3	1	1	-	-	-	-	-	-	-	-
CO2	1	1	3	1	-	-	-	-	-	-	-	-
CO3	1	3	2	1	-	-	-	-	-	-	-	-
CO4	1	3	1	1	-	-	-	-	-	-	-	-
CO5	3	1	2	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

PSO	PSO1	PSO 2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

UNIT-I

Basics of Thermodynamics: Thermodynamic Systems and State, Process, and Cycle. Laws of Thermodynamics (statements only) - First Law of Thermodynamics and analysis of various thermodynamic processes.

Internal Combustion Engines: Classification, working principles – Valve and Port timing diagrams – Air standard cycles – Engine systems line fuel injection, Carburetion, Ignition, Cooling and Lubrication– Engine performance evaluation.

UNIT-II

Vapor Power Cycles: Carnot cycle, Rankine cycle, Thermodynamic variables effecting efficiency and output of Rankine cycle, Analysis of simple Rankine cycle and Re-heat cycle.

Steam Turbines: Schematic layout of steam power plant, Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done and efficiency.

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UNIT –III

Gas Turbines: Simple gas turbine plant-Ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, Analysis of simple cycles with inter Cooling, Reheating and Regeneration.

UNIT-IV

Impact of Jets and Pumps: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved).

Pumps: Types of pumps, Centrifugal pump and Reciprocating Pump: Main components, working principle, Multi stage pumps, Performance and characteristic curves.

UNIT-V

Hydraulic Turbines: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and Kaplan turbines, Governing of turbines, Performance and characteristic curves. Site selection and layout of Hydro- electric power plant; Components of Hydro- electric power plant.

Text Books:

1. Fluid Mechanics & Hydraulic Machinery, Sukumar Pati, Tata Mc-Graw hill, New Delhi, 2nd editon.
2. Thermal Engineering, Rajput, Lakshmi publications, New Delhi, 8th edition.
3. Thermal engineering, M.M Rathore, Tata Mc-Graw hill, New Delhi, 1st edition.

Reference Books:

1. Fluid Mechanics, Victor.L.Streeter, Tata McGraw-Hill publication, New Delhi, 2nd edtion,
2. Introduction to Fluid Mechanics, Edward .J. Shaughnessy Jr., Oxford university press, UK, 3rd edition.
3. Fluid Mechanics & Its Applications, Vijay Gupta, Santhosh.k.Gupta, New Academic Science, UK, 3rd edition.
4. Fluid Mechanics & Fluid power Engineering, Dr D.S.Kumar, Kataria, New Delhi, 8th edition.

Web Links:

1. http://nptel.ac.in/courses/112105123/
2. http://nptel.ac.in/courses/112108148/
3. http://nptel.ac.in/courses/112104113/
4. http://nptel.ac.in/courses/112104033/
5. http://nptel.ac.in/courses/112104118/

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ELECTRICAL MACHINES-I LAB

IV Semester **L T P C**
Course Code: 171EE4L03 **0 0 3 2**

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Interpret the constructional details of the DC machines and Transformers.
CO 2: Determine and predetermine the performance of DC machines.
CO 3: Analyze the various speed control techniques of DC motor.
CO 4: Estimate the performance of transformers.
CO 5: Determine the Efficiency and regulation of transformers.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	1	1	-	3	-	-	-	-	-	-	-	-
CO2	1	1	3	-	-	-	-	-	-	-	-	-
CO3	2	1	3	1	-	-	-	-	-	-	-	-
CO4	2	3	1	1	-	-	-	-	-	-	-	-
CO5	2	1	1	3	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO 2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-

List of experiments

1 To draw open circuit characteristic curves of a given DC shunt generator and to find critical speed & critical field resistance.
2 To draw the performance curves of the D.C shunt motor by conducting brake test.
3 To determine the efficiencies of two identical shunt machines by conducting regenerative test (Hopkinson's test).
4 To find the efficiency of D.C shunt machine by conducting Swinburne's test.
5 To control or change the speed of a given D.C shunt motor by field current control method and armature resistance control method and draw speed curve.
6 To draw the internal & external characteristic curves of the given D.C Shunt generator by conducting load test.
7 To separate the losses in D.C shunt motor.
8 To perform O.C and S.C tests on a single phase transformer and to evaluate efficiency and Regulation and determination of equivalent circuit.
9 To conduct sumpner's test on a two identical single phase transformers and obtain copper losses and core losses and evaluate the efficiency.
10 To make scott connection on the given two 1-Ø transformer and verifying the voltage on the secondary side of the Scott connected transformer.

List of Augmented experiments

(Any two of the following experiments can be performed)

1. To determine the efficiency of single phase transformer and DC machine by using simulation.
2. To make parallel Operation of Two Identical 1-ØTransformers & Verifying the load Sharing.
3. To separate the hysteresis losses and eddy current losses of a 1-Ø transformer.
4. To draw the internal & external characteristic curves of the given DC cumulative compound generator by conducting load test
5. To draw the internal & external characteristic curves of the given DC differential compound generator by conducting load test
6. To draw the internal & external characteristic curves of the given D.C Series Generator by conducting load test.

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 4th edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition.
3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill education 2015
4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
5. Electric Machines by Mulukutla S.Sarma & Mukesh k.Pathak, CENGAGE Learning.
6. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

Web Links:

1. http://nptel.ac.in/courses/108106071
2. http://www.ncert.nic.in/html/learning_basket/electricity/electricity/machine/machine_content.htm
3. https://lecturenotes.in/subject/41/electrical-machine-1

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III Year – I SEMESTER

L	T	P	C
4	0	0	3

PULSE AND DIGITAL CIRCUITS OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

UNIT I

LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators , its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II

NON-LINEAR WAVE SHAPING : Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT III

SWITCHING CHARACTERISTICS OF DEVICES : Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

Bistable Multivibrator: Analysis And Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).

UNIT IV

Monostable Multivibrator: Analysis and Design of Collector Coupled Monostable Multi vibrator, Triggering of Monostable Multivibrator, Applications of Monostable Multivibrator.

Astable Multivibrator: Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.

UNIT V

VOLTAGE TIME BASE GENERATORS:

General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.

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UNIT VI

LOGIC FAMILIES & SAMPLING GATES:

LOGIC FAMILIES: Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic, Comparison of Logic Families.

SAMPLING GATES: Basic Operating Principles of Sampling Gates, Diode Unidirectional Sampling Gate and Two-Diode Bi-Directional Sampling Gate, Four-Diode gates, Six-Diode Gates, Reduction of Pedestal in Sampling Gates, Applications of Sampling Gates.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005

REFERENCES :

1.Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill, Second Edition, 2007.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002
3. Pulse & Digital Circuits by Venkata Rao,K,Ramasudha K, Manmadha Rao,G., Pearson,2010

OUTCOMES

After going through this course the student will be able to

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.
- Utilize the non sinusoidal signals in many experimental research areas.

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III Year – I SEMESTER

L	T	P	C
4	0	0	3

POWER ELECTRONICS

Preamble:

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:

- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters.
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To analyze the operation of AC-AC regulators.

UNIT–I:

Power Semi-Conductor Devices

Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT– Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design– Basic requirements of gating circuits for SCR, IGBT and MOSFET.

UNIT–II:

AC-DCSingle-Phase Converters

1-phase half wave controlled rectifiers – R load and RL load with and without freewheeling diode – 1-phase full wave controlled rectifiers – center tapped configuration and bridge configuration- R load and RL load with and without freewheeling diode – continuous and discontinuous conduction – Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction.

UNIT–III:

AC-DC3-Phase Converters

3-phase half wave and Full wave uncontrolled rectifier – 3-phase half wave controlled rectifier with R and RL load – 3-phase fully controlled rectifier with R and RL load – 3-phase semi controlled rectifier with R and RL load.

UNIT–IV:

DC–DC Converters

Analysis of Buck, boost and buck, buck-boost converters in ContinuousConduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt-sec balance in CCM & DCM output voltage ripple & inductor current, ripple for CCM only – Principle operation of forward and fly back converters in CCM.

UNIT – V:

DC–AC Converters

1- phase halfbridge and full bridge inverters with R and RL loads – 3-phase square wave inverters – 120^0 conduction and 180^0 conduction modes of operation – PWM inverters – Quasi-square wave pulse width modulation – Sinusoidal pulse width modulation – Prevention of shoot through fault in Voltage Source Inverter (VSI) – Current Source Inverter (CSI) – Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI) .

UNIT – VI:

AC – AC Regulators.

Static V-I characteristics of TRIAC and modes of operation – 1-phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load only – Transformer tap changing using antiparallel Thyristors.

Learning Outcomes:

Student should be able to

- Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
- Design firing circuits for SCR.
- Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters.
- Analyze the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyze the operation of AC-AC regulators.

Text Books:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

Reference Books:

1. Elements of Power Electronics–Philip T.Krein.oxford.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.
5. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
6. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

III Year – I SEMESTER

L	T	P	C
0	0	3	2

ELECTRICAL MACHINES – II LABORATORY

Learning objectives:

- To control the speed of three phase induction motors.
- To determine /predetermine the performance three phase and single phase induction motors.
- To improve the power factor of single phase induction motor .
- To predetermine the regulation of three–phase alternator by various methods, find X_d/ $X_q$ratio of alternator and asses the performance of three–phase synchronous motor.

The following experiments are required to be conducted as compulsory experiments:

1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
4. Regulation of three–phase alternator by Potier triangle method
5. V and Inverted V curves of a three—phase synchronous motor.
6. Determination of X_d and X_q of a salient pole synchronous machine
7. Equivalent circuit of single phase induction motor
8. Speed control of induction motor by V/f method.
9. Determination of efficiency of three phase alternator by loading with three phase induction motor.
10. Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.

Learning outcomes:

- Able to assess the performance ofsingle phase and three phase induction motors.
- Able to control the speed of three phase induction motor.
- Able to predetermine the regulation of three–phase alternator by various methods.
- Able to find the X_d/ $X_q$ratio of alternator and asses the performance of three–phase synchronous motor.

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III Year – II SEMESTER

L	T	P	C
4	0	0	3

MICROPROCESSORS AND MICROCONTROLLERS

Preamble:

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, PIC, architecture, programming in C.

Learning objectives:

- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices
- To understand how to develop cyber physical systems

UNIT–I:

Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors– Architecture of 8086–Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.

UNIT–II:

Minimum and Maximum Mode Operations

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:

I/O Interface

8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller (8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT–IV:

Introduction to 8051 Micro Controller

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– V:

PIC Architecture

Block diagram of basic PIC 18 micro controller, registers I/O ports.

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UNIT– VI:

Programming in C for PIC

Data types, I/O programming, logical operations, data conversion

Learning Outcomes:

- To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability
- To be able to program mp and mc
- To be able to interface mp and mc with other electronic devices
- To be able to develop cyber physical systems

Text Books:

1. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18, - Muhammad Ali Mazidi, RolindD.Mckinay , Danny causey -Pearson Publisher 21st Impression.

Reference Books:

1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw–Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd, 2011.
4. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition.
5. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw–Hill.

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III Year – II SEMESTER

L	T	P	C
0	0	3	2

POWER ELECTRONICS LAB

Learning objectives:

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- To understand the operation of AC voltage regulator with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter and inverters.

Any 10 of the Following Experiments are to be conducted

1. Study of Characteristics of Thyristor, MOSFET & IGBT.
2. Design and development of a firing circuit for Thyristor.
3. Design and development of gate drive circuits for IGBT.
4. Single -Phase Half controlled converter with R and RL load
5. Single -Phase fully controlled bridge converter with R and RL loads
6. Single -Phase AC Voltage Regulator with R and RL Loads
7. Single -Phase square wave bridge inverter with R and RL Loads
8. Three- Phase fully controlled converter with RL–load.
9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode(CCM) and Discontinuous Conduction Mode(DCM).
10. Design and verification of voltages ripple in buck converter in CCM operation.
11. Single -phase PWM inverter with sine triangle PWM technique.
12. 3-phase AC-AC voltage regulator with R-load.

Learning outcomes:

- Able to study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
- Able to analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- Able to understand the operation of single phase AC voltage regulator with resistive and inductive loads.
- Able to understand the working of Buck converter, Boost converter, single–phase square wave inverter and PWM inverter.

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Syllabus revision Index for 2018-2019

S. No	Name of the course	Percentage of syllabus change
1	Electrical Circuit Analysis - II	40
2	Thermal and Hydro Prime Movers	25
3	Electrical Machines - I Lab	25
4	Pulse & Digital Circuits	25
5	Power Electronics	30
6	Electrical Machines-II Laboratory	30
7	Micro Processors and Micro controllers	40
8	Power Electronics Laboratory	40

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Electrical Circuit Analysis - II	Electrical Circuit Analysis - II
Course Code	R1621021	171EE3T02
Syllabus	**UNIT-I Balanced Three phase circuits** Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power.	**UNIT-I Three Phase circuits:** Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power. Analysis of three phase unbalanced circuits: Loop method, Star- Delta transformation technique, Millman's Theorem, Two wattmeter methods for measurement of three phase power.
	UNIT-II Unbalanced Three phase circuits Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.	**UNIT-II Transient Analysis in DC circuits:** Transient response of R-L, R-C, and R-L circuits of DC excitation, Solutions using Differential equations and Laplace Transforms.
	UNIT-III Transient Analysis in DC and AC Circuits Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.	**UNIT-III Transient Analysis in AC circuits:** Transient response of R-L, R-C, and R-L circuits of AC excitation, Solutions using Differential equations and Laplace Transforms.
	UNIT-IV Two Port Networks Two port network parameters – Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks - Poles and zeros of network functions.	**UNIT-IV Two Port Networks:** Two Port network parameters-Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks. Poles and zeros of network functions.
	UNIT-V Network synthesis Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL	**UNIT-V Network Synthesis:** Positive real functions, Hurwitz polynomials, Realization of passive RL, RC and LC networks using Foster and Cauer forms.

	admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.	
	UNIT-VI Fourier analysis and Transforms Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non-sinusoidal periodic waveforms. Fourier integrals and Fourier transforms – properties of Fourier transform physical significance of the Fourier Transform and its application to electrical circuits.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Thermal and Hydro Prime Movers	Thermal and Hydro Prime Movers
Course Code	R1621025	171ES3T10
Syllabus	**UNIT I: I.C Engines:** Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.	**UNIT-I Basics of Thermodynamics**: Thermodynamic Systems and State, Process, and Cycle. Laws of Thermodynamics (statements only) - First Law of Thermodynamics and analysis of various thermodynamic processes. **Internal Combustion Engines:** Classification, working principles – Valve and Port timing diagrams – Air standard cycles – Engine systems line fuel injection, Carburetion, Ignition, Cooling and Lubrication– Engine performance evaluation.
	UNIT II: Vapor Power Cycles: Carnot Cycle-Rankine Cycle-Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle and Re-heat cycle. **Steam Turbines:** Schematic layout of steam power plant Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency	**UNIT-II Vapour Power Cycles**: Carnot cycle, Rankine cycle, Thermodynamic variables effecting efficiency and output of Rankine cycle, Analysis of simple Rankine cycle and Re-heat cycle. **Steam Turbines**: Schematic layout of steam power plant, Classification of Steam Turbines-Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done and efficiency.
	UNIT III: Gas Turbines: Simple gas turbine lant-ideal cycle, closed cycle - open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and	**UNIT –III Gas Turbines:** Simple gas turbine plant-Ideal cycle, closed cycle - open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, Analysis of simple cycles with inter Cooling, Reheating and Regeneration.

	Regeneration	
	UNIT IV: Impact of Jets and Pumps: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves	**UNIT-IV Impact of Jets and Pumps:** Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). **Pumps:** Types of pumps, Centrifugal pump and Reciprocating Pump: Main components, working principle, Multi stage pumps, Performance and characteristic curves.
	UNIT V: Hydraulic Turbines: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.	**UNIT-V Hydraulic Turbines:** Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and Kaplan turbines, Governing of turbines, Performance and characteristic curves. Site selection and layout of Hydro- electric power plant; Components of Hydro- electric power plant.
	UNIT VI: Hydro Power: Components of Hydroelectric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power, prediction of load.	

Vijetha
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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Electrical Machines -I Laboratory	Electrical Machines - I Lab
Course Code	R1622027	171EE4L03
Syllabus	1.Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed. 2.Brake test on DC shunt motor. Determination of performance curves. 3.Hopkinson's test on DC shunt machines. Predetermination of efficiency. 4.Swinburne's test and Predetermination of efficiencies as Generator and Motor. 5.Speed control of DC shunt motor by Field and armature Control. 6.Retardation test on DC shunt motor. Determination of losses at rated speed. 7.Separation of losses in DC shunts motor. 8.Oc& SC test on single phase transformer. 9.Sumpner's test on single phase transformer. 10.Scott connection of transformers 11.Parallel operation of Single phase Transformers 12.Separation of core losses of a single phase transformer 13.Heat run test on a bank of 3 Nos. of single phase Delta connected transformers	1. To draw open circuit characteristic curves of a given DC shunt generator and to find critical speed & critical field resistance. 2. To draw the performance curves of the D.C shunt motor by conducting brake test. 3. To determine the efficiencies of two identical shunt machines by conducting regenerative test (Hopkinson's test). 4. To find the efficiency of D.C shunt machine by conducting Swinburne's test. 5. To control or change the speed of a given D.C shunt motor by field current control method and armature resistance control method and draw speed curve. 6. To draw the internal & external characteristic curves of the given D.C Shunt generator by conducting load test. 7. To separate the losses in D.C shunt motor. 8. To perform O.C and S.C tests on a single phase transformer and to evaluate efficiency and Regulation and determination of equivalent circuit. 9. To conduct sumpner's test on a two identical single phase transformers and obtain copper losses and core

		losses and evaluate the efficiency. 10. To make scott connection on the given two 1-Ø transformer and verifying the voltage on the secondary side of the Scott connected transformer. **Augmented Experiments** 1. To determine the efficiency of single phase transformer and DC machine by using simulation. 2. To make parallel Operation of Two Identical 1-ØTransformers & Verifying the load Sharing. 3. To separate the hysteresis losses and eddy current losses of a 1-Ø transformer. 4. To draw the internal & external characteristic curves of the given DC cumulative compound generator by conducting load test. 5. To draw the internal & external characteristic curves of the given DC differential compound generator by conducting load test 6. To draw the internal & external characteristic curves of the given D.C Series Generator by conducting load test.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Pulse & Digital Circuits	Pulse & Digital Circuits
Course Code	RT22023	R1631024
Syllabus	**UNIT-I: Linear Wave Shaping:** High pass, low pass RC circuits-response to sinusoidal, step, pulse, square and ramp inputs. RC circuit as differentiator and integrator. Attenuators: Basic attenuator circuit and compensated attenuator circuit. Switching characteristics of devices: Diode as a switch, transistor as a switch-transistor at cut off, the reverse collector saturation current ICBO, Its variation with the junction temperature. The transistor switch in saturation. Design of transistor switch.	**Unit I: Linear Wave shaping:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.
	UNIT-II: Nonlinear wave shaping: Diode clippers, Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation, diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input, clamping circuit theorem-practical clamping circuit.	**UNIT II: Non-Linear Wave Shaping**: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.
	UNIT-III: Multi vibrators: **Bistable multi vibrators:** A basic binary circuit-explanation. Fixed-bias transistor binary, self-biased transistor binary, binary with commutating capacitors-analysis. Non saturated binary–symmetrical triggering, Schmitt trigger circuit-	**UNIT III: Switching Characteristics of Devices:** Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of

	emitter coupled binary circuit. **Monostable multi vibrator:** Basic circuit-collector coupled monostable multivibrator- emitter coupled monostable multivibrator- triggering of monostable multivibrator. **Astable multi vibrator:** The Astable collector coupled multivibrator; the Astable emitter coupled multivibrator.	transistor switch, transistor-switching times. Bistable Multivibrator: Analysis and Design of Fixed Bias, Self-Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).
	UNIT-IV: Digital logic circuits: Introduction, positive and negative logic, Diode OR gate, Diode AND gate, an inverter circuit with transistor, DTL, TTL, ECL, AOI logic, NMOS logic, PMOS logic, CMOS logic-analysis and problem solving.	**UNIT IV: Monostable Multivibrator**: Analysis and Design of Collector Coupled Monostable Multi vibrator, Triggering of Monostable Multivibrator, Applications of Monostable Multivibrator. Astable Multivibrator: Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.
	UNIT-V: Time base generators: Voltage time base generators- Introduction, definitions of sweep speed error, displacement error, transmission error, various methods of generating time- base waveforms, UJT time base generator, transistor constant current sweep. Miller time base generators: General considerations, The miller sweep- general considerations of bootstrap time base generator-basic principles, transistor bootstrap time base generator.	**UNIT V: Voltage Time Base Generators:** General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.
	UNIT-VI: Synchronization and frequency division: Pulse synchronization of relaxation devices, frequency division of the sweep circuit-synchronization of Astable multi, Monostable multivibrator, synchronization of sweep circuit with symmetrical signals-sine wave frequency division with a sweep circuit. **Sampling Gates:** Basic operating principle, Unidirectional diode gate	**UNIT VI: Logic Families & Sampling Gates:** LOGIC FAMILIES: Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor- Transistor Logic, Emitter Coupled Logic, AOI Logic, Comparison of Logic Families. SAMPLING GATES: Basic Operating Principles of Sampling Gates, Diode Unidirectional Sampling Gate and Two-Diode Bi-Directional Sampling Gate, Four-Diode gates, Six-Diode Gates,

	circuits, bi-directional gates using transistors. A bidirectional diode gate, Four- diode gate.	Reduction of Pedestal in Sampling Gates, Applications of Sampling Gates.

Course Coordinator

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Power Electronics**	**Power Electronics**
Course Code	RT31025	R1631025
Syllabus	**UNIT–I: Power Semi-Conductor Devices:** Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT–Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design–Numerical problems–Diode bridge rectifier with R–load and capacitive filter–Output voltage and input current waveforms.	**UNIT–I: Power Semi-Conductor Devices:** Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT–Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design– Basic requirements of gating circuits for SCR, IGBT and MOSFET.
	UNIT–II: Phase Controlled Converters – Single Phase Firing circuits for SCR– Line commutation principle– Single phase AC voltage controller with R and RL load–Half wave converters with R, RL and RLE loads– Derivation of average load voltage and current–Effect of freewheeling diode for RL load.	**UNIT–II: AC-DC Single-Phase Converters:** 1-phase half wave-controlled rectifiers – R load and RL load with and without freewheeling diode – 1-phase full wave-controlled rectifiers – center tapped configuration and bridge configuration- R load and RL load with and without freewheeling diode – continuous and discontinuous conduction – Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction.
	UNIT–III: Single Phase Bridge Converter and Harmonic Analysis Fully controlled converters Operation with R, RL and RLE loads–Derivation of average voltage and current – Effect of source Inductance. Semi Converters (Half Controlled): Operation with R, RL and RLE loads	**UNIT–III: AC-DC3-Phase Converters** 3-phase half wave and Full wave uncontrolled rectifier – 3-phase half wave-controlled rectifier with R and RL load – 3-phase fully controlled rectifier with R and RL load – 3-phase semi controlled rectifier with R and RL load.

	– Harmonic analysis for input current waveform in a system with a large load inductance –Calculation of input power factor.	
	UNIT–IV: Three Phase AC–DC Bridge Converters Full converter with R and RL loads– Semi converter (Half Controlled) with R and RL loads– Derivation of load voltage–Line commutated Inverter operation–Dual converters with non–circulating and circulating currents.	**UNIT–IV: DC–DC Converters** Analysis of Buck, boost and buck, buck-boost converters in Continuous Conduction Mode (CCM) , and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt- sec balance in CCM & DCM output voltage ripple & inductor current, ripple for CCM only – Principle operation of forward and fly back converters in CCM.
	UNIT – V: AC–AC and DC–DC Converters: Single phase Bridge type cyclo converter with R and RL load (Principle of operation) –High frequency DC–DC converters: Buck Converter operation– Time ratio control and current limit control strategies–Voltage and current waveforms–Derivation of output voltage–Boost converter operation–Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms.	**UNIT – V: DC–AC Converters** 1- phase half bridge and full bridge inverters with R and RL loads – 3-phase square wave inverters – 120^0 conduction and 180^0 conduction modes of operation – PWM inverters – Quasi-square wave pulse width modulation – Sinusoidal pulse width modulation – Prevention of shoot through fault in Voltage Source Inverter (VSI) – Current Source Inverter (CSI) – Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI) .
	UNIT – VI: DC–AC Inverters Inverters: Single phase inverters–Unipolar and bipolar switching–Three phase Inverters (120^0 and 180^0 modes of operation) –PWM techniques– Sine triangular PWM technique– amplitude and frequency modulation Indices – Harmonic analysis.	**UNIT – VI: AC – AC Regulators.** Static V-I characteristics of TRIAC and modes of operation – 1-phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load only – Transformer tap changing using antiparallel Thyristors.

Course Coordinator

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Electrical Machines-II Lab**	**Electrical Machines-II Laboratory**
Course Code	**RT31027**	**R1631026**
Syllabus	1.O.C. & S.C. Tests on Single phase Transformer 2.Sumpner's test on single phase transformers 3.Scott connection of transformers 4.No–load & Blocked rotor tests on three phase Induction motor 5.Regulation of a three –phase alternator by synchronous impedance & M.M.F. Methods. 6.V and Inverted V curves of a three—phase synchronous motor. 7.Equivalent Circuit of a single phase induction motor 8.Determination of Xd and Xq of a salient pole synchronous machine **Additional Experiments:** 1.Parallel operation of Single phase Transformers 2.Separation of core losses of a single phase transformer 3.Brake test on three phase Induction Motor 4.Regulation of three–phase alternator by Potier triangle method. 5.Efficiency of a three–phase alternator 6.Heat run test on a bank of 3 Nos. of single phase Delta connected transformers. 7.Measurement of sequence impedance of a three–phase alternator.	1.Brake test on three phase Induction Motor 2.No–load & Blocked rotor tests on three phase Induction motor 3.Regulation of a three –phase alternator by synchronous impedance & MMF. Methods 4.Regulation of three–phase alternator by Potier triangle method 5.V and Inverted V curves of a three—phase synchronous motor. 6.Determination of Xd and Xq of a salient pole synchronous machine 7.Equivalent circuit of single phase induction motor 8.Speed control of induction motor by V/f method. 9.Determination of efficiency of three phase alternator by loading with three phase induction motor. 10.Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Microprocessors & Microcontrollers**	**Micro Processors and Micro controllers**
Course Code	**1RT32021**	**R1632023**
Syllabus	**UNIT–I: Introduction to Microprocessor Architecture** Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086– Memory organization of 8086– General bus operation of 8086– Introduction to 80286–80386 and 80486 and Pentium.	**UNIT–I: Introduction to Microprocessor Architecture** Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.
	UNIT–II: Minimum and Maximum Mode Operations Instruction set, addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.	**UNIT–II: Minimum and Maximum Mode Operations** Instruction set, addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.
	UNIT–III: Assembly Language Programming: Assembly Directives–Macro's– Algorithms for Implementation of FOR Loop–WHILE–REPEAT and IF-THEN-ELSE Features–Addressing modes and Instruction set of 8051– Assembly language programming of 8051– Development systems and tools.	**UNIT–III: I/O Interface** 8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086– DMA controller (8257)–Architecture– Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259– Keyboard/display controller (8279)– Architecture–Modes of operation– Command words of 8279– Interfacing of 8279.

	UNIT–IV: I/O Interface 8255 PPI– Architecture of 8255– Modes of operation– Interfacing I/O devices to 8086 using 8255– Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086– DMA controller (8257)–Architecture– Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller (8279)– Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.	**UNIT–IV: Introduction to 8051 Micro Controller** Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts– Timers and Counters–Serial Communication.
	UNIT–V: Introduction to 8051 Micro Controller Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters– Serial Communication.	**UNIT– V: PIC Architecture** Block diagram of basic PIC 18 micro controller, registers I/O ports.
	UNIT– VI: Cyber physical systems and industrial applications of 8051 Applications of Micro Controllers– Interfacing 8051 to LED's–Push button– Relay's and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display– ADC and DAC Interfacing.	**UNIT– VI: Programming in C for PIC:** Data types, I/O programming, logical operations, data conversion

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Power Electronics Lab**	**Power Electronics Laboratory**
Course Code	**RT32027**	**R1632026**
Syllabus	1.Study of Characteristics of SCR, MOSFET & IGBT 2.Gate firing circuits for SCR's 3.Single -Phase Half controlled converter with R and RL load 4.Single -Phase fully controlled bridge converter with R and RL loads 5.Single -Phase AC Voltage Controller with R and RL Loads 6.Single -Phase Cyclo–converter with R and RL loads 7.Single -Phase Bridge Inverter with R and RL Loads 8.Single -Phase dual converter with RL loads 9.Three -Phase half-controlled bridge converter with RL load. 10.Three- Phase full converter with RL–load. 11.DC–DC buck converter. 12.DC–DC boost converter. 13.Single -phase PWM inverter. 14.Single -phase diode bridge rectifier with R load and capacitance filter. 15.Forced commutation circuits (Class A, Class B, Class C, Class D and Class E)	1. Study of Characteristics of Thyristor, MOSFET & IGBT. 2. Design and development of a firing circuit for Thyristor. 3. Design and development of gate drive circuits for IGBT. 4. Single -Phase Half controlled converter with R and RL load 5. Single -Phase fully controlled bridge converter with R and RL loads 6. Single -Phase AC Voltage Regulator with R and RL Loads 7. Single -Phase square wave bridge inverter with R and RL Loads 8. Three- Phase fully controlled converter with RL–load. 9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode (CCM) and Discontinuous Conduction Mode (DCM). 10. Design and verification of voltages ripple in buck converter in CCM operation. 11. Single -phase PWM inverter with sine triangle PWM technique. 12. 3-phase AC-AC voltage regulator with R-load.

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Program Name : B.Tech. in Mechanical Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	171HS1T01	English – I	0
2	I	171BS1T01	Mathematics - I	0
3	I	171HS1T02	Environmental Studies	0
4	I	171BS1T03	Engineering Chemistry	0
5	I	171ES1T02	Engineering Mechanics	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab - I	0
8	I	171BS1L01	Engineering Chemistry Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English - II	0
11	II	171BS2T02	Mathematics - II	0
12	II	171BS2T06	Mathematics - III	0
13	II	171BS2T07	Engineering Physics	0
14	II	171ES2T03	Engineering Drawing	0
15	II	171ES2T05	Basic Electrical and Electronics Engineering	0
16	II	171HS2L02	English Communication Skills Lab - II	0
17	II	171BS2L02	Engineering Physics Lab	0
18	II	171ES2L02	Engineering Workshop and IT Workshop	0
19	III	171ES3T13	Metallurgy & Materials Science	5
20	III	171ES3T11	Mechanics of Solids	22
21	III	171ES3T12	Thermodynamics	0
22	III	171HS3T04	Managerial Economics and Financial Analysis	0
23	III	171ES3T14	Fluid Mechanics & Hydraulic Machinery	0
24	III	171ME3T01	Computer Aided Engineering Drawing Practice	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
25	III	171ES3L05	Basic Electrical And Electronics Engg. Lab	20
26	III	171ES3L06	Mechanics of Solids and Metallurgy Lab	20
27	III	171HS3A09	Professional Ethics &Human Values	0
28	III	171HS3A10	Employability skills-I	100
29	IV	171ME4T02	Kinematics of Machinery	10
30	IV	171ME4T03	Thermal Engineering -I	0
31	IV	171ME4T04	Production Technology	10
32	IV	171ME4T05	Design of Machine members-I	20
33	IV	171ME4T06	Industrial Engineering and Management	26
34	IV	171ME4T07	Machine Drawing	30
35	IV	171HS4T08	Intellectual Property rights and patents	0
36	IV	171ME4L01	Production Technology Lab	20
37	IV	171ES4L07	Fluid mechanics and Hydraulic Machinery Lab	24
38	IV	171HS4A11	Employability Skills -II	100
39	V	R1631031	Dynamics of Machinery	0
40	V	R1631032	Metal Cutting and Machine Tools	0
41	V	R1631033	Design of Machine members-II	0
42	V	R1631034	Operations Research	0
43	V	R1631035	Thermal Engineering -II	0
44	V	R1631036	Theory of Machines Lab	100
45	V	R1631037	Machine Tools Lab	0
46	V	R1631038	Thermal Engineering Lab	0
47	V	R1631029	IPR&Patents	0
48	VI	R1632031	Metrology	0
49	VI	R1632032	Instrumentation and Control systems	0
50	VI	R1632033	Refrigeration and Air Conditioning	0
51	VI	R1632034	Heat Transfer	0
52	VI	R163201A	Entrepreneurship	100
53	VI	R163201D	Waste Water Management	0
54	VI	R1632036	Heat Transfer Lab	0
55	VI	R1632037	Metrology & Instrumentation Lab	0
56	VI	R1632038	Computational Fluid Dynamics Lab	100

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
57	VI	R1632029	Professional Ethics &Human Values	0
58	VII	RT41031	Automobile Engineering	0
59	VII	RT41032	CAD/CAM	0
60	VII	RT41033	finite Element Methods	0
61	VII	RT41034	Unconventional Machining Process	0
62	VII	RT41035	MEMS	0
63	VII	RT41036	Nano technology	0
64	VII	RT41037	Material Characterization techniques	0
65	VII	RT41038	Design for Manufacture	0
66	VII	RT41039	Automation in Manufacturing	0
67	VII	RT4103A	Industrial hydraulics and Pneumatics	0
68	VII	RT4103L	Simulation Lab	0
69	VII	RT4103M	Design/Fabrication project	0
70	VIII	RT42031	Production Planning and control	0
71	VIII	RT42032	Green Engineering Systems	0
72	VIII	RT42033A	Experimental Stress Analysis	0
73	VIII	RT42033B	Mechatronics	0
74	VIII	RT42033C	Advanced Materials	0
75	VIII	RT42033D	Power Plant Engineering	0
76	VIII	RT42034A	Non Destructive Evaluation	0
77	VIII	RT42034B	Advanced Optimization techniques	0
78	VIII	RT42034C	Gas Dynamics and Jet Propulsion	0
79	VIII	RT42034D	Quality &Reliability Engineering	0
80	VIII	RT42035	Project Work	0
Total number of courses in the academic year 2018-2019				80
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				13
Percentage of syllabus revision carried out in the academic year 2018-2019 = (13/80)*100				= 16.25

Program Coordinator

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Head of the Department

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS1T01	English - I	HSS	3	1	---	4	3
171BS1T01	Mathematics - I	BS	3	1	---	4	3
171HS1T02	Environmental Studies	HSS	2	1	---	3	2
171BS1T03	Engineering Chemistry	BS	3	1	---	4	3
171ES1T02	Engineering Mechanics	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab - I	HSS	---	---	3	3	2
171BS1L01	Engineering Chemistry Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
		TOTAL	17	6	11	34	23

II SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS2T03	English - II	HSS	3	1	---	4	3
171BS2T02	Mathematics - II	BS	3	1	---	4	3
171BS2T06	Mathematics - III	BS	3	1	---	4	3
171BS2T07	Engineering Physics	BS	3	1	---	4	3
171ES2T03	Engineering Drawing	ES	3	---	3	6	3
171ES2T05	Basic Electrical and Electronics Engineering	ES	3	1	--	4	3
171HS2L02	English Communication Skills Lab – II	HSS	---	---	3	3	2
171BS2L02	Engineering Physics Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop And IT Workshop	ES	---	---	3	3	2
		TOTAL	18	5	14	37	24

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project

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III SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171ES3T13	Metallurgy and Material Science	ES	3	1	---	4	3
171ES3T11	Mechanics of Solids	ES	3	1	---	4	3
171ES3T12	Thermodynamics	ES	3	1	---	4	3
171HS3T04	Managerial Economics and Financial Analysis	HSS	3	1	---	4	3
171ES3T14	Fluid Mechanics and Hydraulic Machinery	ES	3	1	---	4	3
171ME3T01	Computer Aided Engineering Drawing Practice	PC	3	---	3	6	3
171ES3L05	Basic Electrical and Electronics Lab	ES	---	---	3	3	2
171ES3L06	Mechanics of Solids and Metallurgy Lab	ES	---	---	3	3	2
171HS3A09	Professional Ethics and Human Values	HSS	2	---	---	2	---
171HS3A10	Employability Skills - I	HSS	2	---	---	2	---
		TOTAL	22	5	9	36	22

IV SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171ME4T02	Kinematics of Machinery	PC	3	1	---	4	3
171ME4T03	Thermal Engineering - I	PC	3	1	---	4	3
171ME4T04	Production Technology	PC	3	1	---	4	3
171ME4T05	Design of Machine Members - I	PC	3	1	---	4	3
171ME4T06	Industrial Engineering and Management	PC	3	1	---	4	3
171ME4T07	Machine Drawing	PC	3	---	3	6	3
171HS4T08	Intellectual Property Rights and Patents	HSS	2	---	---	2	1
171ME4L01	Production Technology Lab	PC	---	---	3	3	2
171ES4L07	Fluid Mechanics And Hydraulic Machinery Lab	ES	---	---	3	3	2
171HS4A11	Employability Skills - II	HSS	2	---	---	2	---
		TOTAL	22	5	09	36	23

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III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Dynamics of Machinery	4	--	--	3
2	Metal Cutting & Machine Tools	4	--	--	3
3	Design of Machine Members–II	4	--	--	3
4	Operations Research	4	--	--	3
5	Thermal Engineering -II	4	--	--	3
6	Theory of Machines Lab	--	--	3	2
7	Machine Tools Lab	--	--	3	2
8	Thermal Engineering Lab	--	--	3	2
9	IPR & Patents	--	2	--	--
	Total Credits				**21**

III YEAR - II Semester

S. No.	Subjects	L	T	P	Credits
1	Metrology	4	--	--	3
2	Instrumentation & Control Systems	4	--	--	3
3	Refrigeration & Air-conditioning	4	--	--	3
4	Heat Transfer	4	--	--	3
5	**OPEN ELECTIVE** 1. Entrepreneurship 2. Data Base Management System 3. Waste Water Management 4. Computer Graphics 5. Industrial Robotics 6. Green Engineering Systems	4	--	--	3
6	Heat Transfer Lab	--	--	3	2
7	Metrology & Instrumentation Lab	--	--	3	2
8	Computational Fluid Dynamics Lab	--	--	3	2
9MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

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III Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Operations Research	3+1*		3
2	Interactive Computer Graphics	3+1*		3
3	Design of Machine Members– II	3+1*		3
4	Robotics	3+1*		3
5	Heat Transfer	3+1*		3
6	Industrial Engineering Management	3+1*		3
7	**Departmental Elective – I**	3+1*		3
8	Heat Transfer Lab		3	2
	Total Credits			23

IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Automobile Engineering	3+1*		3
2	CAD/CAM	3+1*		3
3	Finite Element Methods	3+1*		3
4	Unconventional Machining Processes	3+1*		3
5	**Open Elective**	3+1*		3
6	**Departmental Elective – II**	3+1*		3
7	Simulation Lab		3	2
8	Design/Fabrication Project		2	1
	Total Credits			**21**

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Production Planning and Control	3+1*		3
2	Green Engineering Systems	3+1*		3
3	**Departmental Elective – III**	3+1*		3
4	**Departmental Elective – IV**	3+1*		3
5	Project Work			9
	Total Credits			**21**

OPEN ELECTIVE:

1. MEMS
2. Nanotechnology

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Departmental Elective -I:

1. Refrigeration & Air-conditioning
2. Computational Fluid Dynamics
3. Condition Monitoring
4. Rapid Prototyping

Departmental Elective -II:

1. Material Characterization Techniques
2. Design for Manufacture
3. Automation in Manufacturing
4. Industrial Hydraulics & Pneumatics

Departmental Elective -III:

1. Experimental Stress Analysis
2. Mechatronics
3. Advanced Materials
4. Power Plant Engineering

Departmental Elective -IV:

1. Non Destructive Evaluation
2. Advanced Optimization Techniques
3. Gas Dynamics & Jet Propulsion
4. Quality and Reliability Engineering

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MECHANICS OF SOLIDS

III Semester
Course Code: 171ES3T11

L	T	P	C
3	1	0	3

Course Outcomes:
At the end of the Course, Student will be able to:

- CO1: Estimate the stresses and strains in bodies of varying cross-section, Composite bars and loads in various numbers of plain trusses and frames.
- CO2: Sketch the shear force and bending moment diagrams for beams of various supports and loads.
- CO3: Analyze the variation of bending and shear stresses across a beam cross-section
- CO4: Calculate the slope and deflection for beams of various load and support arrangements
- CO5: Compute the shear stresses due to application of twisting moment and buckling loads for various columns

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	2	-	-	-	1	-	-	-	-	-
CO2	3	2	1	-	-	-	1	-	-	-	-	-
CO3	3	2	1	-	-	-	1	-	-	-	-	-
CO4	3	2	2	-	-	-	1	-	-	-	-	-
CO5	3	2	1	-	-	-	1	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

UNIT-I

Simple Stresses & Strains:
Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & Volumetric strain – Bars of varying section – Composite bars – Temperature stresses - Relation between elastic constants- Strain energy – Resilience – Gradual, Sudden, Impact and Shock loadings.

UNIT-II

Analysis of Plane Trusses and Frames: Method of sections - Method of joints.
Shear Force and Bending Moment:
Definition of beam – Types of beams – Concept of shear force and Bending moment –
S.F and B.M diagrams for Cantilever, Simply supported and Overhanging beams subjected to point loads, Uniformly distributing loads, Uniformly varying loads, Simple couples, Eccentric loads and combination of these loads – Point of contra flexure – Relation between S.F, B.M and rate of loading at a section of a beam.

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UNIT-III

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis – Determination bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I-section, T-section, Angle and Channel sections – Design of simple beam sections.

Shear Stresses:

Derivation of formula – Shear stress distribution across various beams sections like Rectangular, Circular, Triangular, I-section, T-section, Angle sections.

UNIT-IV

Deflection of Beams:

Bending into a circular arc – Slope, Deflection and Radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads – Uniformly distributing loads – Uniformly varying load. Mohr's theorems – Moment area method – Application to simple cases including overhanging beams.

UNIT-V

Torsion:

Introduction – Derivation – Torsion of Circular shafts – Pure Shear – Transmission of power by circular shafts, Shafts in series, Shafts in parallel.

Columns:

Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula.

Text Books:

1. Mechanics of Materials, B. C. Purnima, Laxmi Publications.
2. Strength of Materials, G.H. Ryder, 3rd Edition.

Reference Books:

1. Mechanics of Materials, James. M. Gere. Nelson Thornes Publication, 6th Edition.
2. Mechanics of Materials, E Russell Johnston and John T DeWolf, Mc. Graw Hills, 3rd Edition.
3. Strength of Materials, Part-1, S.Timshenko, CBS Publication, 3rd Edition.
4. Strength of Materials, S. Ramamrutham, Dhanapat Rai Publications, 16th Edition.

Web Links:

1. http://nptel.ac.in/courses/112107147/
2. http://www.nptel.ac.in/courses/Webcoursecontents/IITROORKEE/strength%20of%20materials/homepage.htm
3. https://www.accessengineeringlibrary.com/maps/strength-of-materials

BASIC ELECTRICAL AND ELECTRONICS LAB

III Semester L T P C
Course Code: 171ES3L05 0 0 3 2

Course Outcomes:
At the end of the Course, Student will be able to:

- CO1: Illustrate the efficiency of a a DC machines, transformer and 3-Phase induction motor
- CO2: Apply Synchronous impedance method to Pre-determine the regulation of An alternator
- CO3: Apply the Field flux control method & Armature Voltage control method to Control the speed of a DC shunt motor
- CO4: Explain the working of PN junction diode, BJT and CE amplifier
- CO5: Develop rectifier circuits for signal conversion from AC to DC
- CO6: Explain the simple mathematical operations using Operational Amplifier- IC-741(inverting, non-inverting, integrator and differentiator)

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	-	1	-	-	-	-	-	-	-	-	-
CO2	3	-	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	2	-	1	-	-	-	-	-	-	-	-	-
CO5	3	-	1	-	-	-	-	-	-	-	-	-
CO6	2	1	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

The following experiments are required to be conducted as compulsory experiments:

Section A: Electrical Engineering

Week1. To determine the efficiency of a given D.C.Shunt machine working as motor and generator (Swinburne's test on D.C. Shunt machine.)

Week2. To determine the efficiency and regulation of single-phase transformer at given power factors (OC and SC tests on single phase transformer).

Week3. To obtain the performance characteristics of 3-phase Induction motor (Brake test).

Week4. To obtain the regulation of alternator by Synchronous impedance method.

Week5. To conduct the Speed control test on D.C. Shunt motor by

a) Armature Voltage control
b) Field flux control method

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Week6. To obtain the performance characteristics of D.C Shunt Motor (Brake test).

Section B: Electronics Engineering

The following experiments are required to be conducted as compulsory experiments:

Week7. To draw the PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)

Week8. To obtain the CE characteristics of transistor (Input and output)

Week9. To find out the characteristics of half wave rectifier with and without filters.

Week10. To find out the characteristics of full wave rectifier with and without filters.

Week 11. To draw the frequency response of CE amplifiers.

Week 12. To obtain the OP- Amp applications (inverting, non-inverting, integrator and differentiator)

List of Augmented experiments - Electrical Engineering (Week 13 – Week14)

(Any one of the following experiments can be performed)

Week 13. To make Scott connection on the given two 1-ø transformer and verifying the voltage on the secondary side of the Scott connected transformer.

Week 14. To Verify of Parallel Operation of Two Identical 1- ø Transformers

Week 15. To separate the hysteresis losses and eddy current losses of a 1-Ø transformer

List of Augmented experiments – Electronics Engineering (Week 15 – Week16)

(Any one of the following experiments can be performed)

Week 16. To draw the V I characteristics of a P-N Junction Diode (Ge &Si).

Week 17. To draw the V I characteristics of a Zener Diode.

Week 18. To verify the operation of Zener Diode as a voltage regulator.

Reference Books:

1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering by Sukhija and Nagsarkar, Oxford Publications, 2nd edition
4. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group.

Web Links:

1. http://jntuk-coeerd.in/
2. http://www.nptelvideos.in/2012/11/electrical-machines-i.html
3. http://nptel.ac.in/courses/117106101/
4. http://nptel.ac.in/courses/122106025/

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MECHANICS OF SOLIDS AND METALLURGY LAB

	L	T	P	C
III Semester				
Course Code: 171ES3L06	0	0	3	2

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Demonstrate the material mechanical behavior under various direct loads
- CO 2: Calculate the mechanical strength of spring and cube.
- CO 3: Demonstrate the materials mechanical behavior under various Indirect loads.
- CO 4: Analyze the Structure of pure metals and alloys
- CO 5: Estimate the hardness of various treated and untreated steels

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	1	-	-	-	-	2	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	2	-	-	-	-	-
CO4	1	3	-	-	-	-	-	-	-	-	-	-
CO5	2	1	-	-	-	-	2	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

The following experiments are required to be conducted as compulsory experiments:

Section A: Mechanics of Solids

Week1. To conduct direct tension test on mild steel bar.

Week2. To conduct bending test on Simple supported beam & Cantilever beam.

Week3. To determine Modulus of rigidity of given specimen by conducting Torsion test on circular shafts

Week4. To determine hardness value for the given metal specimen using

a) Brinell hardness tester

b) Rockwell hardness tester.

Week5. To conduct compression and tension test on springs.

Week6. To determine the compression strength on cube by a) UTM b)CTM.

The following experiments are required to be conducted as compulsory experiments:

Section B: Metallurgy & Material Science

Week7. To study the Micro Structure of pure metals like Iron, Cu and Al.

Week8. To study the Microstructure of Mild steels, low carbon steels, high–C steels.

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Week9. To Study the Micro Structures of Cast Irons.
Week 10. To Study the Micro Structures of Non-Ferrous alloys.
Week 11. To Study the Micro structures of Heat-treated steels.
Week 12. To determine the harden ability of steels by Jominy End Quench Test.

List of Augmented Experiments - Mechanics of Solids (Week 13 – Week 15)
(Any one of the following experiments can be performed)
Week 13. To conduct Impact test by a) Izod test. B) Charpy test
Week 14. To find shear strength on given specimen by Punch shear test
Week 15. To determine the maximum shear stress induced in circular beam

List of Augmented Experiments - Metallurgy & Material Science (Week 16 – Week 18)
(Any one of the following experiments can be performed)
Week 16. To find out the hardness of various treated and untreated steels.
Week 17. To study the microstructure of high-speed steels.
Week 18. To find the increase in hardness values for the given steel alloys (EN8) specimen by (oil quenching) medium hardening method.

Reference Books:

1. A laboratory manual of Metals and Alloys, S M Ashram, Sharif Ahmed, Volume 2.
2. Strength of Materials, R.K.Rajput, S.Chand Publications 4th edition.
3. Introduction to Physical Metallurgy, Sidney H Avener, TMH 2nd edition.

We b Links:

1. http://www.mlrinstitutions.ac.in/sites/default/files/lab1/cb1938e0e081ecdd712d1c8778bd2fc1-MMS-lab.pdf
2. http://www.iitk.ac.in/mseold/mse_new/facilities/laboratories/Material_Testing-Lab/MSE313A.pdf
3. http://web.mit.edu/emech/dontindex-build/

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DESIGN OF MACHINE MEMBERS - I

IV SEMESTER

Course Code: 171ME4T05

L	T	P	C
3	1	0	3

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1: Apply the design procedure to engineering problems, considering Technical and manufacturing constraints.
- CO 2: Evaluate the strength, stiffness and fatigue of machine elements.
- CO 3: Analyze various types of stresses on mechanical components subjected to both static and dynamic loads.
- CO 4: Explain the design of fasteners subjected to eccentric & fluctuating loads.
- CO 5: Calculate the design parameters of various components like springs and pressure vessels.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	-	1	1	2	-	-	-	-	-	-	-
CO2	-	-	2	2	-	-	-	-	-	-	-	-
CO3	-	-	2	2	-	-	-	-	-	-	-	-
CO4	-	-	2	2	-	-	-	-	-	-	-	-
CO5	2	-	1	-	2	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

UNIT – I

Introduction to Machine Design:
Introduction to machine design- Engineering Materials and their properties – selection –Manufacturing considerations in design- Preferred numbers- BIS Codes – Combined Stresses - Complex Stresses - Stresses on an inclined plane under different uniaxial and biaxial stress conditions - Principal planes and principal stresses - Mohr's circle - various theories of failure.

UNIT – II

Design Under Fluctuating Stresses:
Stress concentration –Theoretical Stress Concentration Factor – Fatigue Stress Concentration Factor - Notch Sensitivity – Design for fluctuating stresses – Endurance limit –Estimation of endurance strength – Goodman's line – Soderberg's line – Modified Goodman's line.

Design of Shafts:
Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – shaft sizes - Design of shafts for gear and belt drives.

UNIT – III

Design of Keys and Couplings:

Design of keys-stresses in keys- Rigid couplings – Muff, Split muff and Flange couplings- Flexible couplings – Flange coupling (Modified).

Cotter & Knuckle Joints:

Spigot and socket, Sleeve and cotter, Jib and cotter joints- Knuckle joints.

UNIT – IV

Design of Fasteners:

Riveted and welded joints – Design of joints with initial stresses – Eccentric loading. Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – Locking devices – Bolts of uniform strength, Different seals.

UNIT – V

Springs :

Stresses and deflections of helical springs – Extension -Compression springs – Springs for fatigue loading, Energy storage capacity – Helical torsion springs – Co-axial springs, Leaf springs.

Pressure Vessels:

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – Hoop, Longitudinal and Volumetric strains – Changes in diameter and volume of thin cylinders – Riveted boiler shells – Thin spherical shells - Thick Cylinders- Lame's equation – Cylinders subjected to inside & outside pressures
–Compound cylinders.

Note: Design data books are not allowed for End Semester Examination

Text Books:

1. Design of Machine Elements, V.B.Bhandari, TMH Publishers, 4th Edition.
2. Machine Design, Pandya & Shah, Charothar Publishers, 17th Edition.

Reference Books:

1. Mechanical Engineering Design, J.E.Shigley & C.R.Mischkie ,Tata McGraw Hill, 3rd Edition
2. Machine Design, Sundara raja moorthy T.V & Shanmugam. N,Anuradha Publications,
3. Design of Machine Elements, M.F.Spotts , Pearson Education, 8th Edition.
4. Design Data, PSG College of Technology, Kalaikathir Achchagam Publishers, 2nd Edition.
5. Design Data Hand Book, S.M.d.Jalaludeen, AnuradhaPublications

Web Links:

1. http://nptel.ac.in/courses/Webcourse contents /IIT% 20Kharagpur /Machine%20 design1/New_index1.html
2. http://www.nptel.ac.in/downloads/112105125/
3. http:/www.alljntuworld.in/download/design-machine-members-1-dmm-1- materials-notes/

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INDUSTRIAL ENGINEERING AND MANAGEMENT

IV Semester
Course Code: 171ME4T06

L	T	P	C
3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Identify the role of an industrial engineer and required managerial skill set.
- CO 2: Compare and contrast product layout, process layout and combinational layout in Plant layout
- CO 3: Develop the efficient work system using concepts of Method study and Time study
- CO 4: Analyze the production flow parameters by means of Control charts of Variable and Attributes
- CO 5: Analyze Job evaluation and Wage incentive system in an Industrial Human Resource Environment
- CO 6: Calculate the optimal project duration using CPM and PERT techniques

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	1
CO2	1	-	-	-	-	-	-	-	-	-	-	1
CO3	1	1	-	-	-	-	-	-	-	-	-	1
CO4	1	2	-	-	-	-	-	-	-	-	-	1
CO5	1	-	-	-	-	-	-	-	-	-	-	1
CO6	1	2	-	-	-	-	-	-	-	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-
CO6	1	-

UNIT- I

Introduction:

Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of I.E., and productivity measurement. Concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

UNIT- II

Plant Layout:

Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and break down maintenance.

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Industrial Safety:
Safety Training Hazard checklist, Human Factors in Machine equipment safety, Precautions in maintenance work, Safety in material handling and storage. Installation, Lubrication, General maintenance of machine tools, Breakdown maintenance and remedies.

UNIT- III
Operations Management:
Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

UNIT-IV
Statistical Quality Control:
Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts, X bar and R charts X bar and S charts, P charts, NP charts and their applications, numerical examples

UNIT- V
Resource Management:
Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.
Project Management:
PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing and numerical examples.

Text Books:

1. Industrial Engineering and Management, O. P. Khanna, Khanna Publishers, 7^{th} Edition.
2. Industrial Engineering and Production Management, MartandTelsang, S. Chand & Company Ltd., New Delhi, 2^{nd} Edition.

Reference Books:

1. Industrial Engineering and Management Science, T. R. Banga, S. C. Sharma, N. K.Agarwal, Khanna Publishers, 12^{th}Edition
2. Production and Operations Management, S. N. Chary, Tata Mc Graw Hill Publications, 3^{rd} Edition
3. Motion and Time Study, Ralph M. Barnes, Wiley Publications, 7^{th}Edition
4. Statistical Quality Control, M. Mahajan, Dhanpat Rai & Co., 1^{st}Edition

Web Links:

1. https://totalqualitymanagement.wordpress.com/2008/0 9/21/management-of- process-quality/
2. http://www.himpub.com/documents/Chapter850.pdf

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MACHINE DRAWING

IV Semester
Course Code: 171ME4T07

L	T	P	C
3	0	3	3

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Explain the conventional representation of materials and machine components
- CO 2: Apply the principles of engineering drawing in machine drawing
- CO 3: Construct various types of temporary fasteners
- CO 4: Sketch various types of permanent fasteners
- CO 5: Practice assembly drawings from the given part drawings for manufacturing
- CO 6: Construct part drawings from the given assembly drawing

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-
CO4	2	-	-	-	-	-	-	-	-	2	-	-
CO5	1	-	-	-	-	-	-	-	-	2	-	1
CO6	1	-	-	-	-	-	-	-	-	2	-	1

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1	PSO 2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-
CO6	2	-

Note: First angle projection to be adopted.

Unit-I

Machine Drawing Conventions:

Need for drawing conventions – introduction to standard conventions

A) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

B) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

C) Drawing of machine elements and simple parts Selection of views, additional views for the following machine elements and parts with easy drawing proportions.

i) Standard forms of screw threads, bolts, nuts, stud bolts, tap bolts, setscrews.
ii) Keys, cotter joint and knuckle joint.
iii) Riveted joints for plates
iv) Shaft coupling, spigot and socket pipe joint.
v) Journal bearing and foot step bearing.

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Unit-II

Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

A) Engine parts – eccentric, petrol engine connecting rod, piston assembly.
B) Other machine parts - screw jack, machine vice, Plummer block, lathe tail stock.
C) Valves- steam stop valve, non-return valve and feed check valve.

Production Drawing (only for Practice, not for Examination):

Introduction to Limits, Fits& Tolerances, Types of Assembly systems Importance of BOM, Part drawing procedure, construction of part drawings from the given assembly drawings using conventions and easy drawing proportions. Part drawings of Eccentric, Single tool post, Plummer block, Screw Jack.

Note for question paper: Students should answer 2 questions from Unit I and 1 question from Unit II. Each question will have internal choice. Unit I carries 20 Marks and Unit II carries 40 Marks.

Text Books:

1. Machine Drawing, N.Siddeswar, P.Kannaiah, V.V.S.Sastry, Mcgrawhill education.
2. Machine Drawing, G.R.Nagpal, Khanna publications.

Reference Books:

1. Ajeet Singh, Machine Drawing includes AutoCAD, McGraw Hill, 2nd Edition.
2. Machine drawing P.S.Gill, S.K.Kataria & Sons, 3rd Edition.
3. Goutam Pohit, Goutam Ghosh, Machine Drawing with AutoCAD, Pearson Education, 1st Edition.

Web Links:

1. nptel.ac.in/syllabus/112106075/
2. www.machinedesignonline.com

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PRODUCTION TECHNOLOGY LAB

IV Semester
Course Code: 171ME4L01

L	T	P	C
0	0	3	2

Course Outcomes:

At the end of the Course, Student will be able to

- CO 1: Demonstrate mould making process for casting process and sand preparation methods.
- CO 2: Identify basic knowledge of casting defects and their remedies.
- CO 3: Differentiate between various gas welding, arc welding processes and Solid-state welding process
- CO 4: Apply the principles of sheet-metal forming process for making a component.
- CO 5: Produce the plastic object through different plastic processing techniques.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	3	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	3	2	-
CO4	3	2	-	-	-	-	-	-	-	2	2	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2
CO1	-	-
CO2	2	-
CO3	2	-
CO4	-	-
CO5	-	-

The following experiments are required to be conducted as compulsory experiments:

Casting:

Week1. To design and manufacture a Wooden Pattern for a given Casting.

Week2.To prepare a Casting for the given Solid Pattern using Green Sand Molding Processes.

Week3.To Prepare a Aluminum Casting for the given Split Pattern using Green Sand Molding Processes.

Welding:

Week4.To prepare a V – Butt & Lap Joint Joint using Arc Welding Process

Week5.To prepare a lap Joint on the given work pieces using spot welding equipment.

Week6.To prepare a V – Butt Joint Using TIG Welding.

Week7.To prepare a corner Joint & T Joint using Arc Welding Process.

Sheet metal experiment:

Week8.To perform the punching and blanking operation.

Week9.To prepare a work piece using Compound die.

Bulk deformation:

Week 10. To perform Bending Operation on a given pipe.

Plastic Processing technique:

Week 11. To make an Air Tight Bottle Cap & Screw type Bottle Cap by Using Injection Moulding.

Week 12. To prepare a plastic bottle by using Blow Moulding

List of Augmented Experiments (Week 13 – Week 16)

(Any two of the following experiments can be performed)

13. To determine the Grain size, Permeability and Compressive Strength of the Molding Sand.
14. To prepare a Single Strap Butt Joint on the given work pieces using spot welding equipment.
15. To prepare a Lap Joint Using TIG welding and MIG welding.
16. To study the progressive tool and perform blanking and piercing operations.
17. To determine the punching force and blanking force theoretically and compare the obtained readings.

Reference Books:

1. Aditya Engineering College: Laboratory Manual.
2. Workshop Technology, Chapman W.A.J, Arnold Publisher, Vol. I and II, 4^{th} Edition.
3. Elements of Manufacturing Technology Vol II, Hajra Choudhary.S.K & Hajra Choudhary. A.K,Media Publishers, 7^{th}Edition.

Web Links:

1. http://www.sme.org/fmp
2. https://cosmolearning.org/courses/manufacturing-processes-i-538/video-lectures

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FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

IV Semester
Course Code: 171ES4L07

L	T	P	C
0	0	3	2

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1: Calculate the head losses causing decrease in energy of flow experimentally and by the verification of Bernoulli 's theorem
- CO 2: Select the flow meter for better performance used in pipes of Turbines.
- CO 3: Determine efficiencies of Centrifugal and Reciprocating pumps maintaining under similar conditions
- CO 4: Determine performance characteristic curves and efficiencies of different hydraulic turbines
- CO 5: Calculate the work done and efficiency of various vane shapes for turbine applications

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	1	-	-	-	-	2
CO2	2	2	-	-	-	-	1	-	-	-	-	2
CO3	3	2	-	-	-	-	1	-	-	-	-	2
CO4	3	2	-	-	-	-	1	-	-	-	-	2
CO5	3	2	-	-	-	-	1	-	-	-	-	2

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

The following experiments are required to be conducted as compulsory experiments:

Week 1. To determine the of major losses (friction factor) in pipes
Week 2. To determine the minor losses in pipes
Week 3. To determine the of co-efficient of discharge of a Venturi meter
Week 4. To determine the of co-efficient of discharge of an Orifice meter
Week 5. To determine the Discharge and efficiency of a Centrifugal pump
Week 6. To determine the Discharge and efficiency of a Reciprocating pump
Week 7. To determine the Head, Discharge and efficiency of a Pelton wheel
Week 8. To determine the Head, Discharge and efficiency of a Francis turbine
Week 9. To determine the Head, Discharge and efficiency of a Kaplan turbine
Week 10. To study the Impact of Jets on different vane geometry
Week 11. To determine the of Meta centric height of a Ship model
Week 12. To determine the velocity of flow at any point in a pipe using Pitot tube

List of Augmented Experiments (Week 13 - Week 16)
(Any two of the following experiments can be performed)

13. To verify the Bernoulli's theorem using experimental setup.
14. To find the Laminar and Turbulent flow types using Reynolds's Experiment.
15. To determine the co-efficient of discharge of a Rotameter.
16. To determine the co-efficient of the discharge of a water meter.

Reference Book:

1. Hydraulic Machines by Banga & Sharma, Khanna Publishers, 6th Edition
2. Fluid mechanics and Hydraulics, P.N. Modi and S.M. Seth, Text book House, 14th Edition.
3. Fluid Mechanics and Hydraulic Machines, R.K. Rajput, S.Chand publications, 6th Edition.
4. Fluid Mechanics and Hydraulic Machines, R.K.Bansal, Laxmi Publications (P) Ltd, 9th Edition.

Web Links:

1. http://www.science-animations.com/fluidmechanics.html
2. https://iitbmechdamp.wordpress.

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Syllabus revision Index (2018-19)

S. No	Name of the course	Percentage of syllabus change
1	Mechanics of solids	22
2	BEEE Lab	20
3	MOS and MMS Lab	20
4	Design of Machine Members – I	20
5	Industrial Engineering and Management	26
6	Machine Drawing	30
7	PT Lab	20
8	FM &HM Lab	24

Program Coordinator

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mechanics of Solids	Mechanics of Solids
Course Code	R1621032	171ES3T11
Syllabus	**UNIT-I:** **Simple Stresses & Strains:** Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses- Complex Stresses - Stresses on an inclined plane under different uniaxial and biaxial stress conditions - Principal planes and principal stresses - Mohr's circle - Relation between elastic constants, Strain energy – Resilience – Gradual, sudden, impact and shock loadings.	**UNIT-I:** **Simple Stresses & Strains:** Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & Volumetric strain – Bars of varying section – Composite bars – Temperature stresses - Relation between elastic constants- Strain energy – Resilience – Gradual, Sudden, Impact and Shock loadings.
	UNIT-II: **Shear Force and Bending Moment:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.	**UNIT-II:** **Analysis of Plane Trusses and Frames:** Method of sections - Method of joints. Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and Bending moment – S.F and B.M diagrams for Cantilever, simply supported and Overhanging beams subjected to point loads, uniformly distributing loads, uniformly varying loads, Simple couples, Eccentric loads and combination of these loads – Point of contra flexure – Relation between S.F, B.M and rate of loading at a section of a beam.

	UNIT-III: **Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections. SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.	**UNIT-III:** **Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis – Determination bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I-section, T-section, Angle and Channel sections – Design of simple beam sections. Shear Stresses: Derivation of formula – Shear stress distribution across various beams sections like Rectangular, Circular, Triangular, I-section, T-section, Angle sections.
	UNIT-IV: **Deflection of Beams**: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams, Statically Indeterminate Beams and solution methods.	**UNIT-IV:** **Deflection of Beams:** Bending into a circular arc – Slope, Deflection and Radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads – Uniformly distributing loads – Uniformly varying load. Mohr's theorems – Moment area method – Application to simple cases including overhanging beams.
	UNIT-V: **Thin Cylinders:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells. **Thick Cylinders:** Lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.	**UNIT-V:** **Torsion:** Introduction – Derivation – Torsion of Circular shafts – Pure Shear – Transmission of power by circular shafts, Shafts in series, Shafts in parallel. **Columns:** Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula.

	UNIT-VI: **Torsion**: Introduction-Derivation- Torsion of Circular shafts- Pure Shear- Transmission of power by circular shafts, Shafts in series, Shafts in parallel. **Columns:** Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Electrical and Electronics Engineering Lab	Basic Electrical and Electronics Engineering Lab
Course Code	R1621036	171ES3L05
Syllabus	**List of Experiments:** 1. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C.Shunt machine working as motor and generator). 2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors). 3. Brake test on 3-phase Induction motor (Determination of performance characteristics) 4. Regulation of alternator by Synchronous impedance method. 5. Speed control of D.C. Shunt motor by a. Armature Voltage control b) Field flux control method 6. Brake test on D.C. Shunt Motor.	**List of Experiments:** 1. To determine the efficiency of a given D.C.Shunt machine working as motor and generator (Swinburne's test on D.C. Shunt machine.) 2. To determine the efficiency and regulation of single phase transformer at given power factors (OC and SC tests on single phase transformer). 3. To obtain the performance characteristics of 3-phase Induction motor (Brake test). 4. To obtain the regulation of alternator by Synchronous impedance method. 5. To conduct the Speed control test on D.C. Shunt motor by 6. a) Armature Voltage control b) Field flux control method 7. To obtain the performance characteristics of D.C Shunt Motor (Brake test).
	1. PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations) 2. Transistor CE characteristics (Input and output) 3. Half wave rectifier with and with out filters. 4. Full wave rectifier with and with out filters. 5. CE amplifiers.	1. The following experiments are required to be conducted as compulsory experiments: 2. To draw the PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations) 3. To obtain the CE characteristics of transistor (Input and output) 4. To find out the characteristics of half wave rectifier with and without filters.

	6. OP- Amp applications (inverting, non inverting, integrator and differentiator)	5. To find out the characteristics of full wave rectifier with and without filters. 6. To draw the frequency response of CE amplifiers. 7. To obtain the OP- Amp applications (inverting, non inverting, integrator and differentiator)
		1. To make scott connection on the given two 1-ø transformer and verifying the voltage on the secondary side of the Scott connected transformer. 2. To Verify of Parallel Operation of Two Identical 1- ø Transformers 3. To separate the hysteresis losses and eddy current losses of a 1- ø transformer

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mechanics of Solids& Metallurgy Lab	Mechanics of Solids& Metallurgy Lab
Course Code	R1621037	171ES3L06
Syllabus	**List of Experiments** 1. Direct tension test 2. Bending test on a) Simple supported b) Cantilever beam 3. Torsion test 4. Hardness test a) Brinells hardness test b) Rockwell hardness test 5. Test on springs 6. Compression test on cube 7. Impact test 8. Punch shear test	**List of Experiments** 1. To conduct direct tension test on mild steel bar. 2. To conduct bending test on Simple supported beam & Cantilever beam. 3. To determine Modulus of rigidity of given specimen by conducting Torsion test on circular shafts 4. To determine hardness value for the given metal specimen using a) Brinell hardness tester b) Rockwell hardness tester. 5. To determine the compression strength on cube by a) UTM b) CTM
	1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al 2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels. 3. Study of the Micro Structures of Cast Irons. 4. Study of the Micro Structures of Non-Ferrous alloys. 5. Study of the Micro structures of Heat-treated steels. 6. Hardenability of steels by Jominy End Quench Test. 7. To find out the hardness of various treated and untreated steels.	1. To study the Micro Structure of pure metals like Iron, Cu and Al. 2. To study the Microstructure of Mild steels, low carbon steels, high – C steels. 3. To Study the Micro Structures of Cast Irons and Non-Ferrous alloys. 4. To Study the Micro structures of Heat-treated steels. 5. To determine the harden ability of steels by Jominy End Quench Test.

		1. To conduct Impact test by a) Izod test. b) Charpy test 2. To find shear strength on given specimen by Punch shear test 3. To determine the maximum shear stress induced in circular beam
		1. To find out the hardness of various treated and untreated steels. 2. To study the microstructure of high speed steels. 3. To find the increase in hardness values for the given steel alloys (EN8) specimen by (oil quenching) medium hardening method.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Design of Machine Members – I**	**Design of Machine Members – I**
Course Code	**R1622034**	**171ME4T05**
	UNIT-I: **Introduction:** General considerations in the design of Engineering Materials and their properties – selection – Manufacturing consideration in design, tolerances and fits –BIS codes of steels. **Stresses in Machine Members:** Simple stresses – combined stresses – torsional and bending stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers. the concept of stiffness in tension, bending, torsion and combined situations – static strength design based on fracture toughness.	**UNIT-I:** **Introduction to Machine Design:** Introduction to machine design- Engineering Materials and their properties – selection –Manufacturing considerations in design- Preferred numbers- BIS Codes – Combined Stresses - Complex Stresses - Stresses on an inclined plane under different uniaxial and biaxial stress conditions - Principal planes and principal stresses - Mohr's circle various theories of failure
Syllabus	**UNIT-II:**. **Strength of Machine Elements:** Stress concentration – theoretical stress concentration factor – fatigue stress concentration factor notch sensitivity – design for fluctuating stresses – endurance limit – estimation of endurance strength – Goodman's line – Soderberg's line – modified Goodman's line.	**UNIT-II:** **Design Under Fluctuating Stresses:** Stress concentration –Theoretical Stress Concentration Factor – Fatigue Stress Concentration Factor - Notch Sensitivity – Design for fluctuating stresses – Endurance limit –Estimation of endurance strength – Goodman's line – Soderberg's line – Modified Goodman's line.
	UNIT-III: **Riveted and welded joints:** Design of joints with initial stresses – eccentric loading. Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, different seals	**UNIT-III:** **Design of Keys and Couplings:** Design of keys-stresses in keys- Rigid couplings – Muff, Split muff and Flange couplings-Flexible couplings – Flange coupling (Modified). Cotter & Knuckle Joints: Spigot and socket, Sleeve and cotter, Jib and cotter joints-Knuckle joints

	UNIT-IV: **Keys, Cotters And Knuckle Joints:** Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints-knuckle joints. **Shafts:** Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).	**UNIT-IV:** **Design of Fasteners:** Riveted and welded joints – Design of joints with initial stresses – Eccentric loading. Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – Locking devices – Bolts of uniform strength, Different seals.
	UNIT-V: **Shaft Coupling:** Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).	**UNIT-V:** **Springs:** Stresses and deflections of helical springs – Extension -Compression springs – Springs for fatigue loading, Energy storage capacity – Helical torsion springs – Coaxial springs, Leaf springs. **Pressure Vessels:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – Hoop, Longitudinal and Volumetric strains – Changes in diameter and volume of thin cylinders – Riveted boiler shells – Thin spherical shells Thick Cylinders- Lame's equation – Cylinders subjected to inside & outside pressures – Compound cylinders.
	UNIT-VI: **Mechanical Springs:** Stresses and deflections of helical springs – extension -compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Industrial Engineering and Management**	**Industrial Engineering and Management**
Course Code	**R1622036**	**171ME4T06**
Syllabus	**UNIT-I:** **Introduction:** Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.	**UNIT-I:** **Introduction:** Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of I.E., and productivity measurement. Concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.
	UNIT-II:. **Plant Layout:** Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.	**UNIT-II:** **Plant Layout:** Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance. **Industrial Safety:** Safety Training Hazard checklist, Human Factors in Machine equipment safety, Precautions in maintenance work, Safety in material handling and storage. Installation, Lubrication, General maintenance of machine tools, Breakdown maintenance and remedies.
	UNIT-III: **Operations Management:** Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor	**UNIT-III:** **Operations Management:** Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system,

	system, principles of Ergonomics, flow process charts, string diagrams and Therbligs	principles of Ergonomics, flow process charts, string diagrams and Therbligs.
	UNIT-IV: **Statistical Quality Control:** Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – X and R – charts X AND S charts and their applications, numerical examples. **Total Quality Management:** Zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts	**UNIT-IV:** **Statistical Quality Control:** Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts, X bar and R charts X bar and S charts, P charts, NP charts and their applications, numerical examples
	UNIT-V: **Resource Management:** Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types. II	**UNIT-V:** **Resource Management:** Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types. **Project Management:** PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing and numerical examples.
	UNIT-VI: **VALUE ANALYSIS:** Value engineering, implementation procedure, enterprise resource planning and supply chain management. **Project Management:** PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Machine Drawing	Machine Drawing
Course Code	R1622035	171ME4T07
	Machine Drawing Conventions : Need for drawing conventions – introduction to IS conventions A. Conventional representation of materials, common machine elements and parts such asscrews, nuts, bolts,keys, gears, webs, ribs. B. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned. C. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features. D. Title boxes, their size, location and details - common abbreviations & their liberal usage E. Types of Drawings – working drawings for machine parts.	Machine Drawing Conventions: A.Need for drawing conventions – introduction to standard conventions Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs. B. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned. C. Drawing of machine elements and simple parts Selection of views, additional views for the following machine elements and parts with easy drawing proportions i) Standard forms of screw threads, bolts, nuts, stud bolts, tap bolts, set screws. ii) Keys, cotter joint and knuckle joint. iii) Riveted joints for plates iv) Shaft coupling, spigot and socket pipe joint. v) Journal bearing and foot step bearing.
	I. Drawing of Machine Elements and simple parts Selection of Views, additional views for the following machine elements and parts with every drawing proportions. a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.	

	b) Keys, cotter joints and knuckle joint. c) Riveted joints for plates d) Shaft coupling, spigot and socket pipe joint. e) Journal, pivot and collar and foot step bearings.	
	II. Assembly Drawings: Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions. a) Engine parts –Gear pump, Fuel pump Petrol Engine connecting rod, piston assembly. b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock. c) Valves: spring loaded safety valve, feed check valve and air cock, Control valves	**Assembly Drawings:** Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions. A) Engine parts – eccentric, petrol engine connecting rod, piston assembly. B) Other machine parts - screw jack, machine vice, Plummer block, lathe tailstock. C) Valves- steam stop valve, non return valve and feed check valve.
		Production Drawing (only for Practice, not for Examination): Introduction to Limits, Fits& Tolerances, Types of Assembly systems Importance of BOM. Part drawing procedure, construction of part drawings from the given assembly drawings using conventions and easy drawing proportions. Part drawings of Eccentric, Single tool post, Plummer block, Screw Jack.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Production Technology Lab**	**Production Technology Lab**
Course Code	R1622038	171ME4L01
Syllabus	**List of Experiments:** **Metal Casting :** 1. Pattern Design and making - for one casting drawing. 2. Sand properties testing - for strength and permeability 3. Mould preparation, Melting and Casting	**List of Experiments:** 1. To design and manufacture a Wooden Pattern for a given Casting. 2. To prepare a Casting for the given Solid Pattern using Green Sand Molding Processes. 3. To Prepare a Aluminum Casting for the given Split Pattern using Green Sand Molding Processes.
	Welding: 1. Gas welding 2. Gas cutting 3. Manual metal arc welding - Lap & Butt Joints 4. TIG/MIG Welding 5. Resistance Spot Welding 6. Brazing and soldering	1. To prepare a V – Butt & Lap Joint Joint using Arc Welding Process 2. To prepare a lap Joint on the given work pieces using spot welding equipment. 3. To prepare a V – Butt Joint Using TIG Welding.
	Metal Forming and Powder Metallurgy: 1. 1.Blanking & Piercing operations and study of simple, compound and progressive dies. 2. Deep drawing and extrusion operations. 3. Bending and other operations 4. 4. Basic powder compaction and sintering	1. To perform the punching and blanking operation. 2. To prepare a work piece using Compound die

	Processing of Plastics 1. Injection Moulding 2. Blow Moulding	1. To perform Bending Operation on a given pipe.
		2. To prepare a plastic bottle by using Blow Moulding

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Fluid Mechanics & Hydraulic Machines Lab	Fluid Mechanics & Hydraulic Machines Lab
Course Code	R1622037	171ES4L07
Syllabus	**List of Experiments** 1. Impact of jets on Vanes. 2. Performance Test on Pelton Wheel. 3. Performance Test on Francis Turbine. 4. Performance Test on Kaplan Turbine. 5. Performance Test on Single Stage Centrifugal Pump. 6. Performance Test on Multi Stage Centrifugal Pump. 7. Performance Test on Reciprocating Pump. 8. Calibration of Venturimeter. 9. Calibration of Orifice meter. 10. Determination of friction factor for a given pipe line. 11. Determination of loss of head due to sudden contraction in a pipeline. 12. Turbine flow meter.	**List of Experiments** 1. To determine the of major losses (friction factor) in pipes 2. To determine the minor losses in pipes 3. To determine the of co-efficient of discharge of a Venturi meter 4. To determine the of co-efficient of discharge of an Orifice meter 5. To determine the Discharge and efficiency of a Centrifugal pump 6. To determine the Discharge and efficiency of a Reciprocating pump 7. To determine the Head, Discharge and efficiency of a Pelton wheel. 8. To determine the Head, Discharge and efficiency of a Francis turbine 9. To determine the Head, Discharge and efficiency of a Kaplan turbine 10. To determine the velocity of flow at any point in a pipe using Pitot tube

		11. To verify the Bernoulli's theorem using experimental setup . 12. To find the Laminar and Turbulent flow types using Reynolds's Experiment. 13. To determine the co-efficient of discharge of a Rota meter. 14. To determine the co-efficient of the discharge of a water meter

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Program Name : B.Tech. in Electronics and Communication Engineering

Syllabus Revision for the Academic Year 2018-19

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	171HS1T01	English - I	0
2	I	171BS1T01	Mathematics – I	0
3	I	171BS1T02	Mathematics - II	0
4	I	171BS1T04	Applied Physics	0
5	I	171ES1T03	Engineering Drawing	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab - I	0
8	I	171BS1L04	Applied Physics Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English – II	0
11	II	171BS2T06	Mathematics – III	0
12	II	171HS2T02	Environmental Studies	0
13	II	171BS2T05	Applied Chemistry	0
14	II	171ES2T06	Electrical and Mechanical Technology	0
15	II	171CS2T01	Data Structures through c	0
16	II	171HS2L02	English Communication Skills Lab – II	0
17	II	171BS2L03	Applied Chemistry Lab	0
18	II	171ES2L02	Engineering Workshop And IT Workshop	0
19	III	171EC3T01	Electronic Devices and Circuits	16.6
20	III	171EC3T02	Switching Theory and Logic Design	0
21	III	171EC3T03	Signals and Systems	8
22	III	171ES3T15	Network Analysis	0
23	III	171EC3T04	Random Variables and Stochastic Processes	5.5
24	III	171HS3T04	Managerial Economics and Financial Analysis	20
25	III	171EC3L01	Electronic Devices and Circuits Lab	20
26	III	171ES3L08	Networks and Electrical Technology Lab	20
27	III	171HS3A09	Professional Ethics and Human Values	10

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
28	III	171HS3A10	Employability Skills – I	100
29	IV	171EC4T05	Electronic Circuit Analysis	16.6
30	IV	171EC4T06	Electromagnetic Waves and Transmission Lines	0
31	IV	171EC4T07	Analog Communications	0
32	IV	171EC4T08	Pulse and Digital Circuits	0
33	IV	171HS4T05	Management Science	18
34	IV	171ES4T28	Linear Control Systems	0
35	IV	171HS4T08	IPR and Patents	0
36	IV	171EC4L02	Electronic Circuit Analysis Lab	17.6
37	IV	171EC4L03	Analog Communications Lab	50
38	IV	171HS4A11	Employability Skills – II	100
39	V	R1631041	Computer Architecture and Organization	15
40	V	R1631042	Linear I C Applications	5
41	V	R1631043	Digital I C Applications	33
42	V	R1631044	Digital Communications	0
43	V	R1631045	Antenna and Wave Propagation	0
44	V	R1631046	Pulse and Digital Circuits Lab	0
45	V	R1631047	Linear I C Applications Lab	5
46	V	R1631048	Digital I C Applications Lab	30
47	V	R1631049	Professional Ethics & Human Values	100
48	VI	R1632041	Micro Processors & Micro Controllers	18
49	VI	R1632042	Micro Wave Engineering	0
50	VI	R1632043	VLSI Design	15
51	VI	R1632044	Digital Signal Processing	5
52	VI	R163204A	OOPs through Java	100
53	VI	R163204B	Data Mining	100
54	VI	R163204C	Industrial Robotics	100
55	VI	R163204E	Power Electronics	100
56	VI	R163204D	Bio-Medical Engineering	0
57	VI	R163204F	Artificial Neural Networks	100
58	VI	R1632046	Micro Processors & Micro Controllers Lab	15
59	VI	R1632047	VLSI Lab	20
60	VI	R1632048	Digital Communications Lab	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
61	VI	R1632049	IPR & Patents	18
62	VII	RT41041	VLSI Design	0
63	VII	RT41042	Computer Networks	0
64	VII	RT41043	Digital Image Processing	0
65	VII	RT41044	Computer Architecture & Organization	0
66	VII	RT41045	1. Electronic Switching Systems	0
67	VII	RT41046	2. Analog IC Design	0
68	VII	RT41047	3. Object Oriented Programming & O S	0
69	VII	RT41048	4. Radar Systems	0
70	VII	RT41049	5. Advanced Computer Architecture	0
71	VII	RT4104A	1. Optical Communication	0
72	VII	RT4104B	2. Digital IC Design	0
73	VII	RT4104C	3. Speech Processing	0
74	VII	RT4104D	4. Artificial Neural Network & Fuzzy Logic	0
75	VII	RT4104E	5. Network Security & Cryptography	0
76	VII	RT4104L	V L S I Lab	0
77	VII	RT4104M	Microwave Engineering Lab	0
78	VIII	RT42041	Cellular Mobile Communication	0
79	VIII	RT42042	Electronic Measurements and Instrumentation	0
80	VIII	RT42043A	1. Satellite Communication	0
81	VIII	RT42043B	2. Mixed signal Design	0
82	VIII	RT42043C	3. Embedded systems	0
83	VIII	RT42043D	4. RF Circuit Design	0
84	VIII	RT42043E	5. Cloud Computing	0
85	VIII	RT42044A	1.Wireless Sensors and Networks	0
86	VIII	RT42044B	2.System on Chip	0
87	VIII	RT42044C	3.Low Power IC Design	0
88	VIII	RT42044D	4.Bio-Medical Instrumentation	0
89	VIII	RT42044E	5.EMI/EMC	0
90	VIII	RT42045	Project & Seminar	0

Total number of courses in the academic year 2018-19	= 90
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-19	= 15
Percentage of syllabus revision carried out in the academic year 2018-19 = (15/90)*100	= 16.66%

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Program Coordinator

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Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS1T01	English - I	HSS	3	1	0	4	3
171BS1T01	Mathematics – I	BS	3	1	2	6	3
171BS1T02	Mathematics - II	BS	3	1	0	4	3
171BS1T04	Applied Physics	BS	3	1	0	4	3
171ES1T03	Engineering Drawing	ES	3	0	3	6	3
171ES1T01	Computer Programming	ES	3	1	0	4	3
171HS1L01	English Communication Skills Lab - I	HSS	0	0	3	3	2
171BS1L04	Applied Physics Lab	BS	0	0	3	3	2
171ES1L01	Computer Programming Lab	ES	0	0	3	3	2
		Total	18	5	14	37	24

II SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS2T03	English – II	HSS	3	1	0	4	3
171BS2T06	Mathematics – III	BS	3	1	2	6	3
171HS2T02	Environmental Studies	HSS	2	1	0	3	2
171BS2T05	Applied Chemistry	BS	3	1	0	4	3
171ES2T06	Electrical and Mechanical Technology	ES	3	1	0	4	3
171CS2T01	Data Structures through C	ES	3	1	2	6	3
171HS2L02	English Communication Skills Lab – II	HSS	0	0	3	3	2
171BS2L03	Applied Chemistry Lab	BS	0	0	3	3	2
171ES2L02	Engineering Workshop And IT Workshop	ES	0	0	3	3	2
		Total	17	6	13	36	23

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171EC3T01	Electronic Devices and Circuits	PC	3	1	0	4	3
171EC3T02	Switching Theory and Logic Design	PC	3	1	0	4	3
171EC3T03	Signals and Systems	PC	3	1	0	4	3
171ES3T15	Network Analysis	ES	3	1	0	4	3
171EC3T04	Random Variables and Stochastic Processes	PC	3	1	0	4	3
171HS3T04	Managerial Economics and Financial Analysis	HSS	3	1	0	4	3
171EC3L01	Electronic Devices and Circuits Lab	PC	0	0	3	3	2
171ES3L08	Networks and Electrical Technology Lab	ES	0	0	3	3	2
171HS3A09	Professional Ethics and Human Values	HSS	2	0	0	2	0
171HS3A10	Employability Skills – I	HSS	0	0	2	2	0
		Total	20	6	8	34	22

IV SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171EC4T05	Electronic Circuit Analysis	PC	3	1	0	4	3
171EC4T06	Electromagnetic Waves and Transmission Lines	PC	3	1	0	4	3
171EC4T07	Analog Communications	PC	3	1	0	4	3
171EC4T08	Pulse and Digital Circuits	PC	3	1	0	4	3
171HS4T05	Management Science	HSS	3	1	0	4	3
171ES4T28	Linear Control Systems	ES	3	1	0	4	3
171HS4T08	IPR and Patents	HSS	2	0	0	2	1
171EC4L02	Electronic Circuit Analysis Lab	PC	0	0	3	3	2
171EC4L03	Analog Communications Lab	PC	0	0	3	3	2
171HS4A11	Employability Skills – II	HSS	0	0	2	2	0
		Total	20	6	8	34	23

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III Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Computer Architecture and Organization	4	--	--	3
2	Linear I C Applications	4	--	--	3
3	Digital I C Applications	4	--	--	3
4	Digital Communications	4	--	--	3
5	Antenna and Wave Propagation	4	--	--	3
6	Pulse and Digital Circuits Lab	--	--	3	2
7	Linear I C Applications Lab	--	--	3	2
8	Digital I C Applications Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

III Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Micro Processors & Micro Controllers	4	--	--	3
2	Micro Wave Engineering	4	--	--	3
3	VLSI Design	4	--	--	3
4	Digital Signal Processing	4	--	--	3
5	**OPEN ELECTIVE** 1. OOPs through Java 2. Data Mining 3. Industrial Robotics 4. Power Electronics 5. Bio-Medical Engineering 6.Artificial Neural Networks	4	--	--	3
6	Micro Processors & Micro Controllers Lab	--	--	3	2
7	VLSI Lab	--	--	3	2
8	Digital Communications Lab	--	--	3	2
MC	IPR & Patents	--	2	--	--
	Total Credits				**21**

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IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	VLSI Design	3+1	-	3
2	Computer Networks	3+1	-	3
3	Digital Image Processing	3+1	-	3
4	Computer Architecture & Organization	3+1	-	3
5	**Elective – I** 1. Electronic Switching Systems 2. Analog IC Design 3. Object Oriented Programming & O S 4. Radar Systems 5. Advanced Computer Architecture	3+1	-	3
6	**Elective – II** 1. Optical Communication 2. Digital IC Design 3. Speech Processing 4. Artificial Neural Network & Fuzzy Logic 5. Network Security & Cryptography	3+1	-	3
7	V L S I Lab	-	3	2
8	Microwave Engineering Lab	-	3	2
Total Credits				**22**

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Cellular Mobile Communication	3+1		3
2	Electronic Measurements and Instrumentation	3+1		3
3	**Elective III** 1. Satellite Communication 2. Mixed signal Design 3. Embedded systems 4. RF Circuit Design 5. Cloud Computing	3+1		3
4	**Elective IV** 1.Wireless Sensors and Networks 2.System on Chip 3.Low Power IC Design 4.Bio-Medical Instrumentation 5.EMI/EMC	3+1		3
5	Project & Seminar			9
Total Credits				**21**

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to EEE, ME, ECE, CSE & IT)

	L	T	P	C
III Semester	**L**	**T**	**P**	**C**
Course Code: 171HS3T04	**3**	**1**	**0**	**3**

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Explain the Managerial Economic concepts for decision making and forward planning.
- CO 2: Illustrate the law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
- CO 3: Identify the cost behaviour, costs useful for managerial decision making and Break Even Point (BEP) of an enterprise.
- CO 4: Outline the different types of business organizations along with basic knowledge on business cycle.
- CO 5: Make use of the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise.
- CO 6: Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	2	-	-
CO 3	1	1	-	-	-	-	-	-	-	-	1	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-
CO 5	1	1	-	-	-	-	-	-	-	3	-	-
CO 6	1	1	-	-	-	-	-	-	-	-	2	-

Mapping of Course Outcomes with Program Specific Outcomes:

OC/PSO	PSO 1	PSO 2
CO 1	-	1
CO 2	-	1
CO 3	-	1
CO 4	-	1
CO 5	-	1
CO 6	-	2

UNIT-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting

UNIT – II

Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function – Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

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UNIT – III

Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT – IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1. Managerial Economics and Financial Analysis, A R Aryasri, TMH Publication, 4th Edition, 2012.
2. Managerial Economics and Financial Analysis, S A Siddiqui & A. S. Siddiqui, New Age Publishers, 1st Edition, 2012.

Reference Books:

1. Managerial Economics: Principles and Worldwide Applications, Dominick Salvatore, Oxford University Press, 7th Edition, 2012.
2. Financial Accounting for Management, Ramachandran N, Ram Kumar Kakani, Pearson Education, 2nd Edition, 2007.
3. Managerial Economics, D N Dwivedi, PHI Publication, 8th Edition, 2010.

Web links:

1. www.managementstudyguide.com
2. www.tutorialspoint.com

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ELECTRONIC DEVICES AND CIRCUITS LAB

III Semester **L T P C**
Course Code : 171EC3L01 **0 0 3 2**

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Demonstrate the working of semiconductor devices and measuring instruments.
CO 2: Develop the circuits with basic semiconductor devices.
CO 3: Explain the characteristics of BJT & JFET.
CO 4: Design differentamplifiers and observe their frequency responses.
CO 5: Describe the behavior of negative resistance devices

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	1	-	-	-	-	-	-	2	1	-	-
CO 2	3	2	-	-	-	-	-	-	2	1	-	-
CO 3	2	2	-	-	-	-	-	-	2	1	-	-
CO 4	2	2	-	-	-	-	-	-	2	1	-	-
CO 5	2	2	-	-	-	-	-	-	2	1	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2
CO 1	2	-
CO 2	3	-
CO 3	3	-
CO 4	3	-
CO 5	2	-

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

List of Experiments:
(Minimum of Ten Experiments has to be performed)

Week 1. Draw the V-I characteristics of a P-N Junction Diode (Ge &Si).
Week 2. Draw the V-I characteristics of a Zener Diode.
Week 3. Verify the operation of Zener Diode as a voltage regulator.

Week 4. Calculate the Ripple factor and percentage of Regulation of Half-wave Rectifier (without and with filter)
Week 5. Calculate the Ripple factor and percentage of Regulation of Full-wave Rectifier (without and with filter)
Week 6. Determine the Input and Output Characteristics of BJT-CE Configuration.

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Week 7. Obtain the Drain and Transfer Characteristics of FET-CS Configuration.
Week 8. Identify the negative resistance region of UJT.
Week 9. Measure the voltage and frequency of given wave form using CRO.
Week 10. Obtain the frequency response of BJT-CE Amplifier.
Week 11. Obtain the frequency response of Emitter Follower-CC Amplifier
Week 12. Obtain the frequency response of FET-CS Amplifier.

List of Augmented Experiments (Week 13 &14)
(Any two of the following Experiments can be performed)

1. Determine the Input and Output Characteristics of BJT-CB Configuration.
2. Obtain the frequency response of BJT-CB Amplifier..
3. Verify the operation of series and shunt voltage regulators.
4. Draw the V-I Characteristics of SCR.
5. Obtain the quiescent point of given self bias transistor circuit.

Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

Reference Books:

1. Electronic Devices and Circuits, J. Millman, Christos C. Halkias, Tata Mc-Graw Hill, 4th Edition, 2010.
2. Electronic Devices and Circuits, David A. Bell, Oxford University Press, 5th Edition, 2009.

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NETWORKS AND ELECTRICAL TECHNOLOGY LAB

III Semester **L T P C**
Course Code: 171ES3L08 **0 0 3 2**

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 : Analyze RLC circuits and understand resonant frequency and Q-factor.
CO 2 : Determine first order RC/RL networks of periodic non- sinusoidal Waveforms.
CO 3 : Apply network theorems to analyze the electrical network.
CO 4 : Explain the performance of dc shunt machine.
CO 5 : Estimate the performance of 1-phase transformer.
CO 6 : Analyze the performance of 3-phase induction motor and alternator.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	1	1	2	-	-	-	-	-	2	-	-	-
CO2	2	2	1	-	-	-	-	-	2	-	-	-
CO3	2	2	-	1	-	-	-	-	2	-	-	-
CO4	2	2	-	-	-	-	-	-	2	-	-	-
CO5	2	2	-	-	-	-	-	-	2	-	-	-
CO6	2	2	-	-	-	-	-	-	2	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

PART – A

Any five experiments are to be conducted from each part

Week 1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

Week 2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.

Week 3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.

Week 4. Verification of Superposition and Reciprocity theorems.

Week 5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.

Week 6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

Week 7. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.

Week 8. Speed control of D.C. Shunt motor by Armature & flux control methods

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Week 9. Brake test on DC shunt motor. Determination of performance characteristics.
Week 10. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
Week 11. Brake test on 3-phase Induction motor (performance characteristics).
Week 12. Regulation of alternator by synchronous impedance method.

List of Augmented experiments (Week 13 &14)
(Any one of the following experiments can be performed)

1. To make scott connection on the given two 1-phase transformer and verifying the voltage on the secondary side of the Scott connected transformer.
2. Verification of Parallel Operation of Two Identical 1- phase Transformers
3. To separate the hysteresis losses and eddy current losses of a 1- phase transformer

Reference Books:

1. Electrical Technology, M. S. Naidu and S. Kamakshiah, TMH Publications, 2006.
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI Publications, 2nd Edition.

Web Links:

1. http://www.nptelvideos.in/2012/11/electrical-machines-i.html
2. http://nptel.ac.in/courses/117106101/
3. http://nptel.ac.in/courses/122106025/

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ANALOG COMMUNICATION LAB

IV Semester L T P C
Course Code: 171EC4L03 0 0 3 2

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Demonstrate analog, pulse analog modulation and demodulation for baseband signal.
CO 2: Infer AGC transfer characteristics for an AF amplifier.
CO 3: Interpret frequency response of pre-emphasis and de-emphasis circuits.
CO 4: Demonstrate natural, flattop sampling and reconstruct the input signal.
CO 5: Identify fundamental frequency and harmonics for AM/FM modulated signal using spectrum analyzer. .
CO 6: Test for the functionality of all experiments using MATLAB.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	2	-	-	2	-	-	-	2	-	-	-
CO 2	2	2	-	-	2	-	-	-	2	-	-	-
CO 3	2	2	-	-	2	-	-	-	2	-	-	-
CO 4	2	1	-	-	2	-	-	-	2	-	-	-
CO 5	2	2	-	-	2	-	-	-	2	-	-	-
CO 6	2	2	-	-	2	-	-	-	2	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2
CO 1	2	-
CO 2	2	-
CO 3	2	-
CO 4	2	-
CO 5	3	-
CO 6	3	-

List of Experiments: (Minimum ten experiments to be done by using Hardware as well as MATLAB Simulink and Communication toolbox).

Week1. Generate amplitude modulated signal and determine the percentage modulation and also demodulate the modulated signal using envelope detector.

Week2. Generate AM-DSB SC Modulated signal and Demodulate the modulated signal using coherent detection.

Week3. Generate AM-SSB SC Modulated signal and Demodulate the modulated signal using coherent detection.

Week4. Generate frequency modulated signal and determine the modulation index and bandwidth and also demodulate a Frequency Modulated signal using PLL.

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Week5. Verify the AGC characteristics of an AF amplifier.

Week6. Plot the frequency response of the pre-emphasis and de-emphasis circuits.

Week7. Generate the waveforms of different types of signal sampling and its reconstruction.

Week8. Analyze the process of pulse Amplitude Modulation & Demodulation Techniques and the effect of amplitude of the modulating signal on the output.

Week9. Generate pulse width and pulse position modulation and demodulation signals and study the effect of amplitude of the modulating signal on output

Week10. Calculate the bandwidth of amplitude modulated and frequency modulated signals using Spectrum Analyzer.

Week11. Experimentally study the characteristics of Radio receiver.

List of Augmented Experiments (Week 12 & 13)
(Any two of the following Experiments can be performed)

1. Determine the input amplitude response on the output of a squelch circuit.
2. Experimentally study the characteristics of a given mixer circuit.
3. Experimentally study the process of frequency division multiplexing and demultiplexing circuits and verify its operation.
4. Simulate the response of ring modulator using MATLAB Simulink.
5. Simulate the response of Foster Seeley Discriminator using MATLAB Simulink.
6. Simulate the effect of demodulator on modulation index of received AM signal using MATLAB Simulink.

Equipment and Software required:

Software:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (Simulink & MATLAB)

Equipment:

1. RPS	-	0 – 30 V
2. CRO	-	0 – 20 MHz
3. Function Generators	-	0 – 1 MHz
4. Components		
5. Multimeters		
6. Spectrum Analyzer		

Reference Books:

1. Analog communication, V.Chandra Sekar, Oxford university press, 2010.
2. Principles of Communication Systems, H. Taub & D. Schilling, Gautam Sahe, TMH, 3rd Edition, 2007.

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III Year - I Semester

L	T	P	C
4	0	0	3

DIGITAL IC APPLICATIONS

OBJECTIVES

The main objectives of this course are:

- Introduction of digital logic families and interfacing concepts for digital design is considered.
- VHDL fundamentals were discussed to modeling the digital system design blocks.
- VHDL compilers, simulators and synthesis tools are described, which are used to verify digital systems in a technology-independent fashion.
- Design and implementation of combinational and sequential digital logic circuits is explained.

Outcomes:

At the end of this course the student can able to:

- Understand the structure of commercially available digital integrated circuit families.
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
- Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.

Syllabus:

UNIT-I

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

(Text book-1)

UNIT-II

Introduction to VHDL: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling.

(Text book-2)

UNIT-III

Behavioral Modeling: Process statement, variable assignment statement, signal assignment statement, wait statement , if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, more on signal assignment statement ,Inertial Delay Model, Transport Delay Model ,Creating Signal Waveforms, Signal Drivers , Other Sequential Statements , Multiple Processes. Logic Synthesis, Inside a logic Synthesizer.

(Text book-2)

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UNIT-IV

Combinational Logic Design: Binary Adder-Subtractor, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder, Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

(Text book-1)

UNIT-V

Sequential Logic Design: SSI Latches and flip flops, Ring Counter, Johnson Counter, Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

(Text book-1)

UNIT-VI:

Synchronous and Asynchronous Sequential Circuits: Basic design steps: State diagram, state table, state assignment, choice of flip flops and derivation of next state and output expressions, timing diagram. State assignment problem: One hot encoding. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder. Analysis of Asynchronous circuits, State Reduction, State Assignment. A complete design example: The vending machine controller.

(Reference text book- 1)

Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

References:

1. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic, McGrawHill, 3rd Edition.

B. Sridevi

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III Year - I Semester

L	T	P	C
0	0	3	2

DICA LABORATORY

Note: The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Realization of Logic Gates
2. Design of Full Adder using 3 modeling systems
3. 3 to 8 Decoder -74138
4. 8 to 3 Encoder (with and without parity)
5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
6. 4- Bit comparator-7485
7. D Flip-Flop-7474
8. Decade counter -7490
9. Shift registers-7495
10. 8-bit serial in-parallel out and parallel in-serial out
11. Fast In & Fast Out (FIFO)
12. MAC (Multiplier & Accumulator)
13. ALU Design.

Equipment/Software required:

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware
3. Personal computer system with necessary software to run the programs and Implement.

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III Year - II Semester

L	T	P	C
0	0	3	2

VLSI LABORATORY

Note: The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

List of Experiments:

i. Design and Implementation of an Universal Gates
ii. Design and Implementation of an Inverter
iii. Design and Implementation of Full Adder
iv. Design and Implementation of Full Subtractor
v. Design and Implementation of Decoder
vi. Design and Implementation of RS-Latch
vii. Design and Implementation of D-Latch
viii. Design and Implementation asynchronous counter
ix. Design and Implementation of static RAM cell
x. Design and Implementation of 8 bit DAC using R-2R latter network

Software Required:

i. Mentor Graphics Software / Equivalent Industry Standard Software.
ii. Personal computer system with necessary software to run the programs and to implement.

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Syllabus revision Index

2018-19

S.No	Name of the course	Percentage of syllabus change
1	Managerial Economics and Financial Analysis	20%
2	Electronic Devices and Circuits Lab	20%
3	Networks and Electrical Technology Lab	20%
4	Analog Communications Lab	50%
5	Digital I C Applications	33%
6	Digital I C Applications Lab	30%
7	VLSI Lab	20%

G. Sridevi

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Managerial Economics & Financial Analysis	Managerial Economics & Financial Analysis
Course Code	R1621026	171HS3T04
Syllabus	**UNIT-I** **Introduction to Managerial Economics and demand Analysis:** Definition of Managerial Economics – Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..	**UNIT-I** **Introduction to Managerial Economics and demand Analysis:** Definition of Managerial Economics – Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting
	UNIT – II **Production and Cost Analyses:** Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost – Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.	**UNIT – II** **Production and Cost Analyses:** Concept of Production function- Cobb-Douglas Production function – Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.
	UNIT – III **Introduction to Markets, Theories**	**UNIT – III** **Introduction to Markets, Pricing**

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	of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price andOutput Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing:Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.	**Policies:** Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.
	UNIT – IV **Types of Business Organization and Business Cycles:**Features and Evaluation of Sole Trader, partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.	**UNIT – IV** **Introduction to Accounting & Financing Analysis:** Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis
	UNIT – V **Introduction to Accounting & Financing Analysis:** Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)	**UNIT – V** **Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money-Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)
	UNIT – VI **Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of CapitalBudgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period,accounting rate of return	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Electronic Devices and Circuits Lab	Electronic Devices and Circuits Lab
Course Code	R1621046	171EC3L01
Syllabus	**List of Experiments: (Minimum of Ten Experiments has to be performed)** 1. P-N Junction Diode Characteristics Part A: Germanium Diode (Forward bias& Reverse bias) Part B: Silicon Diode (Forward Bias only) 2. Zener Diode Characteristics Part A: V-I Characteristics Part B: Zener Diode as Voltage Regulator 3. Rectifiers (without and with c-filter) Part A: Half-wave Rectifier Part B: Full-wave Rectifier 4. BJT Characteristics(CE Configuration) Part A: Input Characteristics Part B: Output Characteristics 5. FET Characteristics(CS Configuration) Part A: Drain Characteristics Part B: Transfer Characteristics 6. SCR Characteristics 7. UJT Characteristics 8. Transistor Biasing 9. CRO Operation and its Measurements 10. BJT-CE Amplifier 11. Emitter Follower-CC Amplifier 12. FET-CS Amplifier	**List of Experiments:** **(Minimum of Ten Experiments has to be performed)** Week 1. Draw the V-I characteristics of a P-N Junction Diode (Ge &Si). Week 2. Draw the V-I characteristics of a Zener Diode. Week 3. Verify the operation of Zener Diode as a voltage regulator. Week 4. Calculate the Ripple factor and percentage of Regulation of Half-wave Rectifier (without and with filter) Week 5. Calculate the Ripple factor and percentage of Regulation of Full-wave Rectifier (without and with filter) Week 6. Determine the Input and Output Characteristics of BJT-CE Configuration. Week 7. Obtain the Drain and Transfer Characteristics of FET-CS Configuration. Week 8. Identify the negative resistance region of UJT. Week 9. Measure the voltage and frequency of given wave form using CRO. Week 10. Obtain the frequency response of BJT-CE Amplifier. Week 11. Obtain the frequency response of Emitter Follower-CC Amplifier Week 12. Obtain the frequency response of FET-CS Amplifier. **List of Augmented Experiments**

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		(Week 13 &14) **(Any two of the following Experiments can be performed)** 1. Determine the Input and Output Characteristics of BJT-CB Configuration. 2. Obtain the frequency response of BJT-CB Amplifier.. 3. Verify the operation of series and shunt voltage regulators. 4. Draw the V-I Characteristics of SCR. 5. Obtain the quiescent point of given self bias transistor circuit.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Networks and Electrical Technology Lab	Networks and Electrical Technology Lab
Course Code	R1621047	171ES3L08
Syllabus	**PART – A** **Any five experiments are to be conducted from each part** 1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network. 2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination. 3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification. 4. Verification of Superposition and Reciprocity theorems. 5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads. 6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test. **PART – B** 1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance. 2. Speed control of D.C. Shunt motor by Armature & flux control methods 3. Brake test on DC shunt motor. Determination of performance characteristics. 4. OC & SC tests on Single-phase	**PART – A** **Any five experiments are to be conducted from each part** Week 1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network. Week 2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination. Week 3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification. Week 4. Verification of Superposition and Reciprocity theorems. Week 5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads. Week 6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test. **PART – B** Week 7. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance. Week 8. Speed control of D.C. Shunt motor by Armature & flux control methods Week 9. Brake test on DC shunt motor.

	transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit). 5. Brake test on 3-phase Induction motor (performance characteristics). 6. Regulation of alternator by synchronous impedance method	Determination of performance characteristics. Week 10. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit). Week 11. Brake test on 3-phase Induction motor (performance characteristics). Week 12. Regulation of alternator by synchronous impedance method. **List of Augmented experiments (Week 13 &14)** **(Any one of the following experiments can be performed)** 1. To make scott connection on the given two 1-phase transformer and verifying the voltage on the secondary side of the Scott connected transformer. 2. Verification of Parallel Operation of Two Identical 1- phase Transformers 3. To separate the hysteresis losses and eddy current losses of a 1- phase transformer

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	**Pre-Revision**	**Post-Revision**
Course Title	Analog Communications Lab	Analog Communications Lab
Course Code	R1622047	171EC4L03
Syllabus	List of Experiments (Twelve experiments to be done- **The students have to calculate the relevant parameters**) - (a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box) A. Amplitude Modulation - Mod. & Demod. B. AM - DSB SC - Mod. & Demod. C. Spectrum Analysis of Modulated signal using Spectrum Analyser D. Diode Detector E. Pre-emphasis & De-emphasis F. Frequency Modulation - Mod. & Demod. G. AGC Circuits H. Sampling Theorem I. Pulse Amplitude Modulation - Mod. & Demod. J. PWM , PPM - Mod. & Demod. K. PLL L. Radio receiver characteristics	**List of Experiments:** (Minimum ten experiments to be done by using Hardware as well as MATLAB Simulink and Communication toolbox). Week1. Generate amplitude modulated signal and determine the percentage modulation and also demodulate the modulated signal using envelope detector. Week2. Generate AM-DSB SC Modulated signal and Demodulate the modulated signal using coherent detection. Week3. Generate AM-SSB SC Modulated signal and Demodulate the modulated signal using coherent detection Week4. Generate frequency modulated signal and determine the modulation index and bandwidth and also demodulate a Frequency Modulated signal using PLL. Week5. Verify the AGC characteristics of an AF amplifier. Week6. Plot the frequency response of the pre-emphasis and de-emphasis circuits. Week7. Generate the waveforms of different types of signal sampling and its reconstruction. Week8. Analyze the process of pulse Amplitude Modulation & Demodulation Techniques and the effect of amplitude

		of the modulating signal on the output. Week9. Generate pulse width and pulse position modulation and demodulation signals and study the effect of amplitude of the modulating signal on output Week10. Calculate the bandwidth of amplitude modulated and frequency modulated signals using Spectrum Analyzer. Week11. Experimentally study the characteristics of Radio receiver. **List of Augmented Experiments (Week 12 & 13)** **(Any two of the following Experiments can be performed)** 1. Determine the input amplitude response on the output of a squelch circuit. 2. Experimentally study the characteristics of a given mixer circuit. 3. Experimentally study the process of frequency division multiplexing and demultiplexing circuits and verify its operation. 4. Simulate the response of ring modulator using MATLAB Simulink. 5. Simulate the response of Foster Seeley Discriminator using MATLAB Simulink. 6. Simulate the effect of demodulator on modulation index of received AM signal using MATLAB Simulink.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS	Digital IC Applications
Course Code	RT31044	R1631042
SYLLABUS	**Unit-I:** **Digital Design Using HDL:** Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.	**UNIT-I :** **Digital Logic Families and Interfacing:** Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.
	Unit-II: **VHDL Modelling :** Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach	**UNIT-II :** **Introduction to VHDL:** Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling
	Unit-III: **Programmable Logic Devices (PLDs) & Memories:** Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs	**UNIT-III** **Behavioral Modeling:** Process statement, variable assignment statement, signal assignment statement, wait statement , if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, more on signal assignment statement ,Inertial Delay Model, Transport Delay Model ,Creating Signal Waveforms, Signal Drivers , Other Sequential Statements , Multiple Processes. Logic Synthesis, Inside a logic Synthesizer

	with relevant Digital ICs	
	Unit-IV: **Digital Logic Families and Interfacing:** Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families.bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.	**UNIT-IV :** **Combinational Logic Design:** Binary Adder-Subtractor, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, parity circuits, comparators, Barrel Shifter, Simple FloatingPoint Encoder, Dual Priority Encoder, Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.
	Unit-V: **Combinational Logic Design:** Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, modeling of Circuits by using VHDL.	**UNIT-V :** **Sequential Logic Design:** SSI Latches and flip flops, Ring Counter, Johnson Counter, Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.
	Unit-VI: **Sequential Logic Design:** SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.	**UNIT-VI:** **Synchronous and Asynchronous Sequential Circuits:** Basic design steps: State diagram, state table, state assignment, choice of flip flops and derivation of next state and output expressions, timing diagram. State assignment problem: One hot encoding. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder. Analysis of Asynchronous circuits, State Reduction, State Assignment. A complete design example: The vending machine controller.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Digital System Design & DICA Laboratory	DICA LABORATORY
Course Code	RT31049	R1631048
SYLLABUS	1. Realization of Logic Gates. 2. 3 to 8 Decoder- 74138. 3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155. 4. 4-Bit Comparator-7485. 5. D Flip-Flop- 7474. 6. Decade Counter- 7490. 7. 4 Bit Counter-7493. 8. Shift Register-7495. 9. Universal shift register-74194/195 10. Ram (16*4)-74189 (read and write operations). 11. ALU.	1. Realization of Logic Gates 2. Design of Full Adder using 3 modeling systems 3. 3 to 8 Decoder -74138 4. 8 to 3 Encoder (with and without priority) 5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155 6. 4- Bit comparator-7485 7. D Flip-Flop-7474 8. Decade counter -7490 9. Shift registers-7495 10. 8-bit serial in-parallel out and parallel in-serial out SR 11. First In & First Out (FIFO) 12. MAC (Multiplier & Accumulator) 13. ALU Design.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	VLSI Laboratory	VLSI LABORATORY
Course Code	RT4104L	R1632047
SYLLABUS	1. Design and implementation of an inverter. 2. Design and implementation of universal gates. 3. Design and implementation of full adder. 4. Design and implementation of full subtractor. 5. Design and implementation of RS-latch. 6. Design and implementation of D-latch. 7. Design and implementation asynchronous counte.r 8. Design and Implementation of static RAM cell. 9. Design and Implementation of differential amplifier. 10. Design and Implementation of ring oscillator.	**i.** Design and Implementation of Universal Gates. **ii.** Design and Implementation of an Inverter. **iii.** Design and Implementation of Full Adder. **iv.** Design and Implementation of Full Subtractor. **v.** Design and Implementation of Decoder. **vi.** Design and Implementation of RS-Latch. **vii.** Design and Implementation of D-Latch. **viii.** Design and Implementation asynchronous counter. **ix.** Design and Implementation of static RAM cell. **x.** Design and Implementation of 8 bit DAC using R-2R ladder network

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Program Name : B.Tech. in Computer Science and Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	171HS1T01	English – I	0
2	I	171BS1T01	Mathematics – I	0
3	I	171BS1T02	Mathematics – II	0
4	I	171BS1T04	Applied Physics	0
5	I	171ES1T03	Engineering Drawing	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab – I	0
8	I	171BS1L04	Applied Physics Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English – II	0
11	II	171BS2T06	Mathematics – III	0
12	II	171HS2T02	Environmental Studies	0
13	II	171BS2T05	Applied Chemistry	0
14	II	171ES2T02	Engineering Mechanics	0
15	II	171CS2T01	Data Structures through C	0
16	II	171HS2L02	English Communication Skills Lab – II	0
17	II	171BS2L03	Applied Chemistry Lab	0
18	II	171ES2L02	Engineering Workshop & IT Workshop	0
19	III	171BS3T08	Mathematical Foundations of Computer Science	25
20	III	171ES3T23	Digital Logic Design	0
21	III	171CS3T02	Statistics with R Programming	80

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
22	III	171CS3T03	Object Oriented Programming Through C++	0
23	III	171HS3T04	Managerial Economics & Financial Analysis	0
24	III	171CS3T04	Advanced Data Structures	0
25	III	171CS3L01	Object Oriented Programming Lab	80
26	III	171CS3L02	Advanced Data Structures Lab	30
27	III	171HS3A10	Employability Skills – I	100
28	III	171HS3A09	Professional Ethics & Human Values	0
29	IV	171CS4T05	Software Engineering	50
30	IV	171CS4T06	Formal Languages & Automata Theory	0
31	IV	171CS4T07	Java Programming	0
32	IV	171CS4T08	Database Management Systems	0
33	IV	171CS4T09	Principles of Programming Languages	0
34	IV	171CS4T10	Computer Organization	20
35	IV	171CS4L03	Java Programming Lab	50
36	IV	171CS4L04	Database Management Systems Lab	20
37	IV	171HS4A11	Employability Skills – II	100
38	IV	171HS4A08	IPR & Patents	0
39	V	R1631051	Compiler Design	0
40	V	R1631052	Unix Programming	0
41	V	R1631053	Object Oriented Analysis and Design using UML	0
42	V	R1631054	Database Management Systems	0
43	V	R1631055	Operating Systems	0
44	V	R1631056	Unified Modeling Lab	0
45	V	R1631057	Operating System & Linux Programming Lab	0
46	V	R1631058	Database Management System Lab	0
47	V	R1631049	Professional Ethics & Human Values	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
48	VI	R1632049	IPR & Patents	0
49	VI	R1632051	Computer Networks	0
50	VI	R1632052	Data Warehousing and Mining	0
51	VI	R1632053	Design and Analysis of Algorithms	0
52	VI	R1632054	Software Testing Methodologies	70
53	VI	R163205A	Artificial Intelligence	0
54	VI	R163205B	Internet of Things	100
55	VI	R163205C	Cyber Security	100
56	VI	R163205D	Digital Signal Processing	100
57	VI	R163205E	Embedded Systems	100
58	VI	R163205F	Robotics	100
59	VI	R1632056	Network Programming Lab	100
60	VI	R1632057	Software Testing Lab	100
61	VI	R1632058	Data Warehousing and Mining Lab	0
62	VII	RT41051	Cryptography and Network Security	0
63	VII	RT41052	UML and Design Patterns	0
64	VII	RT41053	Mobile Computing	0
65	VII	RT41054	Software Testing Methodologies	0
66	VII	RT41055	Simulation Modeling	0
67	VII	RT41056	Information Retrieval Systems	0
68	VII	RT41057	Artificial Intelligence	0
69	VII	RT41058	Multimedia Computing	0
70	VII	RT41059	High Performance Computing	0
71	VII	RT4105A	Digital Forensics	0
72	VII	RT4105B	Hadoop and Big Data	0
73	VII	RT4105C	Software Project Management	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
74	VII	RT4105D	Machine Learning	0
75	VII	RT4105E	Advanced Databases	0
76	VII	RT4105M	MOBILE APPLICATION DEVELOPMENT LAB	0
77	VII	RT4105N	SOFTWARE TESTING LAB	0
78	VII	RT4105O	HADOOP AND BIGDATA LAB	0
79	VII	RT4105L	UML AND DESIGN PATTERNS LAB	0
80	VIII	RT42051	DISTRIBUTED SYSTEMS	0
81	VIII	RT42052	MANAGEMENT SCIENCE	0
82	VIII	RT42053A	Human Computer Interaction	0
83	VIII	RT42053B	Advanced Operating Systems	0
84	VIII	RT42053C	Mobile Adhoc & Sensor Networks	0
85	VIII	RT42053D	Pattern Recognition	0
86	VIII	RT42053E	Digital Image Processing	0
87	VIII	RT42053F	Micro processers and Multi Core Systems	0
88	VIII	RT42043B	Embedded and Real Time Systems	0
89	VIII	RT42043C	Neural Networks & Soft Computing	0
90	VIII	RT42043D	Social Networks and the Semantic Web	0
91	VIII	RT42043E	Cloud Computing	0
92	VIII	RT42055	PROJECT	0

Total number of courses in the academic year 2018-2019	= 92
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 18
Percentage of syllabus revision carried out in the academic year 2018-2019 = (18/92)*100	= 19.57%

K-SP
Program Coordinator

Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS1T01	English – I	HSS	3	1	---	4	3
171BS1T01	Mathematics – I	BS	3	1	2	6	3
171BS1T02	Mathematics – II	BS	3	1	---	4	3
171BS1T04	Applied Physics	BS	3	1	---	4	3
171ES1T03	Engineering Drawing	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab – I	HSS	---	---	3	3	2
171BS1L04	Applied Physics Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
		TOTAL	18	6	11	35	24

II SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS2T03	English – II	HSS	3	1	---	4	3
171BS2T06	Mathematics – III	BS	3	1	2	6	3
171HS2T02	Environmental Studies	HSS	2	1	---	3	2
171BS2T05	Applied Chemistry	BS	3	1	---	4	3
171ES2T02	Engineering Mechanics	ES	3	1	---	4	3
171CS2T01	Data Structures through C	PC	3	1	2	6	3
171HS2L02	English Communication Skills Lab – II	HSS	---	---	3	3	2
171BS2L03	Applied Chemistry Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop & IT Workshop	ES	---	---	3	3	2
		TOTAL	17	6	13	36	23

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171BS3T08	Mathematical Foundations of Computer Science	BS	3	1	---	4	3
171ES3T23	Digital Logic Design	ES	3	1	---	4	3
171CS3T02	Statistics with R Programming	PC	3	---	2	5	3
171CS3T03	Object Oriented Programming Through C++	PC	3	1	---	4	3
171HS3T04	Managerial Economics & Financial Analysis	HSS	3	1	---	4	3
171CS3T04	Advanced Data Structures	PC	3	1	---	4	3
171CS3L01	Object Oriented Programming Lab	PC	---	---	3	3	2
171CS3L02	Advanced Data Structures Lab	PC	---	---	3	3	2
171HS3A10	Employability Skills – I	HSS	---	---	2	2	---
171HS3A09	Professional Ethics & Human Values	HSS	2	---	---	2	---
		TOTAL	20	5	10	35	22

IV SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CS4T05	Software Engineering	PC	3	1	---	4	3
171CS4T06	Formal Languages & Automata Theory	PC	3	1	---	4	3
171CS4T07	Java Programming	PC	3	1	---	4	3
171CS4T08	Database Management Systems	PC	3	1	---	4	3
171CS4T09	Principles of Programming Languages	PC	3	1	---	4	3
171CS4T10	Computer Organization	PC	3	1	---	4	3
171CS4L03	Java Programming Lab	PC	---	---	3	3	2
171CS4L04	Database Management Systems Lab	PC	---	---	3	3	2
171HS4A11	Employability Skills – II	HSS	---	---	2	2	---
171HS4A08	IPR & Patents	HSS	2	---	---	2	---
		TOTAL	20	6	8	34	22

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III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Compiler Design	4	--	--	3
2	Unix Programming	4	--	--	3
3	Object Oriented Analysis and Design using UML	4	--	--	3
4	Database Management Systems	4	--	--	3
5	Operating Systems	4	--	--	3
6	Unified Modeling Lab	--	---	3	2
7	Operating System & Linux Programming Lab	--	--	3	2
8	Database Management System Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

III Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Computer Networks	4	2	--	3
2	Data Warehousing and Mining	4	--	--	3
3	Design and Analysis of Algorithms	4	--	--	3
4	Software Testing Methodologies	4	--	--	3
5	**Open Elective:** i. Artificial Intelligence ii. Internet of Things iii Cyber Security iv.Digital Signal Processing v.Embbeded Systems vi. Robotics	4	--	--	3
6	Network Programming Lab	--	--	3	2
7	Software Testing Lab	--	--	3	2
8	Data Warehousing and Mining Lab	--	--	3	2
9	IPR & Patents	--	2	--	--
	Total Credits				**21**

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IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Cryptography and Network Security	4	-	3
2	UML & Design Patterns	4	-	3
3	Mobile Computing	4	-	3
4	**Elective –I**	4	-	3
5	**Elective – II**	4	-	3
6	UML & Design Patterns Lab	-	3	2
7	Mobile Application Development Lab	-	3	2
8	Software Testing Lab	-	3	2
9	Hadoop & BigData Lab	-	3	2
Total Credits				**23**

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	**Elective – III**	4	-	3
2	**Elective – IV**	4	-	3
3	Distributed Systems	4	-	3
4	Management Science	4	-	3
5	Project	-	-	9
Total Credits				**21**

Elective – I:

i) Software Testing Methodologies
ii) Simulation Modeling
iii) Information Retrieval Systems
iv) Artificial Intelligence
v) Multimedia Computing
vi) High Performance
ComputingElective – II:

i. Digital Forensics
ii. Hadoop and Big Data
iii. Software Project Management
iv. Machine Learning
v. Advanced Databases

Elective – III:

i) Human Computer Interaction
ii) Advanced Operating Systems
iii) Mobile Adhoc & Sensor Networks
iv) Pattern Recognition
v) Digital Image Processing
vi) Micro processers and Multi Core Systems

Elective-IV:

i) Embedded and Real Time Systems
ii) Neural Networks & Soft Computing
iii) Social Networks and the Semantic Web
iv) Cloud Computing

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(COMMON TO CSE & IT)

	L	T	P	C
III Semester	**L**	**T**	**P**	**C**
Course Code: 171BS3T08	3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

- CO1: Apply the principles of mathematical logic to statement calculus and predicate calculus.
- CO2: Compute Transitive closure, equivalence classes of binary relations.
- CO3: Apply the principles of number theory and group theory.
- CO4: Solve recurrence relations by various methods.
- CO5: Apply the concepts of graph theory to find euler paths, Hamiltonian paths, Spanning trees, minimal spanning trees and chromatic number.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	2	3	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	2	-
CO4	2	-
CO5	2	-

Unit - I

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus.

Predicate Calculus: Predicate Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

Unit – II

Binary Relations and Properties: Binary relations,Properties,Relation Matrix and Digraph,Operations on Relations,Partition and Covering,Transitive Closure,Warshall Algorithm,Equivalence relation,R-Equivalence class,Partial Ordering Relation,Partially ordered sets,Hasse Diagrams.

Unit – III

Algebraic Structures: Algebraic Systems,Examples,General Properties,Semi Groups and Monoids, Group,Abelian Group,permutation groups.

Number Theory: Properties of Integers,Division Algorithm,The Greatest Common Divisor,Euclidean Algorithm,Least Common Multiple,Testing for Prime Numbers,The Fundamental Theorem of Arithmetic,Addition modulo m,Multiplication modulo m,Congruence modulo m,Fermat's Theorem and Euler's Theorem without proof.

Unit – IV

Recurrence Relations: Recurrence Relations,Formation of Recurrence Relations,Solving Recurrence Relations by Substitution and Generating Functions,Method of Characteristic Roots,

Unit – V

Graph Theory : Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs:Adjacency Matrix,Incidence Matrix,Isomorphic Graphs, Paths and Circuits, Trees-Properties,Spanning trees, Euler and Hamilton Graphs,Planar Graphs and Euler's Formula,Graph Colouring,Chromatic Number,BFS Algorithm,DFS Algorithm,Minimal Spanning Trees and Kruskal's Algorithm.

Text Books:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, Seventh Edition, Tata McGraw Hill.
2. Discrete Mathematical Structures with Applications to Computer Science,J. P. Tremblay and R. Manohar, Tata McGraw Hill.
3. Mathematical Foundations of Computer Science,S.Santha, E.V.Prasad,Cengage Publishers.

Reference Books:

1. Discrete Mathematical Structures,Bernand Kolman, Robert C. Busby,Sharon Cutler Ross,PHI.
2. Discrete Mathematics for Computer Scientists and Mathematicians, J. L.Mott, A. Kandel, T.P. Baker,Second Edition,Prentice Hall of India.
3. Discrete Mathematics,S. K. Chakraborthy and B.K. Sarkar,Oxford,2011.

Web Links:

1. http://nptel.ac.in/courses/106106094/
2. http://mathworld.wolfram.com/classroom/classes/DiscreteMathematics.html
3. http://mathworld.wolfram.com/topics/NumberTheory.html
4. http://mathworld.wolfram.com/topics/GeneralLogic.html
5. https://www.coursera.org/specializations/discrete-mathematics

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Statistics with R Programming
(Common to CSE & IT)

	L	T	P	C
III Semester				
Course Code: 171CS3T02	3	0	2	3

Course Outcomes: At the end of the Course, Student will be able to:

- CO1: Identify discrete and continuous random variables and data structures in R.
- CO2: Apply discrete and continuous probability distributions to the given data and execute R-functions for probability distributions.
- CO3: Explain sampling distribution, estimation and R-functions for constructing confidence intervals.
- CO4: Write R program for standard statistical test.
- CO5: Apply the concepts of correlation and regression to the given statistical data using R-function and making use of R-graphic functions to visualize the data.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	2	-

Unit - I

Random Variables and Introduction to R: Random Variables- Discrete, Continuous variables- Expectation,Variance,Moment Generating Function.Introduction to R software –Vectors –Matrices–Arrays– Lists – Data frames – Basic mathematical operations in R, R functions, loops and Control statements, Basic Graphics.

Unit – II

Probability Distributions: Discrete Probability distributions- Binomial distribution, Poisson distribution, Geometric distribution. Continuous Probability distributions- Normal distribution, Gamma distribution, Exponential distribution. Writing R commands for computing above probability distributions.

Unit – III

Sampling Theory: Sampling – Central limit theorem (without proof) – Sampling distribution of means – point estimation – interval estimation.Built in R functions for sample statistics, construction of confidence intervals using R.

Unit – IV

Test of Hypothesis: Hypothesis,one tailed,two tailed test, types of errors in Sampling, Z-test, t-tests, ANOVA. Writing R programming for above statistical tests.

Unit – V

Correlation and Regression: Correlation-Simple correlation, rank correlation, properties of correlation coefficient.Regression-Method of least squares-fitting a straight line and quadratic equation, multiple linear Regression.Writing R programs for simple linear correlation and regression.

Text Books:

1. Probability And Statistics, Dr.T.K.V.Iyengar, Dr.B. K. Krishna Gandhi, S. Ranganatham, Dr. M.V.S.S.N. Prasad, S.Chand Publications.
2. G. Jay Kerns, Introduction To Probability And Statistics Using R, First Edition (Free E-Book From R Software Website)

Reference Books:

1. Jay L. Devore, Probability And Statistics For Engineering And Sciences, Eighth Edition, Cengage Learning.
2. R Cookbook, Paul Teetor, Oreilly.
3. R In Action, Rob Kabacoff, Manning.
4. R For Everyone, Lander, Second Edition, Pearson.
5. The Art Of R Programming, Norman Matloff, No Starch Press.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc17_ma17/preview
2. https://onlinecourses.nptel.ac.in/noc16_ma03/preview
3. https://www.tutorialspoint.com/r/
4. http://www.stat.umn.edu/geyer/old/5101/rlook.html
5. http://www.r-tutor.com/elementary-statistics

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OBJECT ORIENTED PROGRAMMING LAB

(Common to CSE & IT)

III Semester **L T P C**
Course Code: 171CS3L01 **0 0 3 2**

Course Outcomes:
At the end of the Course, Student will be able to:

- CO1: Make Use of Control Structures and modular programming in solving complex problems.
- CO2: Apply object oriented techniques to solve computing problems.
- CO3: Experiment with the key features of object-oriented programming language.
- CO4: Develop C++ classes for code reuse through inheritance.
- CO5: Apply exception handling technique to handle various errors.
- CO6: Develop C++ programs using Inline, friend functions, Reference variable, this pointer, operator Overloading, static and dynamic binding, template and STL.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	2	1	-	-	-	-	-	3	1	-	-
CO2	-	2	3	-	-	-	-	-	2	1	-	-
CO3	-	3	2	-	-	-	-	-	2	1	-	-
CO4	-	2	3	-	-	-	-	-	2	1	-	-
CO5	-	2	3	-	-	-	-	-	2	1	-	-
CO6	-	3	3	-	-	-	-	-	2	1	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	1	-
CO3	2	-
CO4	2	-
CO5	3	-
CO6	1	-

List of Experiments:

Week 1 (Expressions Control Flow)
1.1) Develop a C++ program to find the roots of a quadratic equation.
1.2) Develop a C++ program to find factorial of a given number using recursion.

Week 2 (Variables, Scope)
2.1) Developa C++ program to implement call-by-reference.
2.2)Develop a C++ program to illustrate scope resolution and namespaces.
2.3) Develop a C++ program illustrating Inline Functions.

Week 3 ((Classes and Objects)

3.1) Develop a C++ program demonstrating a Bank Account with necessary data members and member functions.
3.2) Develop a C++ program for illustrating Access Specifiers public and private.
3.3) Develop a C++ program to illustrate this pointer.

Week 4 (Functions)
4.1) Develop a C++ program illustrate function overloading.
4.2) Develop a C++ program to illustrate the use of default arguments.
4.3) Develop a C++ program illustrating friend function.

Week 5 (Constructors and Destructors)
5.1) Develop a C++ Program to illustrate the use of Constructors and Destructors.
5.2) Develop a C++ program illustrating Constructor overloading.
5.3) Develop a C++ program illustrating Copy Constructor.

Week 6 (Operator Overloading)
6.1) Develop a C++ program to Overload Unary, and Binary Operators using member function.
6.2) Develop a C++ program to Overload Unary, and Binary Operators using friend function.
6.3) Develop a case study on Overloading Operators and Overloading Functions. (150Words)

Week 7(Inheritance)
7.1) Develop C++ Programs to incorporate various forms of Inheritance

i. Single Inheritance
ii. Multiple Inheritances
iii. Multi-level inheritance
iv. Hierarchical Inheritance
v. Hybrid inheritance

7.2) Develop a C++ program in C++ to illustrate the order of execution of constructors and destructors in inheritance.

Week 8 (Access)
8.1) Develop a C++ program to illustrate object as a class member.
8.2) Develop a C++ program to illustrate pointer to a class.
8.3) Develop a C++ program to illustrate Virtual Base Class.

Week 9 (Polymorphism)
10.1) Develop a C++ program to illustrate virtual functions.
10.2) Develop a C++ program to illustrate runtime polymorphism.
10.3) Develop a C++ program to illustrate pure virtual function and calculate the areaofdifferent shapes by using abstract class.

Week 10(Templates)
10.1) Develop a C++ Program illustrating function template.
10.1) Develop a C++ Program illustrating template class.
10.2) Develop a C++ program to illustrate class templates with multiple parameters.

Week 11(Exception Handling)
11.1) Develop a C++ program for handling Exceptions.
11.2) Develop a C++ program to illustrate the use of multiple catch statements.

Week 12 (STL)

12.1) Develop a C++ program to implement List, Vector and its Operations.

12.2) Develop a C++ program to implement Deque and Deque Operations.

12.3) Develop a C++ program to implement Map and Map Operations.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13) Develop a C++ program for flight booking system.

14) Develop Qt application containing slider and spin box in which a slider respondsto changes in the spin box.

15) Develop a Qt application to create a calculator.

16) Develop a Qt application for creating a text pad.

17) Develop a C++ program with maximum of 20 characters, that your user willbeguessed and will show only asterisks (*) on the screen. The user will input or enterone character at a time. And for every correct character, the asteriskwill be replaced by that character until all the characters or the mystery word/s willreveal. Your program will accept a maximum three (3) errors or mistakes inentering/inputting character otherwise the mystery word/s will be viewed.

Sample Output:
Output: *******
Enter your character: e
Output: ***e**e
Enter your character: a
Output: sorry! the character is not existing. you still have 2 chances\
Enter your character: s
Output: s**e**e
Enter your character: c
Output: sc*e*ce
Enter your character: i
Output: scie*ce
Enter your character: n
Output: science

Reference Books:

1. C++ Primer Plus by Stephen Prata, Sixth Edition,Pearson, 2011.
2. C++ GUI Programming with Qt4,Jasmin Blanchette, Mark Summerfield, Second Edition, Prentice Hall Press, 2008.
3. Object Oriented Programming in C++ by E. Balagurusamy, Sixth Edition, Tata McGraw Hill, 2013.
4. C++ for Programmers,Paul J. Deitel, Harvey M. Deitel, Pearson,2009.
5. The C++ Programming Language, BjarneStroustrup, Fourth Edition, Pearson, 2014.

Web Links:

1. http://en.cppreference.com/w/cpp/links/libs
2. https://www.daniweb.com/digital-media/ui-ux-design/threads/113591/trying-to-run-a-c-program-through-a-web-link
3. https://github.com/fffaraz/awesome-cpp
4. http://www.yolinux.com/TUTORIALS/LinuxTutorialC++.html
5. http://www.techsystemsembedded.com/cpp_links.php

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ADVANCED DATA STRUCTURES LAB
(Common to CSE & IT)

III Semester | | L | T | P | C
---|---|---|---|---
Course Code: 171CS3L02 | | 0 | 0 | 3 | 2

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Construct the graph traversals and minimum spanning tree for a given graph.
CO2: Develop program to implement lossless data compression algorithm.
CO3: Apply the hashing techniques to implement Dictionary.
CO4: Build a Binary Heap using Priority queues.
CO5: Analyze various basic operations of AVL tree, Red-Black tree, B-Tree to improve the efficiency.
CO6: Identify the appropriate data structure for a given problem.

Mapping of Course Outcomes with Program Outcomes:

CO/PO.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	2	3	-	-	-	-	-	2	-	-	-
CO2	-	-	1	-	-	-	-	-	2	3	-	-
CO3	-	2	-	-	-	-	-	-	3	-	-	-
CO4	-	1	3	-	-	-	-	-	1	-	-	-
CO5	-	2	2	-	-	-	-	-	3	2	-	-
CO6	-	-	2	-	-	-	-	-	3	1	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	-	2
CO2	-	-
CO3	-	3
CO4	-	-
CO5	-	2
CO6	-	-

List of Experiments:

Week 1

1) Develop a recursive program to implement Breadth First Search and Depth First Search.

Week 2

2) Develop a non recursive program to implement Breadth First Search and Depth First Search.

Week 3

3) Develop a program to generate a minimum-cost spanning tree using Prim's algorithm.

Week 4

4) Develop a program to generate a minimum-cost spanning tree using Kruskal's algorithm.

Week 5

5) Develop a program to implement Huffman coding.

Week 6

6) Develop a program to implement functions of dictionary using Hashing Techniques (division method, digit folding and mid square method).

Week 7

7) Develop a program to implement Collision Resolution Techniques (Linear Probing, Quadratic Probing and Double Hashing) in Hash Table.

Week 8

8) Develop a program to perform binary heap operations.

Week 9

9) Develop a program to perform AVL tree operations.

Week 10

10) Develop a program to perform Red-Black tree operations.

Week 11

11) Develop a program to implement B-Tree operations.

Week 12

12) Develop a program to implement B+ Tree operations.

List of Augmented Experiments:

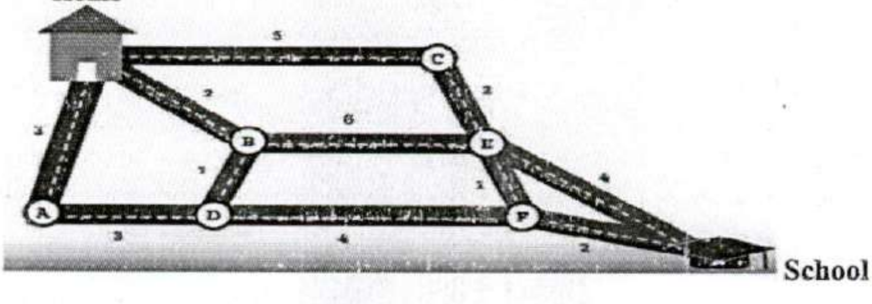
(Any 2 of the following experiments can be performed)

13) Raju created an authentication system which allows users to get authenticated by their passwords. In this system when an user enters a password, the system tries to match it with the password that was earlier created by the user. To keep the system simple Raju stored the passwords set by users in a file in plain in the system.

We all know such system is not secure. Can you help Raju in improving the system using your knowledge on hashing techniques.

14)Suppose a student wants to go from home to school in the shortest possible way. She knows some roads are heavily congested and difficult to use, this means the edge has a large weight--the shortest path tree found by the algorithm will try to avoid edges with larger weights.

Find the shortest path from home to school in the following graph.



14) Monk and Cursed Tree: Binary Search Tree.

Monk has an array A having N distinct integers and a Binary Search Tree which is initially empty. He inserts all the elements of the array from index 1 to N in the BST in the order given in the array. But wait! The tree so formed turns out to be cursed.

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Monk is having some weird experiences since he made that tree. So, now to stop all that, Monk has two options, to destroy the BST or to pray to God and ask for a solution. Now since Monk has to use this BST in a Code Monk Challenge, he cannot destroy it. So he prays to God. God answer his prayers and sends an angel named Micro. Now, Micro asks Monk to find something. He tells him two values, X and Y, present in the BST and ask him to find the maximum value that lie in the path between node having value X and node having value Y. (including X and Y).

Now since, Monk is very afraid of that tree he asks for your help.

Input:
First line consists of a single integer denoting N.
Second line consists of N space separated integers denoting the array A.
Third line consists of two space separated integers denoting X and Y.

Output:
Print the maximum value that lie in the path from node having value X and node having value Y in a new line. It is ensured that values X and Y are present in the array.

15) Print unique rows in a given boolean matrix.
Given a binary matrix, print all unique rows of the given matrix.
Input:
{0, 1, 0, 0, 1}
{1, 0, 1, 1, 0}
{0, 1, 0, 0, 1}
{1, 1, 1, 0, 0}
Output:
0 1 0 0 1
1 0 1 1 0
1 1 1 0 0
(Use Trie data structure)
Since the matrix is boolean, a variant of Trie data structure can be used where each node will be having two children one for 0 and other for 1. Insert each row in the Trie. If the row is already there, don't print the row. If row is not there in Trie, insert it in Trie and print it.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. Data Structures And Algorithms, A. V. Aho, J. E. Hopcroft, And J. D.Ullman, Pearson, 2002.
3. Introduction To Algorithms, Thomas H. Cormen, Charles E. Leiserson And Ronald L. Rivest,Third Edition, The Mit Press.
4. Data Structures And Algorithm Analysis In C,Mark Allen Weiss, Second Edition, Pearson.

Web Links:

1. https://ocw.mit.edu/courses/...and.../6-006-introduction-to-algorithms-spring-2008/
2. https://www.coursera.org/specializations/data-structures-algorithm
3. https://in.udacity.com/course/intro-to-algorithms--cs215
4. https://www.alljntuworld.in/jntu-lab-manuals/

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Software Engineering
(Common to CSE & IT)

IVSemester
Course Code:171CS4T05

L	T	P	C
3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Demonstrate an understanding of the key facts, concepts, principles and theories of software engineering.
CO2: Analyze the effective software engineering process, based on knowledge of widely used development lifecycle models.
CO3: Explain the various responsibilities and activities of project management.
CO4: Translate a requirements specification into an implementable design, following a structured and organized process.
CO5: Examine a testing strategy for a software system using different testing techniques.
CO6: Discuss about software reliability, quality management, software maintenance and reusability.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	-	-	-	-	-	-	-	-
CO3	3	-	1	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-
CO6	3	1	-	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	1	-
CO4	2	-
CO5	1	-
CO6	1	-

Unit - I

Introduction to Software Engineering: Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.

Software Process: Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models.

Case Study: Survey on different process models including
i)Advantages and Disadvantages of the models
ii)Applicability of the model
iii)Projects developed using the various models

Unit – II

Software Project Management: Project Management Essentials, What is Project Management, Software Configuration Management, Risk management.

Project Planning and Estimation: Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques.
Case Study: Estimate the effort using function point analysis for a real time project

Unit – III

Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management,

Case Study: Create a SRS document for a real time scenario.

Unit – IV

Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies,

Implementation: Coding Principles, Coding Process, Code Verification, Code Documentation.

Case Study: Construct the HLD and LLD using SRS created.

Unit – V

Software Testing: Testing Fundamentals, Test Planning, Black-Box Testing, White-Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches.

Software Quality and Reliability: Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability.

Case Study: Write the test cases for the real time scenario considered.

Text Books:

1. Software Engineering – Concepts and Practices: Ugrasen Suman, Cengage Learning, 2013.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, Prentice Hall India.

Reference Books:

1. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press
3. An integrated approach to Software Engineering, Pankaj Jalote, Springer Narosa.
4. Software Engineering: A practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill

Web Links:

1. http://nptel.ac.in/courses/106101061/
2. https://www.coursera.org/learn/software-processes-and-agile-practices
3. http://www.rspa.com/spi/process-generic.html
4. http://www.geeksforgeeks.org/software-engineering-gq/
5. https://www.tutorialspoint.com/software_engineering

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Computer Organization
(Common to CSE & IT)

IV Semester
Course Code:171CS4T10

L	T	P	C
3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Describe the structure and various types of instructions in the computer system.
CO2: Demonstrate the working of CPU, RISC and CISC architecture.
CO3: Summarize the computer arithmetic.
CO4: Demonstrate the use of pipeline and vector processing.
CO5: Exemplify I/O and Memory organization.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	1	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-
CO4	2	2	2	2	-	-	-	-	-	-	-	-
CO5	1	2	1	3	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-

Unit - I
Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective.

Machine Instruction and Programs: Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions.Case Study: ARM, Motorola and Intel Instruction sets.

Unit – II
Arithmetic : Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro programd Control -Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructionswith Next –Address Field.

Unit – III
The Memory System: Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage

Unit – IV

Input/Output Organization: Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –Programd I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

Unit – V

Pipelining-: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.

Text Books:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill, 2011.
2. Computer System Architecture, M.Morris Mano, Third Edition, Pearson Education,2016.

Reference Books:

1. Computer Architecture and Organization, John P. Hayes, McGraw Hill, 1998.
2. Computer Organization and Architecture, William Stallings, Eighth Edition, Pearson, 2012.
3. Computer System Organization and Architecture, John D. Carpinelli, PearsonEducation, 2012.
4. Structured Computer Organization, Andrew S Tanenbaum, Todd Austin, Sixth Edition, Pearson Education, 2013.
5. Computer Systems Architecture, Aharan Yadin, CRC Press, 2016.

Web Links:

1. http://nptel.ac.in/courses/106106092/
2. http://nptel.ac.in/courses/106103068/2
3. https://onlinecourses.nptel.ac.in/noc17_cs35/preview
4. https://www.coursera.org/learn/comparch
5. http://www.studytonight.com/computer-architecture/

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JAVA PROGRAMMING LAB
(Common to CSE & IT)

IV Semester
Course Code: 171CS4L03

L	T	P	C
0	0	3	2

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Apply OOP concepts to solve real time problems.
CO2: Make use of class, inheritance, interface and packages to develop solutions for complex problems.
CO3: Develop a solution for a real time problem using Exception handling.
CO4: Build java applications using Threads.
CO5: Apply applets and event handling to create interactive applications.
CO6: Design GUI using AWT and Swing Components.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	1	3	-	1	-	-	-	2	-	-	-
CO2	-	1	3	-	2	-	-	-	2	-	-	-
CO3	-	1	3	-	2	-	-	-	2	-	-	-
CO4	-	1	-	-	3	-	-	-	2	-	-	-
CO5	-	1	3	-	2	-	-	-	2	-	-	-
CO6	-	1	1	-	3	-	-	-	2	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	2	-
CO5	2	-
CO6	2	-

List of Experiments:

Week 1 (Basic Programs)

1.1) Write a Java program to find the discriminent value D and find out the roots of the quadratic equation of the form ax2+bx+c=0.

1.2) Five Bikers Compete in a race such that they drive at a constant speed which mayor may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Week 2 (Control Flow Statements)

2.1) Write a Java program to select all the prime numbers within the range of 1 to

10000.

2.2) Write a Java program to Find the sum of all even terms in the Fibonacci sequence up to the given range N.

2.3) Write a Java program to check whether a given N digit number is Armstrong or not.

Week 3 (Class Mechanism)

3.1) Write a Java program to display the details of a person. Personal details should be given in one method and the qualification details in another method.

3.2) Write a Java program to implement constructor.

3.3) Write a Java program to implement method overloading.

Week 4 (Arrays)

4.1)Write a Java program to perform addition and multiplication of two matrices.

4.2) Write a Java program to implement binary search.

4.3) Write a Java program to sort the elements using Quick sort.

Week 5 (Strings)

5.1) Write a Java program to sort given set of strings.

5.2) Write a Java program for using StringBuffer to remove or delete a character.

5.3) Write a Java program to find the number of tokens in a given string without using countTokens() method but by using other methods of StringTokenizer class.

Week 6 (Inheritance, Interface & Abstract Class)

6.1) Write a Java program to find the available balance in a customer account. Customer's account details should be taken as input in one class, Transaction details should be taken in another class. (Note: Make use of Multi-Level Inheritance.)

6.2) Take the details of internal exam marks in one Interface. Take the details of external exam marks in another interface. Write a Java program to find the total marks obtained in each subject by a student. (Note: Make use of Multiple Inheritance using interfaces.)

6.3) Write a Java program to find the areas of different shapes using abstract classes.

Week 7 (Packages)

7.1) Write a Java program to illustrate the use of classpath using Java code.

7.2) Write a Java program that import and use user defined package.

7.3) Write a Java program to illustrate the use of protected members in a package.

Week 8 (Exception Handling)

8.1) Write a Java program to illustrate exception handling mechanism using multiple catch clauses.

8.2) Write a Java program to make use of Built-in and user-defined Exceptions in handling a run time exception.

Week 9 (Multithreading)

9.1) Write a Java program to demonstrate the use of demon thread.

9.2) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable).

9.3) Write a Java program to solve Producer-Consumer problem using synchronization.

Week 10 (Applets)

10.1)Write a Java program to demonstrate the Life Cycle of an applet.

10.2) Write a Java program to draw different shapes and fill each shape with a colour using applets.

Week 11 (Event Handling)

11.1)Write a Java program to illustrate the Keyboard Events by using an applet code.

11.2) Write a Java program to illustrate the Mouse Events by using an applet code.

Week 12 (AWT & Swings)

12.1) Write a Java program to generate a simple calculator using AWT components.

12.2) Write a Java program to create a single ball bouncing inside a JPanel.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13) Create an interface which consists of methods with the name's no of watt's consumable, luminescent value, efficiency in percentage. Write classes for different categories of bulbs like LED, tube light and find out which light is efficient in terms of consumption.
14) Write a Java program to display analog clock using Applet.
15) Write a Java program to create a menu of a restaurant which includes starters, veggies, delights etc. Ask the user to select the items from the menu and generate bill for those items which he has chosen. (Make use of Swing Components).
16) Write a Java program to display all drives in our system as a tree structure using JTree.

Reference Books:

1. Core Java: An Integrated Approach – R. Nageswara Rao, First Edition,John Wiley and Sons Inc., 2015.
2. Java Tutorial: A Short Note on Basics - Sharon BioccaZakhour, SoumyaKannan, Raymond Gallardo – Fifth Edition, Oracle Corp, 2012.
3. Object Oriented Programming using Java – Simon Kendal, First Edition, 2009.
4. Java:The fundamentals of Objects and Classes–David Etheridge, First Edition, 2009.

Web Links:

1. http://www.programmingtutorials.com/java.aspx
2. http://www.javacodegeeks.com
3. http://java.sun.com/developer/onlineTraining/
4. http://java.sun.com/learning
5. http://www.kodejava.org

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DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE & IT)

IV Semester **L T P C**
Course Code: 171CS4L04 **0 0 3 2**

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Make use of the concepts of relational model techniques for database design.
CO2: Construct a database schema for a given problem-domain.
CO3: Apply Normalization techniques on a database to avoid anomalies.
CO4: Build queries on a database using SQL DDL/DML commands.
CO5: Apply integrity constraints on a database using RDBMS.
CO6: Develop PL/SQL stored procedures, stored functions, cursors and packages.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	1	-	-	3	-	-	-	1	-	-	-
CO2	-	1	-	-	3	-	-	-	1	-	-	-
CO3	-	2	-	-	3	-	-	-	1	-	-	-
CO4	-	2	-	-	3	-	-	-	1	-	-	-
CO5	-	2	-	-	3	-	-	-	1	-	-	-
CO6	-	2	-	-	3	-	-	-	1	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	2	-
CO4	2	-
CO5	1	-
CO6	2	-

List of Experiments:

SQL:

Week 1

1) Queries for Creating, Altering and Dropping Tables, Views and Constraints.

Week 2

2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update.

Week 3

3.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions.

3.2) Queries using operators in SQL.

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Week 4

4.1) Queries using Group By, Order By, and Having Clauses.

4.2) Queries on Controlling Data: Commit, Rollback, and Save point.

Week 5

5) Queries on Joins and Correlated Sub-queries.

Week 6

6) Queries on Working with Index, Sequence, Synonyms.

Week 7

7) Queries to Build Views.

PL/SQL

Week 8

8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation.

Week 9

9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

Week 10

10) Write a PL/SQL block using SQL and Control Structures.

Week 11

11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.

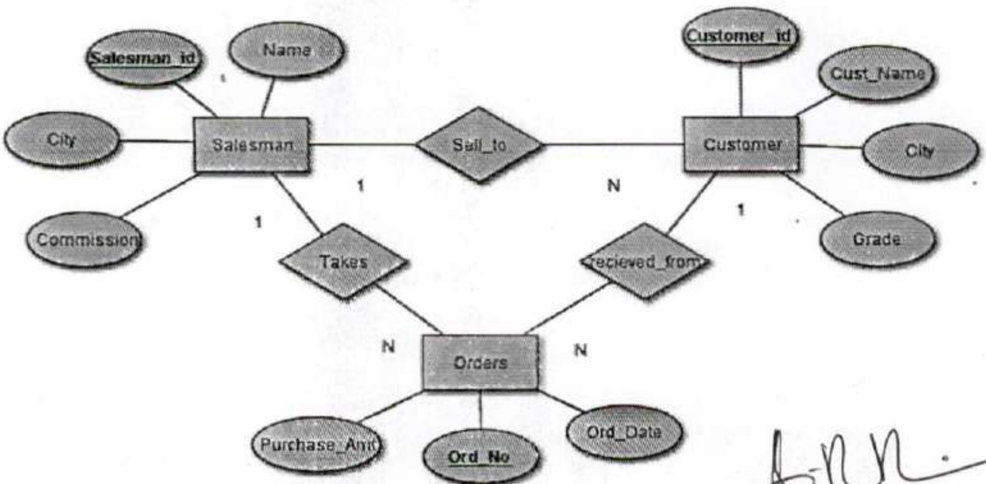
Week 12

12) Write a PL/SQL Code using Procedures, Functions, Packages.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13) For a Sales Order Database System, based on the given E-R diagram.



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a. Design a schema by applying functional dependencies.
b. Apply constraints and verify them.

14) Based on the following schema for a Library Database:

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (Book_id, Author_Name)

PUBLISHER (Name, Address, Phone)

BOOK_COPIES (Book_id, Branch_id, No-of_Copies)

BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

a. Draw the E-R diagram and show the necessary multiplicity and associations among them.
b. Draw the Schema diagram and show the necessary associations among them.

15) For a Faculty Database

EMPLOYEE (EMPID, FName, LName,Address, Sex, Salary,DeptNo)

DEPARTMENT (DeptNo, DName, HOD_EMPID)

PROJECT (ProjNo, PName, DeptNo)

WORKS_ON (EMPID, ProjNo, Hours)

EMPLOYEE DATA:

EMPID	FName	LName	Address	Sex	Salary	DeptNo
1201	Adarsh	Kumar	Kakinada	F	150000	1
1240	Mahi	John	Rajahmundry	F	95000	1
1245	Ramu	Murty	Rajahmundry	M	90000	2
1234	Aditya	Surya	Banglore	M	80000	1
1247	Jack	Paul	Banglore	M	75000	2
1235	Pradeep	Chitra	Rajahmundry	M	78000	1
1211	Srinivas	Kumar	Hyderabad	M	59000	1
1492	Gopala	Rao	Kakinada	M	65000	2
1250	Eswari	Nirupama	Kakinada	F	65000	2

DEPARTMENT DATA:

DeptNo	DName	HOD_EMPID
1	CSE	1240
2	IT	1245

PROJECT DATA:

ProjNo	PName	DeptNo
100	IoT	1
101	CLOUD	1
102	BIGDATA	2
103	NETWORKS	2
104	IOT	2
105	NETWORKS	1

WORKS_ON DATA:

EMPID	ProjNo	Hours
1245	104	16
1240	101	22
1201	100	31
1250	102	25

1492	103	25
1235	105	29

With the sample data Write SQL queries to

a. To Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
b. Find the sum of the salaries of all employees of the 'IT' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

16) For a Movie Database:

ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name)
MOVIES (Mov_id, Mov_Title, Mov_Year, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)

With the sample data Write SQL queries to

1. List the titles of all movies directed by 'STEVEN SPIELBERG'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2015 and also in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.

ACTOR DATA:

Act_id	Act_Name	Act_Gender
01	DICAPRIO	M
02	KATE WINSLET	F
103	SAM WORTHINGTON	M
104	SAM NEIL	M
105	CATE BLANCHETT	F
106	CHRIS PRATT	M
107	BRYCE DALLAS	F
108	LAURA DERN	F
109	DANIEL YORK	F

DIRECTOR DATA:

Dir_id	Dir_Name
10	STEVEN SPIELBERG
11	JAMES CAMERON
12	MARTIN SCORSESE
13	BAZ LUHRMANN
14	CHRISTOPHER NOLAN
15	COLIN TREVORROW
16	RIDLEY SCOTT

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MOVIES DATA:

Mov_id	Mov_Title	Mov_Year	Dir_id
1001	JURASSIC PARK	1993	10
1002	TITANIC	1997	11
1003	THE AVIATOR	2004	12
1004	BODY OF LIES	2008	16
1005	AVATAR	2009	11
1006	INCEPTION	2010	14
1007	THE GREAT GATSBY	2013	13
1008	JURASSIC WORLD	2015	15
1009	THE BFG	2016	10
1010	THE POST	2017	10

MOVIE_CAST DATA:

Act_id	Mov_id	Role
104	1001	HERO
108	1001	HEROINE
101	1002	HERO
102	1002	HEROINE
101	1003	HERO
109	1003	HEROINE
101	1004	HERO
103	1005	HERO
101	1006	HERO
101	1007	HERO
106	1008	HERO
107	1008	HEROINE

RATING DATA:

Mov_id	Rev_stars
1001	5
1002	6
1003	3
1004	4
1005	4
1006	2
1007	2
1008	6
1009	4
1010	2

Reference Books:

1. SQL, PL/SQL The programming language of ORACLE, Ivan Bayross, Fourth edition, BPB Publication, 2009.
2. SQL/PLSQL for ORACLE 9i, P.S.Deshpande, Dreamtech Press, 2003.
3. Teach yourself PL/SQL in 21 days, Tom Luers, Timothy Atwood and JonathamGennick, First Edition, Techmedia, 1997.

Web Links:

1. http://nptel.ac.in/courses/106106093/6
2. http://www.tutorialspoint.com/plsql/
3. https://www.plsql.co/
4. https://www.w3schools.com/sql/

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III Year – II Semester

L	T	P	C
4	0	0	3

SOFTWARE TESTING METHODOLOGIES

OBJECTIVE:

Fundamentals for various testing methodologies.

- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

UNIT-I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application ofDataflow Testing.

UNIT-III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:

Syntax Testing: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT – V:

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

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Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT -VI:

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

OUTCOME:

- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, 2007Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

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Date: 25-05-2018

Department of Computer Science and Engineering

Syllabus revision Index 2018-2019

S.No	Name of the course	Percentage of syllabus change
1	Mathematical Foundations of Computer Science	25%
2	Statistics with R Programming	80%
3	Mathematical Foundations of Computer Science	25%
4	Object Oriented Programming Lab	80%
5	Advanced Data Structures Lab	30%
6	Software Engineering	50%
7	Computer Organization	20%
8	Java Programming Lab	50%
9	Database Management Systems Lab	20%
10	Software Testing Methodologies	70%

KSP

Program Coordinator

Head of the Department

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Department of CSE
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Department of Humanities & Basic Sciences

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mathematical Foundations of Computer Science	Mathematical Foundations of Computer Science
Course Code	R1621052	171BS3T08
Syllabus	UNIT -I: Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.	Unit - I Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus. Predicate Calculus: Predicate Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.
	UNIT -II: Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.	Unit – II Binary Relations and Properties: Binary relations, Properties, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Warshall Algorithm, Equivalence relation, R-Equivalence class, Partial Ordering Relation, Partially ordered sets, Hasse Diagrams.
	UNIT- III: Algebraic Structures and Number Theory: Algebraic Structures: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism,	Unit – III Algebraic Structures:Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Group,Abelian Group, permutation groups. Number Theory: Properties of Integers ,Division Algorithm, The Greatest Common Divisor, Euclidean Algorithm, Least

	Number Theory: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)	Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Addition modulo m, Multiplication modulo m, Congruence modulo m, Fermat's Theorem and Euler's Theorem without proof.
	UNIT -IV: Combinatorics: Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application	Unit – IV Recurrence Relations: Recurrence Relations, Formation of Recurrence Relations , Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots
	UNIT -V: Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations	Unit – V Graph Theory : Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix, Isomorphic Graphs, Paths and Circuits, Trees-Properties, Spanning trees, Euler and Hamilton Graphs, Planar Graphs and Euler's Formula, Graph Colouring,Chromatic Number, BFS Algorithm, DFS Algorithm, Minimal Spanning Trees and Kruskal's Algorithm.
	UNIT -VI: Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Statistics with R Programming	Statistics with R Programming
Course Code	R1621051	171CS3T02
Syllabus	**UNIT-I:** Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.	**UNIT-I:** **Random Variables and Introduction to R:** Random Variables- Discrete, Continuous variables-Expectation, Variance, Moment Generating Function. Introduction to R software – Vectors – Matrices – Arrays – Lists – Data frames – Basic mathematical operations in R, R functions, loops and Control statements, Basic Graphics.
	UNIT-II: R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.	**UNIT-II:** **Probability Distributions:** Discrete Probability distributions- Binomial distribution, Poisson distribution, Geometric distribution. Continuous Probability distributions- Normal distribution, Gamma distribution, Exponential distribution. Writing R commands for computing above probability distributions.
	UNIT-III: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus,	**UNIT-III:** Sampling Theory: Sampling – Central limit theorem (without proof) – Sampling distribution of means – point estimation – interval estimation. Built in R functions for sample

	Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,	statistics, construction of confidence intervals using R.
	UNIT-IV: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.	**UNIT-IV:** **Test of Hypothesis:** Hypothesis, one tailed, two tailed test, types of errors in Sampling, Z-test, t-tests, ANOVA. Writing R programming for above statistical tests.
	UNIT-V: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA.	**UNIT-V:** **Correlation and Regression:** Correlation-Simple correlation, rank correlation, properties of correlation coefficient. Regression-Method of least squares-fitting a straight line and quadratic equation, multiple linear Regression. Writing R programs for simple linear correlation and regression.
	UNIT-VI Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Object Oriented Programming Lab	Object Oriented Programming Lab
Course Code	16A91A0501	171CS3L01
Syllabus	**Exercise – 1 (Basics)** Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user a) Convert any two programs that are written in C into C++ b) Write a description of using g++ (150 Words) **Exercise – 2 (Expressions Control Flow)** Write a Program that computes the simple interest and compound interest payable on principal amount (inRs.) of loan borrowed by the customer from a bank for a giver period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest. b) Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger entersthe bus, the conductor asks "What distance will you travel?" On knowing distance frompassenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.	**Week 1 (Expressions Control Flow)** 1.1) Develop a C++ program to find the roots of a quadratic equation. 1.2) Develop a C++ program to find factorial of a given number using recursion. **Week 2 (Variables, Scope)** 2.1) Develop a C++ program to implement call-by-reference. 2.2) Develop a C++ program to illustrate scope resolution and namespaces. 2.3) Develop a C++ program illustrating Inline Functions. **Week 3 ((Classes and Objects)** 3.1) Develop a C++ program demonstrating a Bank Account with necessary data members and member functions. 3.2) Develop a C++ program for illustrating Access Specifiers public and private. 3.3) Develop a C++ program to illustrate this pointer. **Week 4 (Functions)** 4.1) Develop a C++ program illustrate function overloading. 4.2) Develop a C++ program to illustrate the use of default arguments. 4.3) Develop a C++ program illustrating friend function. **Week 5 (Constructors and**

	Exercise – 3 (Variables, Scope, Allocation) a) Write a program to implement call by value and call by reference using reference variable. b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory Allocation) c) Write a program to illustrate Storage classes d) Write a program to illustrate Enumerations **Exercises –4** (Functions) Write a program illustrating Inline Functions a) Write a program illustrate function overloading. Write 2 overloading functions for power. b) Write a program illustrate the use of default arguments for simple interest function. **Exercise -5** (Functions –Exercise Continued) a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers b) Write a program illustrate function template for power of a number. c) Write a program to illustrate function template for swapping of two numbers. **Exercise -6** (Classes Objects) Create a Distance class with: • feet and inches as data members • member function to input distance • member function to output distance • member function to add two distance objects a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum. b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the	**Destructors)** 5.1) Develop a C++ Program to illustrate the use of Constructors and Destructors. 5.2) Develop a C++ program illustrating Constructor overloading. 5.3) Develop a C++ program illustrating Copy Constructor. **Week 6 (Operator Overloading)** 6.1) Develop a C++ program to Overload Unary, and Binary Operators using member function. 6.2) Develop a C++ program to Overload Unary, and Binary Operators using friend function. 6.3) Develop a case study on Overloading Operators and Overloading Functions. (150 Words) **Week 7(Inheritance)** 7.1) Develop C++ Programs to incorporate various forms of Inheritance 7.2) Develop a C++ program in C++ to illustrate the order of execution of constructors and destructors in inheritance. **Week 8 (Access)** 8.1) Develop a C++ program to illustrate object as a class member. 8.2) Develop a C++ program to illustrate pointer to a class. 8.3) Develop a C++ program to illustrate Virtual Base Class. **Week 9 (Polymorphism)** 10.1) Develop a C++ program to illustrate virtual functions. 10.2) Develop a C++ program to illustrate runtime polymorphism. 10.3) Develop a C++ program to illustrate pure virtual function and calculate the area of different shapes by using abstract class. **Week 10(Templates)** 10.1) Develop a C++ Program illustrating function template. 10.1) Develop a C++ Program illustrating template class.

	above program.) c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem) d). Write a C++ program demonstrating a BankAccount with necessary methods and variables **Exercise – 7** (Access) Write a program for illustratingAccess Specifiers public, private, protected a) Write a program implementing Friend Function b) Write a program to illustrate this pointer c) Write a Program to illustrate pointer to a class **Exercise -8** (Operator Overloading) a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function. i. Unary operator as member function ii. Binary operator as nonmember function b). Write a c ++ program to implement the overloading assignment = operator c).Write a case study on Overloading Operators and Overloading Functions (150 Words) **Exercise -9** (Inheritance) a) Write C++ Programs and incorporating various forms of Inheritance i) Single Inheritance ii) Hierarchical Inheritance iii) Multiple Inheritances iv) Multi-level inheritance v) Hybrid inheritance b) Write a program to show Virtual Base Class c) Write a case study on using virtual classes (150 Words) **Exercise-10** (Inheritance –Continued) a) Write a Program in C++ to illustrate the order of execution of constructors	10.2) Develop a C++ program to illustrate class templates with multiple parameters. **Week 11(Exception Handling)** 11.1) Develop a C++ program for handling Exceptions. 11.2) Develop a C++ program to illustrate the use of multiple catch statements. **Week 12 (STL)** 12.1) Develop a C++ program to implement List, Vector and its Operations. 12.2) Develop a C++ program to implement Deque and Deque Operations. 12.3) Develop a C++ program to implement Map and Map Operations.

	and destructors in inheritance b) Write a Program to *show* how *constructors* are invoked in *derived class* **Exercise -11** (Polymorphism) a) Write a program to illustrate runtime polymorphism b) Write a program to illustrate this pointer c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class. d) Write a case study on virtual functions (150 Words) **Exercise -12**(Templates) a) Write a C++ Program to illustrate template class b) Write a Program to illustrate class templates with multiple parameters c) Write a Program to illustrate member function templates **Exercise -13** (Exception Handling) a).Write a Program for Exception Handling Divide by zero b). Write a Program to rethrow an Exception **Exercise -14** (STL) a) Write a Program to implement List and List Operations b) Write a Program to implementVector andVector Operations **Exercise -15** (STLContinued) a) Write a Program to implement Deque and Deque Operations b) Write a Program to implement Map and Map Operations	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Advanced Data Structures Lab	Advanced Data Structures Lab
Course Code	R1622057	171CS3L02
Syllabus	1. To perform various operations i.e., insertions and deletions on AVL trees. 2. To implement operations on binary heap. i) Vertex insertion ii) Vertex deletion iii) Finding vertex iv) Edge addition and deletion 3. To implement Prim's algorithm to generate a min-cost spanning tree. 4. To implement Krushkal's algorithm to generate a min-cost spanning tree. 5. To implement Dijkstra's algorithm to find shortest path in the graph. 6. To implementation of Static Hashing (Use Linear probing for collision resolution) 7. To implement of Huffmann coding. 8. To implement of B-tree.	1) Develop a recursive program to implement Breadth First Search and Depth First Search. 2) Develop a non recursive program to implement Breadth First Search and Depth First Search. 3) Develop a program to generate a minimum-cost spanning tree using Prim's algorithm. 4) Develop a program to generate a minimum-cost spanning tree using Kruskal's algorithm. 5) Develop a program to implement Huffman coding. 6) Develop a program to implement functions of dictionary using Hashing Techniques (division method, digit folding and mid square method). 7) Develop a program to implement Collision Resolution in Hash Table. 8) Develop a program to perform binary heap operations. 9) Develop a program to perform AVL tree operations. 10) Develop a program to perform Red-Black tree operations. 11) Develop a program to implement B-Tree operations. 12) Develop a program to implement B+ Tree operations.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Engineering	Software Engineering
Course Code	R1622051	171CS4T05
Syllabus	**UNIT-I:** Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.	**UNIT-I:** **Introduction to Software Engineering**: Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. i) Advantages and Disadvantages of the models ii) Applicability of the model iii) Projects developed using the various models **Software Process:** Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models. **Case Study**: Survey on different process models including
	UNIT-II: **Requirements Analysis And Specification:** Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification. **Software Design:** Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design	**UNIT-II:** **Software Project Management:** Project Management Essentials, What is Project Management, Software Configuration Management, Risk management. **Project Planning and Estimation:** Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques. **Case Study:** Estimate the effort using function point analysis for a real time

		project
	UNIT-III: **Function-Oriented Software Design:** Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design. **User Interface Design:** Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.	**UNIT-III:** **Requirements Engineering:** Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management, **Case Study:** Create a SRS document for a real time scenario.
	UNIT-IV: **Coding And Testing:** Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing	**UNIT-IV:** **Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies, **Implementation:** Coding Principles, Coding Process, Code Verification, Code Documentation. **Case Study:** Construct the HLD and LLD using SRS created.
	UNIT-V: **Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model. **Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment	**UNIT-V:** **Software Testing:** Testing Fundamentals, Test Planning, Black-Box Testing, White-Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches. **Software Quality and Reliability:** Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability. **Case Study:** Write the test cases for the real time scenario considered.

	UNIT-VI **Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management. **Software Reuse**: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Computer Organization	Computer Organization
Course Code	R1622054	171CS4T10
Syllabus	**UNIT-I:** Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.	**UNIT-I:** **Basic Structure of Computers:** Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective. **Machine Instruction and Programs:** Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions. **Case Study:** ARM, Motorola and Intel Instruction sets.
	UNIT-II: **Machine Instruction and Programs:** Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions	**UNIT-II:** **Arithmetic :** Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers. **Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro **programd** Control - Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructions with Next –Address Field.
	UNIT-III: Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations	**UNIT-III:** **The Memory System:** Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache

		Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage.
	UNIT-IV: **INPUT/OUTPUTORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)	**UNIT-IV:** **Input/Output Organization:** Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –**Programd** I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).
	UNIT-V: **The MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: MappingFunctions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,	**UNIT-V:** **Pipelining :** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.
	UNIT-VI Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Java Programming Lab	Java Programming Lab
Course Code	R1622058	171CS4L03
Syllabus	Exercise - 1 (Basics) a). Write a JAVA program to display default value of all primitive data type of JAVA b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root. c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers. d) Write a case study on public static void main(250 words) Exercise - 2 (Operations, Expressions, Control-flow, Strings) a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism. b). Write a JAVA program to sort for an element in a given list of elements using bubble sort (c). Write a JAVA program to sort for an element in a given list of elements using merge sort. (d) Write a JAVA program using StringBufferto delete, remove	1.1) Write a Java program to find the discriminent value D and find out the roots of **Week 1 (Basic Programs)** the quadratic equation of the form ax2+bx+c=0. 1.2) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers. **Week 2** (Control Flow Statements) 2.1) Write a Java program to select all the prime numbers within the range of 1 to 10000. 2.2) Write a Java program to Find the sum of all even terms in the Fibonacci sequence up to the given range N. 2.3) Write a Java program to check whether a given N digit number is Armstrong or not. **Week 3** (Class Mechanism) 3.1) Write a Java program to display the details of a person. Personal details should be given in one method and the qualification details in another method. 3.2) Write a Java program to implement constructor. 3.3) Write a Java program to implement

	character. Exercise - 3 (Class, Objects) a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method. b). Write a JAVA program to implement constructor. Exercise - 4 (Methods) a). Write a JAVA program to implement constructor overloading. b). Write a JAVA program implement method overloading. Exercise - 5 (Inheritance) a). Write a JAVA program to implement Single Inheritance b). Write a JAVA program to implement multi level Inheritance c). Write a java program for abstract class to find areas of different shapes Exercise - 6 (Inheritance - Continued) a). Write a JAVA program give example for "super" keyword. b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? **Exercise - 7** (Exception) a).Write a JAVA program that describes exception handling mechanism b).Write a JAVA program Illustrating Multiple catch clauses **Exercise – 8** (Runtime Polymorphism) a). Write a JAVA program that implements Runtime polymorphism b). Write a Case study on run time polymorphism, inheritance that implements in above problem **Exercise – 9** (User defined Exception) a). Write a JAVA program for creation of Illustrating throw b). Write a JAVA program for creation of Illustrating finally c). Write a JAVA program for creation of Java Built-in Exceptions	method overloading. **Week 4** (Arrays) 4.1) Write a Java program to perform addition and multiplication of two matrices. 4.2) Write a Java program to implement binary search. 4.3) Write a Java program to sort the elements using Quick sort. **Week 5** (Strings) 5.1) Write a Java program to sort given set of strings. 5.2) Write a Java program for using StringBuffer to remove or delete a character. 5.3) Write a Java program to find the number of tokens in a given string without using countTokens() method but by using other methods of StringTokenizer class. **Week 6** (Inheritance, Interface & Abstract Class) 6.1) Write a Java program to find the available balance in a customer account. Customer's account details should be taken as input in one class, Transaction details should be taken in another class. (Note: Make use of Multi-Level Inheritance.) 6.2) Take the details of internal exam marks in one Interface. Take the details of external exam marks in another interface. Write a Java program to find the total marks obtained in each subject by a student. (Note: Make use of Multiple Inheritance using interfaces.) 6.3) Write a Java program to find the areas of different shapes using abstract classes. **Week 7** (Packages) 7.1) Write a Java program to illustrate the use of classpath using Java code. 7.2) Write a Java program that import

	d).Write a JAVA program for creation of User Defined Exception **Exercise – 10** (Threads) a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable) b). Write a program illustrating **isAlive** and **join ()** c). Write a Program illustrating Daemon Threads. **Exercise - 11** (Threads continuity) a).Write a JAVA program Producer Consumer Problem b).Write a case study on thread Synchronization after solving the above producer consumer problem **Exercise – 12** (Packages) a). Write a JAVA program illustrate class path b). Write a case study on including in class path in your os environment of your package. c). Write a JAVA program that import and use the defined your package in the previous Problem **Exercise - 13** (Applet) a).Write a JAVA program to paint like paint brush in applet. b) Write a JAVA program to display analog clock using Applet. c). Write a JAVA program to create different shapes and fill colors using Applet. **Exercise - 14** (Event Handling) a).Write a JAVA program that display the x and y position of the cursor movement using Mouse. b).Write a JAVA program that identifies key-up key-down event user entering text in a	and use user defined package. 7.3) Write a Java program to illustrate the use of protected members in a package. **Week 8 (Exception Handling)** 8.1) Write a Java program to illustrate exception handling mechanism using multiple catch clauses. 8.2) Write a Java program to make use of Built-in and user-defined Exceptions in handling a run time exception. **Week 9** (Multithreading) 9.1) Write a Java program to demonstrate the use of demon thread. 9.2) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable). 9.3) Write a Java program to solve Producer-Consumer problem using synchronization. **Week 10** (Applets) 10.1) Write a Java program to demonstrate the Life Cycle of an applet. 10.2) Write a Java program to draw different shapes and fill each shape with a colour using applets. **Week 11** (Event Handling) 11.1)Write a Java program to illustrate the Keyboard Events by using an applet code. 11.2) Write a Java program to illustrate the Mouse Events by using an applet code. **Week 12 (AWT & Swings)** 12.1) Write a Java program to generate a simple calculator using AWT components. 12.2) Write a Java program to create a single ball bouncing inside a JPanel.

	Applet. **Exercise - 15** (Swings) a).Write a JAVA programto build a Calculator in Swings b). Write a JAVA program to display the digital watch in swing tutorial. **Exercise – 16 (Swings - Continued)** a). Write a JAVA program that to create a single ball bouncing inside a JPanel. b). Write a JAVA program JTree as displaying a real tree upside down	**List of Augmented Experiments:** (Any 2 of the following experiments can be performed) 13) Create an interface which consists of methods with the name's no of watt's consumable, luminescent value, efficiency in percentage. Write classes for different categories of bulbs like LED, tube light and find out which light is efficient in terms of consumption. 14) Write a Java program to display analog clock using Applet. 15) Write a Java program to create a menu of a restaurant which includes starters, veggies, delights etc. Ask the user to select the items from the menu and generate bill for those items which he has chosen. (Make use of Swing Components). 16) Write a Java program to display all drives in our system as a tree structure using JTree.

Signature of the course coordinator

Signature of the HOD

ADITYA ENGINEERING COLLEGE

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Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956

Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Department of Computer Science and Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Database Management System Lab	Database Management System Lab
Course Code	R1631058	171CS4L04
Syllabus	SQL 1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions. 2. Queries using operators in SQL 3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update 4. Queries using Group By, Order By, and Having Clauses 5. Queries on Controlling Data: Commit, Rollback, and Save point 6. Queries to Build Report in SQL *PLUS 7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints 8. Queries on Joins and Correlated Sub-Queries 9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features PL/SQL 10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation 11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL	Week 1 1) Queries for Creating, Altering and Dropping Tables, Views and Constraints. Week 2 2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update. 4.1) Queries using Group By, Order By, and Having Clauses. 4.2) Queries on Controlling Data: Commit, Rollback, and Save point. Week 3 3.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions. 3.2) Queries using operators in SQL. Week 4 Week 5 5) Queries on Joins and Correlated Sub-queries. Week 6 6) Queries on Working with Index, Sequence, Synonyms. Week 7 7) Queries to Build Views. PL/SQL Week 8 8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation. Week 9 9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

	12. Write a PL/SQL block using SQL and Control Structures in PL/SQL 13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types 14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS 15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18 16. Demonstration of database connectivity	Week 10 10) Write a PL/SQL block using SQL and Control Structures. Week 11 11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types. Week 12 12) Write a PL/SQL Code using Procedures, Functions, Packages. List of Augmented Experiments: (Any 2 of the following experiments can be performed) 13) For a Sales Order Database System, based on the given E-R diagram

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Department of Computer Science and Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Testing Methodologies	Software Testing Methodologies
Course Code	RT41054	R1632054
Syllabus	**UNIT-I:** **Software Testing:** Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing **Software Testing Terminology and Methodology:** Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to developmentlife cycle Software Testing Methodology.	**UNIT-I:** **Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs. **Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.
	UNIT-II: **Verification and Validation:** Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation **Dynamic Testing I: Black Box testing techniques:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing	**UNIT-II:** **Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application Of Dataflow Testing.
	UNIT-III: Dynamic Testing II: White-Box	**UNIT-III:** Domain Testing: Domains and Paths,

	Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing Static Testing: inspections, Structured Walkthroughs, Technical reviews	Nice & Ugly Domains, Domain testing, Domains And Interfaces Testing, Domain and Interface Testing, Domains and Testability. Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.
	UNIT-IV: **Validation activities:** Unit testing, Integration Testing,. Function testing, system testing, acceptance testing **Regression testing:** Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques	**UNIT-IV:** **Syntax Testing:** Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.
	UNIT-V: . **Efficient Test Suite Management:** Test case deisgnWhy does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite **Software Quality Management:** Software Quality metrics, SQA models Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira	**UNIT-V:** . **State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. **Graph Matrices and Application:-** Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.
	UNIT-VI **Automation and Testing Tools:** need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for	**UNIT-VI** **Software Testing Tools**: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools

	automated testing, overview of some commercial testing tools. **Testing Object Oriented Software:** basics, Object oriented testing **Testing Web based Systems:** Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems	like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

Signature of the Course Coordinator

Signature of the HOD

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Program Name : B.Tech. in Information Technology

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	171HS1T01	English – I	0
2	I	171BS1T01	Mathematics – I	0
3	I	171BS1T02	Mathematics – II	0
4	I	171BS1T04	Applied Physics	0
5	I	171ES1T03	Engineering Drawing	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab – I	0
8	I	171BS1L04	Applied Physics Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English – II	0
11	II	171BS2T06	Mathematics – III	0
12	II	171HS2T02	Environmental Studies	0
13	II	171BS2T05	Applied Chemistry	0
14	II	171ES2T02	Engineering Mechanics	0
15	II	171CS2T01	Data Structures through C	0
16	II	171HS2L02	English Communication Skills Lab – II	0
17	II	171BS2L03	Applied Chemistry Lab	0
18	II	171ES2L02	Engineering Workshop & IT Workshop	0
19	III	171BS3T08	Mathematical Foundations of Computer Science	25
20	III	171ES3T23	Digital Logic Design	0
21	III	171CS3T02	Statistics with R Programming	80
22	III	171CS3T03	Object Oriented Programming through C++	0
23	III	171HS3T04	Managerial Economics & Financial Analysis	0
24	III	171CS3T04	Advanced Data Structures	0
25	III	171CS3L01	Object Oriented Programming Lab	80
26	III	171CS3L02	Advanced Data Structures Lab	30
27	III	171HS3A10	Employability Skills – I	100
28	IV	171HS3A09	Professional Ethics & Human Values	0
29	IV	171CS4T05	Software Engineering	50

30	IV	171IT4T01	Language Processors	100
31	IV	171CS4T07	Java Programming	0
32	IV	171CS4T08	Database Management Systems	0
33	IV	171HS4T05	Management Science	20
34	IV	171CS4T10	Computer Organization	20
35	IV	171CS4L03	Java Programming Lab	50
36	IV	171CS4L04	Database Management Systems Lab	20
37	IV	171HS4A11	Employability Skills – II	100
38	V	171HS4A08	IPR & Patents	0
39	V	R1631121	Human Computer Interaction	100
40	V	R1631052	Unix and Shell Programming	0
41		R1631122	Advanced Java Programming	0
42	V	R1631054	Database Management Systems	0
43	V	R1631055	Operating Systems	0
44	V	R1631123	Advanced Java Programming Lab	0
45	V	R1631124	Unix and Operating Systems Lab	50
46	V	R1631125	Database Management System Lab	20
47	V	R1631049	Professional Ethics & Human Values	0
48	VI	R1632051	Computer Networks	0
49	VI	R1632121	Data Mining	100
50	VI	R1632122	Web Technologies	0
51	VI	R1632054	Software Testing Methodologies	70
52	VI	R163205A	Artificial Intelligence	0
53	VI	R1632123A	Social Networks and Semantic Web	100
54	VI	R1632055D	Digital Signal Processing	0
55	VI	R1632055E	Embbeded Systems	0
56	VI	R1632025D	Robotics	0
57	VI	R1632123B	Operations Research	100
58	VI	R1632124	Web Technologies Lab	0
59	VI	R1632125	Software Testing Lab	20
60	VI	R1632126	Data Mining Lab	100
61	VI	R1632049	IPR & Patents	0
62	VII	RT41051	Cryptography and Network Security	0
63	VII	RT41052	UML & Design Patterns	0
64	VII	RT41053	Mobile Computing	0
65	VII	RT41121	Embedded and Real Time Sytems	0
66	VII	RT41056	Information Retreival Systems	0

67	VII	RT41058	Multimedia Computing	0
68	VII	RT4105B	Haddop and Big Data	0
69	VII	RT4105C	Software Project Management	0
70	VII	RT41122	Computer Vision	0
71	VII	RT4105E	Advanced Databases	0
72	VII	RT4112L	UML & Design Patterns Lab	0
73	VII	RT4112M	Mobile Application Development Lab	0
74	VII	RT4112O	Software Engineering Lab	0
75	VII	RT4112N	Hadoop & BigData Lab	0
76	VII	RT42053A	Human Computer Interaction	0
77	VII	RT42053B	Advanced Operating Systems	0
78	VII	PT42053C	Mobile Adhoc & Sensor Networks	0
79	VII	PT42053D	Pattern Recognition	0
80	VIII	RT42051	Distributed Systems	0
81	VIII	RT42121	Mathematical Opimization (LP, Scheduling, Simulation, QT, Markov analysis, NLP, PERT CPM Network related	0
82	VIII	RT42052	Management Science	0
Total number of courses in the academic year 2018-2019				= 82
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				21
Percentage of syllabus revision carried out in the academic year 2018-2019 = (49/135)*100				= 25.06%

Program Coordinator **Head of the Department**

Head of the Depart.
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18-19

STRUCTURE OF THE CURRICULUM

I SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS1T01	English – I	HSS	3	1	---	4	3
171BS1T01	Mathematics – I	BS	3	1	2	6	3
171BS1T02	Mathematics – II	BS	3	1	---	4	3
171BS1T04	Applied Physics	BS	3	1	---	4	3
171ES1T03	Engineering Drawing	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab – I	HSS	---	---	3	3	2
171BS1L04	Applied Physics Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
		Total	18	6	11	35	24

II SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171HS2T03	English – II	HSS	3	1	---	4	3
171BS2T06	Mathematics – III	BS	3	1	2	6	3
171HS2T02	Environmental Studies	HSS	2	1	---	3	2
171BS2T05	Applied Chemistry	BS	3	1	---	4	3
171ES2T02	Engineering Mechanics	ES	3	1	---	4	3
171CS2T01	Data Structures through C	PC	3	1	2	6	3
171HS2L02	English Communication Skills Lab – II	HSS	---	---	3	3	2
171BS2L03	Applied Chemistry Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop & IT Workshop	ES	---	---	3	3	2
		Total	17	6	13	36	23

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171BS3T08	Mathematical Foundations of Computer Science	BS	3	1	---	4	3
171ES3T23	Digital Logic Design	ES	3	1	---	4	3
171CS3T02	Statistics with R Programming	PC	3	---	2	5	3
171CS3T03	Object Oriented Programming through C++	PC	3	1	---	4	3
171HS3T04	Managerial Economics & Financial Analysis	HSS	3	1	---	4	3
171CS3T04	Advanced Data Structures	PC	3	1	---	4	3
171CS3L01	Object Oriented Programming Lab	PC	---	---	3	3	2
171CS3L02	Advanced Data Structures Lab	PC	---	---	3	3	2
171HS3A10	Employability Skills – I	HSS	---	---	2	2	0
171HS3A09	Professional Ethics & Human Values	HSS	2	---	---	2	0
		Total	20	5	10	35	22

IV SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171CS4T05	Software Engineering	PC	3	1	---	4	3
171IT4T01	Language Processors	PC	3	1	---	4	3
171CS4T07	Java Programming	PC	3	1	---	4	3
171CS4T08	Database Management Systems	PC	3	1	---	4	3
171HS4T05	Management Science	HSS	3	1	---	4	3
171CS4T10	Computer Organization	PC	3	1	---	4	3
171CS4L03	Java Programming Lab	PC	---	---	3	3	2
171CS4L04	Database Management Systems Lab	PC	---	---	3	3	2
171HS4A11	Employability Skills – II	HSS	---	---	2	2	0
171HS4A08	IPR & Patents	HSS	2	---	---	2	0
		Total	20	6	8	34	22

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III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Human Computer Interaction	4	--	--	3
2	Unix and Shell Programming	4	--	--	3
3	Advanced Java Programming	4	--	--	3
4	Database Management Systems	4	--	--	3
5	Operating Systems	4	--	--	3
6	Advanced Java Programming Lab	--	--	--	2
7	Unix and Operating Systems Lab	--	--	3	2
8	Database Management System Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**21**

III Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Computer Networks	4	--	--	3
2	Data Mining	4	--	--	3
3	Web Technologies	4	--	--	3
4	Software Testing Methodologies	4	--	--	3
5	**Open Elective:** i. Artificial Intelligence ii. Social Networks and Semantic Web iii.Digital Signal Processing iv.Embbeded Systems v. Robotics vi.Operations Research	4	--	--	3
6	Web Technologies Lab	--	--	3	2
7	Software Testing Lab	--	--	3	2
8	Data Mining Lab	--	--	3	2
9	IPR & Patents	--	2	--	--
	Total Credits				**21**

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IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Cryptography and Network Security	4	-	3
2	UML & Design Patterns	4	-	3
3	Mobile Computing	4	-	3
4	**Elective –I**	4	-	3
5	**Elective – II**	4	-	3
6	UML & Design Patterns Lab	-	3	2
7	Mobile Application Development Lab	-	3	2
8	Software Testing Lab	-	3	2
9	Hadoop & BigData Lab	-	3	2
	Total Credits			23

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	**Elective – III**	4	-	3
2	Distributed Systems	4	-	3
3	Mathematical Opimization (LP, Scheduling, Simulation, QT, Markov analysis, NLP, PERT CPM Network related problems etc)	4	-	3
4	Management Science	4	-	3
5	Project	-	-	9
	Total Credits			21

Elective – I:

i) Embedded and Real Time Systems
ii) Information Retrieval Systems
iii) Multimedia Computing

Elective – II:

i. Hadoop and Big Data
ii. Software Project Management
iii. Computer Vision
iv. Advanced Databases

Elective – III:

i) Human Computer Interaction
ii) Advanced Operating Systems
iii)Mobile Adhoc & Sensor Networks
iv)Pattern Recognition

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II Year - I Semester

L	T	P	C
4	0	0	3

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

OBJECTIVES:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

UNIT -I:

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus:Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT -II:

Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT- III:

Algebraic Structures and Number Theory: *Algebraic Structures:*Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:*Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT -IV:

Combinatorics: Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

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UNIT -V:

Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT -VI:

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

OUTCOMES:

- Student will be able to demonstrate skills in solving mathematical problems
- Student will be able to comprehend mathematical principles and logic
- Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
- Student will be able to communicate effectively mathematical ideas/results verbally or in writing

TEXT BOOKS:

1.Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.

3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

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STATISTICS WITH R PROGRAMMING
(Common to CSE & IT)

	L	T	P	C
III Semester				
Course Code:171CS3T02	3	0	2	3

Course Outcomes: At the end of the Course, Student will be able to:

- CO1: Identify discrete and continuous random variables and data structures in R
- CO2: Apply discrete and continuous probability distributions to the given data and execute R-functions for probability distributions
- CO3: Explain sampling distribution, estimation and R-functions for constructing confidence intervals
- CO4: Write R program for standard statistical test
- CO5: Apply the concepts of correlation and regression to the given statistical data using R-function and making use of R-graphic functions to visualize the data

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	2	-

Unit – I

Random Variables and Introduction to R: Random Variables- Discrete, Continuous variables-Expectation,Variance,Moment Generating Function.Introduction to R software – Vectors –Matrices–Arrays– Lists – Data frames – Basic mathematical operations in R, R functions, loops and Control statements, Basic Graphics.

Unit – II

Probability Distributions: Discrete Probability distributions- Binomial distribution, Poisson distribution, Geometric distribution. Continuous Probability distributions- Normal distribution, Gamma distribution, Exponential distribution. Writing R commands for computing above probability distributions.

Unit – III

Sampling Theory: Sampling – Central limit theorem (without proof) – Sampling distribution of means – point estimation – interval estimation.Built in R functions for sample statistics, construction of confidence intervals using R.

Unit – IV

Test of Hypothesis: Hypothesis,one tailed,two tailed test, types of errors in Sampling, Z-test, t-tests, ANOVA. Writing R programming for above statistical tests.

Unit – V

Correlation and Regression: Correlation-Simple correlation, rank correlation, properties of correlation coefficient.Regression-Method of least squares-fitting a straight line and quadratic equation, multiple linear Regression.Writing R programs for simple linear correlation and regression.

Text Books:

1. Probability And Statistics, Dr.T.K.V.Iyengar, Dr.B. K. Krishna Gandhi, S. Ranganatham, Dr. M.V.S.S.N. Prasad, S.Chand Publications.
2. G. Jay Kerns, Introduction To Probability And Statistics Using R, First Edition (Free E-Book From R Software Website)

Reference Books:

1. Jay L. Devore, Probability And Statistics For Engineering And Sciences, Eighth Edition, Cengage Learning.
2. R Cookbook, Paul Teetor, Oreilly.
3. R In Action, Rob Kabacoff, Manning.
4. R For Everyone, Lander, Second Edition, Pearson.
5. The Art Of R Programming, Norman Matloff, No Starch Press.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc17_ma17/preview
2. https://onlinecourses.nptel.ac.in/noc16_ma03/preview
3. https://www.tutorialspoint.com/r/
4. http://www.stat.umn.edu/geyer/old/5101/rlook.html
5. http://www.r-tutor.com/elementary-statistics

OBJECT ORIENTED PROGRAMMING LAB

(Common to CSE & IT)

III Semester	**L**	**T**	**P**	**C**
Course Code: 171CS3L01	**0**	**0**	**3**	**2**

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Make Use of Control Structures and modular programming in solving complex problems.

CO2: Apply object oriented techniques to solve computing problems.

CO3: Experiment with the key features of object-oriented programming language.

CO4: Develop C++ classes for code reuse through inheritance.

CO5: Apply exception handling technique to handle various errors.

CO6: Develop C++ programs using Inline, friend functions, Reference variable, this pointer, operator Overloading, static and dynamic binding, template and STL.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	2	1	-	-	-	-	-	3	1	-	-
CO2	-	2	3	-	-	-	-	-	2	1	-	-
CO3	-	3	2	-	-	-	-	-	2	1	-	-
CO4	-	2	3	-	-	-	-	-	2	1	-	-
CO5	-	2	3	-	-	-	-	-	2	1	-	-
CO6	-	3	3	-	-	-	-	-	2	1	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	1	-
CO3	2	-
CO4	2	-
CO5	3	-
CO6	1	-

List of Experiments:

Week 1 (Expressions Control Flow)

1.1) Develop a C++ program to find the roots of a quadratic equation.

1.2) Develop a C++ program to find factorial of a given number using recursion.

Week 2 (Variables, Scope)

2.1) Developa C++ program to implement call-by-reference.

2.2)Develop a C++ program to illustrate scope resolution and namespaces.

2.3) Develop a C++ program illustrating Inline Functions.

Week 3 (Classes and Objects)

3.1) Develop a C++ program demonstrating a Bank Account with necessary data members and member functions.

3.2) Develop a C++ program for illustrating Access Specifiers public and private.

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3.3) Develop a C++ program to illustrate this pointer.

Week 4 (Functions)

4.1) Develop a C++ program illustrate function overloading.
4.2) Develop a C++ program to illustrate the use of default arguments.
4.3) Develop a C++ program illustrating friend function.

Week 5 (Constructors and Destructors)

5.1) Develop a C++ Program to illustrate the use of Constructors and Destructors.
5.2) Develop a C++ program illustrating Constructor overloading.
5.3) Develop a C++ program illustrating Copy Constructor.

Week 6 (Operator Overloading)

6.1) Develop a C++ program to Overload Unary, and Binary Operators using member function.
6.2) Develop a C++ program to Overload Unary, and Binary Operators using friend function.
6.3) Develop a case study on Overloading Operators and Overloading Functions. (150Words)

Week 7(Inheritance)

7.1) Develop C++ Programs to incorporate various forms of Inheritance

i. Single Inheritance
ii. Multiple Inheritances
iii. Multi-level inheritance
iv. Hierarchical Inheritance
v. Hybrid inheritance

7.2) Develop a C++ program in C++ to illustrate the order of execution of constructors and destructors in inheritance.

Week 8 (Access)

8.1) Develop a C++ program to illustrate object as a class member.
8.2) Develop a C++ program to illustrate pointer to a class.
8.3) Develop a C++ program to illustrate Virtual Base Class.

Week 9 (Polymorphism)

10.1) Develop a C++ program to illustrate virtual functions.
10.2) Develop a C++ program to illustrate runtime polymorphism.
10.3) Develop a C++ program to illustrate pure virtual function and calculate the areaofdifferent shapes by using abstract class.

Week 10(Templates)

10.1) Develop a C++ Program illustrating function template.
10.1) Develop a C++ Program illustrating template class.
10.2) Develop a C++ program to illustrate class templates with multiple parameters.

Week 11(Exception Handling)

11.1) Develop a C++ program for handling Exceptions.
11.2) Develop a C++ program to illustrate the use of multiple catch statements.

Week 12 (STL)

12.1) Develop a C++ program to implement List, Vector and its Operations.

12.2) Develop a C++ program to implement Deque and Deque Operations.
12.3) Develop a C++ program to implement Map and Map Operations.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13) Develop a C++ program for flight booking system.

14) Develop Qt application containing slider and spin box in which a slider respondsto changes in the spin box.

15) Develop a Qt application to create a calculator.

16) Develop a Qt application for creating a text pad.

17) Develop a C++ program with maximum of 20 characters, that your user willbeguessed and will show only asterisks (*) on the screen. The user will input or enterone character at a time. And for every correct character, the asteriskwill be replaced by that character until all the characters or the mystery word/s willreveal. Your program will accept a maximum three (3) errors or mistakes inentering/inputting character otherwise the mystery word/s will be viewed.

Sample Output:
Output: *******
Enter your character: e
Output: ***e**e
Enter your character: a
Output: sorry! the character is not existing. you still have 2 chances\
Enter your character: s
Output: s**e**e
Enter your character: c
Output: sc*e*ce
Enter your character: i
Output: scie*ce
Enter your character: n
Output: science

Reference Books:

1. C++ Primer Plus by Stephen Prata, Sixth Edition,Pearson, 2011.
2. C++ GUI Programming with Qt4,Jasmin Blanchette, Mark Summerfield, Second Edition, Prentice Hall Press, 2008.
3. Object Oriented Programming in C++ by E. Balagurusamy, Sixth Edition, Tata McGraw Hill, 2013.
4. C++ for Programmers,Paul J. Deitel, Harvey M. Deitel, Pearson,2009.
5. The C++ Programming Language, BjarneStroustrup, Fourth Edition, Pearson, 2014.

Web Links:

1. http://en.cppreference.com/w/cpp/links/libs
2. https://www.daniweb.com/digital-media/ui-ux-design/threads/113591/trying-to-run-a-c-program-through-a-web-link
3. https://github.com/fffaraz/awesome-cpp
4. http://www.yolinux.com/TUTORIALS/LinuxTutorialC++.html
5. http://www.techsystemsembedded.com/cpp_links.php

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ADVANCED DATA STRUCTURES LAB
(Common to CSE & IT)

III Semester	**L**	**T**	**P**	**C**
Course Code: 171CS3L02	**0**	**0**	**3**	**2**

Course Outcomes:

At the end of the Course, Student will be able to:

- CO1: Construct the graph traversals and minimum spanning tree for a given graph.
- CO2: Develop program to implement lossless data compression algorithm.
- CO3: Apply the hashing techniques to implement Dictionary.
- CO4: Build a Binary Heap using Priority queues.
- CO5: Analyze various basic operations of AVL tree, Red-Black tree, B-Tree to improve the efficiency.
- CO6: Identify the appropriate data structure for a given problem.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	2	3	-	-	-	-	-	2	-	-	-
CO2	-	-	1	-	-	-	-	-	2	3	-	-
CO3	-	2	-	-	-	-	-	-	3	-	-	-
CO4	-	1	3	-	-	-	-	-	1	-	-	-
CO5	-	2	2	-	-	-	-	-	3	2	-	-
CO6	-	-	2	-	-	-	-	-	3	1	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	-	2
CO2	-	-
CO3	-	3
CO4	-	-
CO5	-	2
CO6	-	-

List of Experiments:

Week 1

1) Develop a recursive program to implement Breadth First Search and Depth First Search.

Week 2

2) Develop a non recursive program to implement Breadth First Search and Depth First Search.

Week 3

3) Develop a program to generate a minimum-cost spanning tree using Prim's algorithm.

Week 4

4) Develop a program to generate a minimum-cost spanning tree using Kruskal's algorithm.

Week 5

5) Develop a program to implement Huffman coding.

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Week 6

6) Develop a program to implement functions of dictionary using Hashing Techniques (division method, digit folding and mid square method).

Week 7

7) Develop a program to implement Collision Resolution Techniques (Linear Probing, Quadratic Probing and Double Hashing) in Hash Table.

Week 8

8) Develop a program to perform binary heap operations.

Week 9

9) Develop a program to perform AVL tree operations.

Week 10

10) Develop a program to perform Red-Black tree operations.

Week 11

11) Develop a program to implement B-Tree operations.

Week 12

12) Develop a program to implement B+ Tree operations.

List of Augmented Experiments:

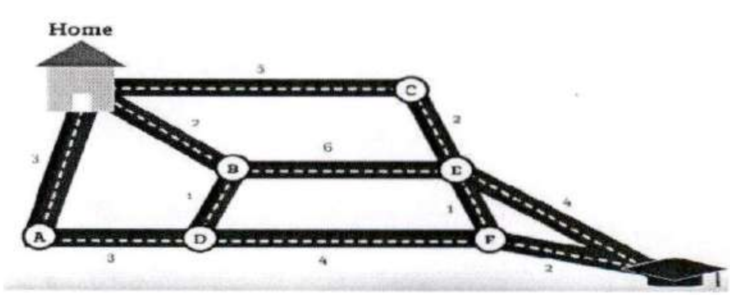
(Any 2 of the following experiments can be performed)

13) Raju created an authentication system which allows users to get authenticated by their passwords. In this system when an user enters a password, the system tries to match it with the password that was earlier created by the user. To keep the system simple Raju stored the passwords set by users in a file in plain in the system.

We all know such system is not secure. Can you help Raju in improving the system using your knowledge on hashing techniques.

14)Suppose a student wants to go from home to school in the shortest possible way. She knows some roads are heavily congested and difficult to use, this means the edge has a large weight--the shortest path tree found by the algorithm will try to avoid edges with larger weights.

Find the shortest path from home to school in the following graph.



14) Monk and Cursed Tree: Binary Search Tree.

Monk has an array A having N distinct integers and a Binary Search Tree which is initially empty. He inserts all the elements of the array from index 1 to N in the BST in the order given in the array. But wait! The tree so formed turns out to be cursed. Monk is having some weird experiences since he made that tree. So, now to stop all that, Monk has two options, to destroy the BST or to pray to God and ask for a solution. Now since Monk has to use this BST in a Code Monk Challenge, he cannot

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SOFTWARE ENGINEERING
(Common to CSE & IT)

IVSemester	**L**	**T**	**P**	**C**
Course Code:171CS4T05	**3**	**1**	**0**	**3**

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Demonstrate an understanding of the key facts, concepts, principles and theories of software engineering.

CO2: Analyze the effective software engineering process, based on knowledge of widely used development lifecycle models. Also

CO3: Explain the various responsibilities and activities of project management.

CO4: Translate a requirements specification into an implementable design, following a structured and organized process.

CO5: Examine a testing strategy for a software system using different testing techniques.

CO6: Discuss about software reliability, quality management, software maintenance and reusability.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	-	-	-	-	-	-	-	-
CO3	3	-	1	-	-	-	-	-	-	-	-	-
CO4	1	2	2	3	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-
CO6	3	1	-	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	1	-
CO4	2	-
CO5	1	-
CO6	1	-

Unit – I

Introduction to Software Engineering: Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.

Software Process: Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models.

Case Study: Survey on different process models including

i)Advantages and Disadvantages of the models

ii)Applicability of the model

iii)Projects developed using the various models

Unit – II

Software Project Management: Project Management Essentials, What is Project

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Management, Software Configuration Management, Risk management.
Project Planning and Estimation: Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques.
Case Study: Estimate the effort using function point analysis for a real time project

Unit – III
Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management,

Case Study: Create a SRS document for a real time scenario.

Unit – IV
Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies,

Implementation: Coding Principles, Coding Process, Code Verification, Code Documentation.

Case Study: Construct the HLD and LLD using SRS created.

Unit – V
Software Testing: Testing Fundamentals, Test Planning, Black-Box Testing, White-Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches.

Software Quality and Reliability: Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability.

Case Study: Write the test cases for the real time scenario considered.

Text Books:

1. Software Engineering – Concepts and Practices: Ugrasen Suman, Cengage Learning, 2013.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, Prentice Hall India.

Reference Books:

1. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press
3. An integrated approach to Software Engineering, Pankaj Jalote, Springer Narosa.
4. Software Engineering: A practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill

Web Links:

1. http://nptel.ac.in/courses/106101061/
2. https://www.coursera.org/learn/software-processes-and-agile-practices
3. http://www.rspa.com/spi/process-generic.html
4. http://www.geeksforgeeks.org/software-engineering-gq/
5. https://www.tutorialspoint.com/software_engineering

IV Year - II Semester

L	T	P	C
4	0	0	3

MANAGEMENT SCIENCE

Course Objectives:

***To familiarize with the process of management and to provide basic insight into select contemporary management practices**

***To provide conceptual knowledge on functional management and strategic management.**

UNIT I

Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

UNIT II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

UNIT IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

Unit V

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

UNIT VI

Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

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Course Outcome:

***After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.**

***Will familiarize with the concepts of functional management project management and strategic management.**

Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science*' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

References:

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

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COMPUTER ORGANIZATION
(Common to CSE & IT)

	L	T	P	C
IV Semester	L	T	P	C
Course Code:171CS4T10	3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Describe the structure and various types of instructions in the computer system.
CO2: Demonstrate the working of CPU, RISC and CISC architecture.
CO3: Summarize the computer arithmetic.
CO4: Demonstrate the use of pipeline and vector processing.
CO5: Exemplify I/O and Memory organization.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	1	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-
CO4	2	2	2	2	-	-	-	-	-	-	-	-
CO5	1	2	1	3	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-

Unit – I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective.

Machine Instruction and Programs: Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions.Case Study: ARM, Motorola and Intel Instruction sets.

Unit – II

Arithmetic : Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro programd Control -Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructionswith Next –Address Field.

Unit – III

The Memory System: Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage

Unit – IV

Input/Output Organization: Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –Programd I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

Unit – V

Pipelining : Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.

Text Books:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill, 2011.
2. Computer System Architecture, M.Morris Mano, Third Edition, Pearson Education,2016.

Reference Books:

1. Computer Architecture and Organization, John P. Hayes, McGraw Hill, 1998.
2. Computer Organization and Architecture, William Stallings, Eighth Edition, Pearson, 2012.
3. Computer System Organization and Architecture, John D. Carpinelli, PearsonEducation, 2012.
4. Structured Computer Organization, Andrew S Tanenbaum, Todd Austin, Sixth Edition, Pearson Education, 2013.
5. Computer Systems Architecture, Aharan Yadin, CRC Press, 2016.

Web Links:

1. http://nptel.ac.in/courses/106106092/
2. http://nptel.ac.in/courses/106103068/2
3. https://onlinecourses.nptel.ac.in/noc17_cs35/preview
4. https://www.coursera.org/learn/comparch
5. http://www.studytonight.com/computer-architecture/

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II Year - II Semester

L	T	P	C
0	0	3	2

JAVA PROGRAMMING LAB

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate thediscriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on **`public static void main`(250 words)**

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements using bubble sort

(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.

(d) Write a JAVA program using StringBufferto delete, remove character.

Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a). Write a JAVA program to implement Single Inheritance

b). Write a JAVA program to implement multi level Inheritance

c). Write a java program for abstract class to find areas of different shapes

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Exercise - 6 (Inheritance - Continued)

a). Write a JAVA program give example for "super" keyword.

b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a).Write a JAVA program that describes exception handling mechanism

b).Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

b). Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

a). Write a JAVA program for creation of Illustrating throw

b). Write a JAVA program for creation of Illustrating finally

c). Write a JAVA program for creation of Java Built-in Exceptions

d).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)

b). Write a program illustrating **isAlive** and **join ()**

c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem

b).Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package.

c). Write a JAVA program that import and use the defined your package in the previous Problem

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Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to display analog clock using Applet.

c). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a).Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

a).Write a JAVA programto build a Calculator in Swings

b). Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)

a). Write a JAVA program that to create a single ball bouncing inside a JPanel.

b). Write a JAVA program JTree as displaying a real tree upside down.

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DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE & IT)

	L	T	P	C
IV Semester				
Course Code: 171CS4L04	**0**	**0**	**3**	**2**

Course Outcomes:

At the end of the Course, Student will be able to:

CO1: Make use of the concepts of relational model techniques for database design.
CO2: Construct a database schema for a given problem-domain.
CO3: Apply Normalization techniques on a database to avoid anomalies.
CO4: Build queries on a database using SQL DDL/DML commands.
CO5: Apply integrity constraints on a database using RDBMS.
CO6: Develop PL/SQL stored procedures, stored functions, cursors and packages.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	1	-	-	3	-	-	-	1	-	-	-
CO2	-	1	-	-	3	-	-	-	1	-	-	-
CO3	-	2	-	-	3	-	-	-	1	-	-	-
CO4	-	2	-	-	3	-	-	-	1	-	-	-
CO5	-	2	-	-	3	-	-	-	1	-	-	-
CO6	-	2	-	-	3	-	-	-	1	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	2	-
CO4	2	-
CO5	1	-
CO6	2	-

List of Experiments:

SQL:

Week 1

1) Queries for Creating, Altering and Dropping Tables, Views and Constraints.

Week 2

2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update.

Week 3

3.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions.

3.2) Queries using operators in SQL.

Week 4

4.1) Queries using Group By, Order By, and Having Clauses.

4.2) Queries on Controlling Data: Commit, Rollback, and Save point.

Week 5

5) Queries on Joins and Correlated Sub-queries.

Week 6

6) Queries on Working with Index, Sequence, Synonyms.

Week 7

7) Queries to Build Views.

PL/SQL

Week 8

8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation.

Week 9

9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

Week 10

10) Write a PL/SQL block using SQL and Control Structures.

Week 11

11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.

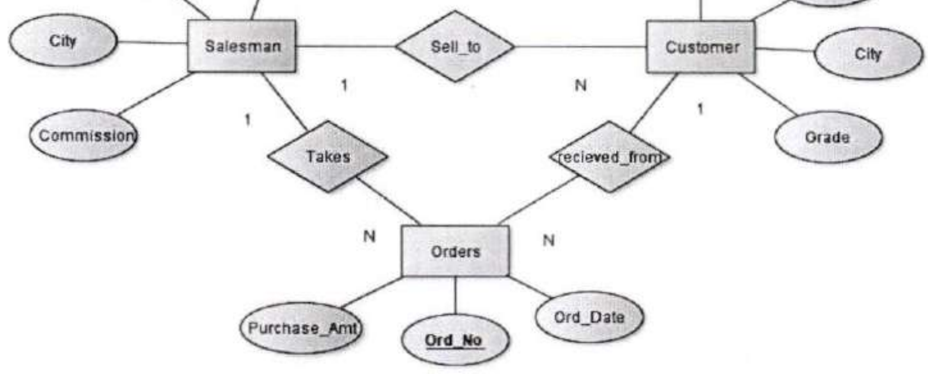
Week 12

12) Write a PL/SQL Code using Procedures, Functions, Packages.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13) For a Sales Order Database System, based on the given E-R diagram.



a. Design a schema by applying functional dependencies.

b. Apply constraints and verify them.

14) Based on the following schema for a Library Database:

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (Book_id, Author_Name)

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Week9 (Multithreading)

9.1) Write a Java program to demonstrate the use of demon thread.

9.2) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable).

9.3) Write a Java program to solve Producer-Consumer problem using synchronization.

Week10 (Applets)

10.1) Write a Java program to demonstrate the Life Cycle of an applet.

10.2) Write a Java program to draw different shapes and fill each shape with a color using applets.

Week11 (Event Handling)

11.1) Write a Java program to illustrate the Keyboard Events by using an applet code.

11.2) Write a Java program to illustrate the Mouse Events by using an applet code.

Week12(AWT & Swings)

12.1) Write a Java program to generate a simple calculator using AWT components.

12.2) Write a Java program to create a single ball bouncing inside a JPanel.

List of Augmented Experiments:Week 13 - Week 16

(Any 2 of the following experiments can be performed)

13) Create an interface which consists of methods calledno of watts consumable, luminescent value, efficiency in percentage. Write classes for different categories of bulbs like LED, tube light and find out which light is efficient in terms of consumption.

14) Write a Javaprogram to display analog clock using Applet.

15) Write a Java program to create a menu of a restaurant which includes starters, veggies, delights etc. Ask the user to select the items from the menu and generate bill for those items which he has chosen. (Make use of Swing Components).

16) Write a Java program to display all drives in our system as a tree structure using JTree.

Reference Books:

1. Core Java: An Integrated Approach – R. Nageswara Rao, John Wiley and Sons Inc., First Edition, 2015.
2. Java Tutorial: A Short Note on Basics - Sharon BioccaZakhour, SoumyaKannan, Raymond Gallardo, Oracle Corp, Fifth Edition,2012.
3. Object Oriented Programming using Java – Simon Kendal First Edition, 2009.
4. Java:The fundamentals of Objects and Classes–David Etheridge First Edition, 2009.

Web Links:

1. http://www.programmingtutorials.com/java.aspx
2. http://www.javacodegeeks.com
3. http://java.sun.com/developer/onlineTraining/
4. http://java.sun.com/learning
5. http://www.kodejava.org

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III Year - I Semester

L	T	P	C
0	0	3	2

UNIX AND OPERATING SYSTEMS LAB

OBJECTIVES:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- To familiarize students with basic Unix administration

Operating Systems

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls
3. Simulate the following
   a) Multiprogramming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention.
6. Simulate the following page replacement algorithms.
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies
   a) Sequenced b) Indexed c) Linked

UNIX Programming

List of Experiments:

1. Basic Shell Commands Shell Programs:
2. Fibonacci Series
3. Designing Calculator
4. File Operations
5. Base conversion
6. Usage of cut and grep commands
7. Usage of user defined functions Administration
8. Managing User Accounts
9. User Quota Management
10. Installation of RPM software and Zipping, tar
11. Configuring RAID
12. Configuring Web server

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OUTCOMES:

- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Work confidently in Unix/Linux environment
- Write shell scripts to automate various tasks
- Master the basics of Linux administration

III Year - II Semester

L	T	P	C
4	0	0	3

SOFTWARE TESTING LAB

OBJECTIVES:

- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications

1 Write programs in 'C' Language to demonstrate the working ofthe following constructs:

i) do...while

ii) while....do

iii) if...else

iv) switch

v) for

2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4 Write the test cases for any known application (e.g. Banking application)

5 Create a test plan document for any application (e.g. Library Management System)

6 Study of Win Runner Testing Tool and its implementation

a) Win runner Testing Process and Win runner User Interface.

b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.

c) How to record a test script and explains the basics of Test Script Language (TSL).

d) How to synchronize a test when the application responds slowly.

e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.

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f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.

g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.

h) How to read and check text found in GUI objects and bitmaps.

i) How to create a batch test that automatically runs the tests.

j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

7 Apply Win Runner testing tool implementation in any real time applications.

OUTCOMES:

- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams
- Define, formulate and analyze a problem

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III Year - II Semester	L	T	P	C
	4	0	0	3

SOFTWARE TESTING METHODOLOGIES

OBJECTIVE:

Fundamentals for various testing methodologies.

- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

UNIT-I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application ofDataflow Testing.

UNIT-III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:

Syntax Testing: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT – V:

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT -VI:

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

OUTCOME:

- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, 2007 Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Statistics with R Programming	Statistics with R Programming
Course Code	R1621051	171CS3T02
Syllabus	**UNIT-I:** Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.	**UNIT-I:** **Random Variables and Introduction to R:** Random Variables- Discrete, Continuous variables-Expectation, Variance, Moment Generating Function. Introduction to R software – Vectors – Matrices – Arrays – Lists – Data frames – Basic mathematical operations in R, R functions, loops and Control statements, Basic Graphics.
	UNIT-II: R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.	**UNIT-II:** **Probability Distributions:** Discrete Probability distributions- Binomial distribution, Poisson distribution, Geometric distribution. Continuous Probability distributions- Normal distribution, Gamma distribution, Exponential distribution. Writing R commands for computing above probability distributions.
	UNIT-III: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products- Minima and Maxima- Calculus,	**UNIT-III:** Sampling Theory: Sampling – Central limit theorem (without proof) – Sampling distribution of means – point estimation – interval estimation. Built in R functions for sample

	Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,	statistics, construction of confidence intervals using R.
	UNIT-IV: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.	**UNIT-IV:** **Test of Hypothesis:** Hypothesis, one tailed, two tailed test, types of errors in Sampling, Z-test, t-tests, ANOVA. Writing R programming for above statistical tests.
	UNIT-V: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA.	**UNIT-V:** **Correlation and Regression:** Correlation-Simple correlation, rank correlation, properties of correlation coefficient. Regression-Method of least squares-fitting a straight line and quadratic equation, multiple linear Regression. Writing R programs for simple linear correlation and regression.
	UNIT-VI Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,	

Signature of the Course Coordinator

Signature of the HOD

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Object Oriented Programming Lab	Object Oriented Programming Lab
Course Code	16A91A0501	171CS3L01
Syllabus	**Exercise – 1 (Basics)** Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user a) Convert any two programs that are written in C into C++ b) Write a description of using g++ (150 Words) **Exercise – 2 (Expressions Control Flow)** Write a Program that computes the simple interest and compound interest payable on principal amount (inRs.) of loan borrowed by the customer from a bank for a giver period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest. b) Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger entersthe bus, the conductor asks "What distance will you travel?" On knowing distance frompassenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.	**Week 1 (Expressions Control Flow)** 1.1) Develop a C++ program to find the roots of a quadratic equation. 1.2) Develop a C++ program to find factorial of a given number using recursion. **Week 2 (Variables, Scope)** 2.1) Develop a C++ program to implement call-by-reference. 2.2) Develop a C++ program to illustrate scope resolution and namespaces. 2.3) Develop a C++ program illustrating Inline Functions. **Week 3 ((Classes and Objects)** 3.1) Develop a C++ program demonstrating a Bank Account with necessary data members and member functions. 3.2) Develop a C++ program for illustrating Access Specifiers public and private. 3.3) Develop a C++ program to illustrate this pointer. **Week 4 (Functions)** 4.1) Develop a C++ program illustrate function overloading. 4.2) Develop a C++ program to illustrate the use of default arguments. 4.3) Develop a C++ program illustrating friend function. **Week 5 (Constructors and**

	Exercise – 3 (Variables, Scope, Allocation) a) Write a program to implement call by value and call by reference using reference variable. b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory Allocation) c) Write a program to illustrate Storage classes d) Write a program to illustrate Enumerations **Exercises –4** (Functions) Write a program illustrating Inline Functions a) Write a program illustrate function overloading. Write 2 overloading functions for power. b) Write a program illustrate the use of default arguments for simple interest function. **Exercise -5** (Functions –Exercise Continued) a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers b) Write a program illustrate function template for power of a number. c) Write a program to illustrate function template for swapping of two numbers. **Exercise -6** (Classes Objects) Create a Distance class with: • feet and inches as data members • member function to input distance • member function to output distance • member function to add two distance objects a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum. b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the	**Destructors)** 5.1) Develop a C++ Program to illustrate the use of Constructors and Destructors. 5.2) Develop a C++ program illustrating Constructor overloading. 5.3) Develop a C++ program illustrating Copy Constructor. **Week 6 (Operator Overloading)** 6.1) Develop a C++ program to Overload Unary, and Binary Operators using member function. 6.2) Develop a C++ program to Overload Unary, and Binary Operators using friend function. 6.3) Develop a case study on Overloading Operators and Overloading Functions. (150 Words) **Week 7(Inheritance)** 7.1) Develop C++ Programs to incorporate various forms of Inheritance 7.2) Develop a C++ program in C++ to illustrate the order of execution of constructors and destructors in inheritance. **Week 8 (Access)** 8.1) Develop a C++ program to illustrate object as a class member. 8.2) Develop a C++ program to illustrate pointer to a class. 8.3) Develop a C++ program to illustrate Virtual Base Class. **Week 9 (Polymorphism)** 10.1) Develop a C++ program to illustrate virtual functions. 10.2) Develop a C++ program to illustrate runtime polymorphism. 10.3) Develop a C++ program to illustrate pure virtual function and calculate the area of different shapes by using abstract class. **Week 10(Templates)** 10.1) Develop a C++ Program illustrating function template. 10.1) Develop a C++ Program illustrating template class.

	above program.) c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem) d). Write a C++ program demonstrating a BankAccount with necessary methods and variables **Exercise – 7** (Access) Write a program for illustratingAccess Specifiers public, private, protected a) Write a program implementing Friend Function b) Write a program to illustrate this pointer c) Write a Program to illustrate pointer to a class **Exercise -8** (Operator Overloading) a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function. i. Unary operator as member function ii. Binary operator as nonmember function b). Write a c ++ program to implement the overloading assignment = operator c).Write a case study on Overloading Operators and Overloading Functions (150 Words) **Exercise -9** (Inheritance) a) Write C++ Programs and incorporating various forms of Inheritance i) Single Inheritance ii) Hierarchical Inheritance iii) Multiple Inheritances iv) Multi-level inheritance v) Hybrid inheritance b) Write a program to show Virtual Base Class c) Write a case study on using virtual classes (150 Words) **Exercise-10** (Inheritance –Continued) a) Write a Program in C++ to illustrate the order of execution of constructors	10.2) Develop a C++ program to illustrate class templates with multiple parameters. **Week 11(Exception Handling)** 11.1) Develop a C++ program for handling Exceptions. 11.2) Develop a C++ program to illustrate the use of multiple catch statements. **Week 12 (STL)** 12.1) Develop a C++ program to implement List, Vector and its Operations. 12.2) Develop a C++ program to implement Deque and Deque Operations. 12.3) Develop a C++ program to implement Map and Map Operations.

	and destructors in inheritance b) Write a Program to *show* how *constructors* are invoked in *derived class* **Exercise -11** (Polymorphism) a) Write a program to illustrate runtime polymorphism b) Write a program to illustrate this pointer c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class. d) Write a case study on virtual functions (150 Words) **Exercise -12**(Templates) a) Write a C++ Program to illustrate template class b) Write a Program to illustrate class templates with multiple parameters c) Write a Program to illustrate member function templates **Exercise -13** (Exception Handling) a).Write a Program for Exception Handling Divide by zero b). Write a Program to rethrow an Exception **Exercise -14** (STL) a) Write a Program to implement List and List Operations b) Write a Program to implementVector andVector Operations **Exercise -15** (STLContinued) a) Write a Program to implement Deque and Deque Operations b) Write a Program to implement Map and Map Operations	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Advanced Data Structures Lab	Advanced Data Structures Lab
Course Code	R1622057	171CS3L02
Syllabus	1. To perform various operations i.e., insertions and deletions on AVL trees. 2. To implement operations on binary heap. i) Vertex insertion ii) Vertex deletion iii) Finding vertex iv) Edge addition and deletion 3. To implement Prim's algorithm to generate a min-cost spanning tree. 4. To implement Krushkal's algorithm to generate a min-cost spanning tree. 5. To implement Dijkstra's algorithm to find shortest path in the graph. 6. To implementation of Static Hashing (Use Linear probing for collision resolution) 7. To implement of Huffmann coding. 8. To implement of B-tree.	1) Develop a recursive program to implement Breadth First Search and Depth First Search. 2) Develop a non recursive program to implement Breadth First Search and Depth First Search. 3) Develop a program to generate a minimum-cost spanning tree using Prim's algorithm. 4) Develop a program to generate a minimum-cost spanning tree using Kruskal's algorithm. 5) Develop a program to implement Huffman coding. 6) Develop a program to implement functions of dictionary using Hashing Techniques (division method, digit folding and mid square method). 7) Develop a program to implement Collision Resolution in Hash Table. 8) Develop a program to perform binary heap operations. 9) Develop a program to perform AVL tree operations. 10) Develop a program to perform Red-Black tree operations. 11) Develop a program to implement B-Tree operations. 12) Develop a program to implement B+ Tree operations.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Engineering	Software Engineering
Course Code	R1622051	171CS4T05
Syllabus	**UNIT-I:** Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.	**UNIT-I:** **Introduction to Software Engineering**: Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. i) Advantages and Disadvantages of the models ii) Applicability of the model iii) Projects developed using the various models **Software Process:** Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models. **Case Study**: Survey on different process models including
	UNIT-II: **Requirements Analysis And Specification:** Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification. **Software Design:** Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design	**UNIT-II:** **Software Project Management:** Project Management Essentials, What is Project Management, Software Configuration Management, Risk management. **Project Planning and Estimation:** Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques. **Case Study:** Estimate the effort using function point analysis for a real time

		project
	UNIT-III: **Function-Oriented Software Design:** Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design. **User Interface Design**: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.	**UNIT-III:** **Requirements Engineering:** Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management, **Case Study:** Create a SRS document for a real time scenario.
	UNIT-IV: **Coding And Testing:** Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing	**UNIT-IV:** **Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies, **Implementation:** Coding Principles, Coding Process, Code Verification, Code Documentation. **Case Study:** Construct the HLD and LLD using SRS created.
	UNIT-V: **Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model. **Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment .	**UNIT-V:** . **Software Testing**: Testing Fundamentals, Test Planning, Black-Box Testing, White-Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches. **Software Quality and Reliability:** Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability. **Case Study:** Write the test cases for the real time scenario considered.

	UNIT-VI **Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management. **Software Reuse**: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Computer Organization	Computer Organization
Course Code	R1622054	171CS4T10
Syllabus	**UNIT-I:** Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.	**UNIT-I:** **Basic Structure of Computers:** Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective. **Machine Instruction and Programs:** Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions. **Case Study:** ARM, Motorola and Intel Instruction sets.
	UNIT-II: **Machine Instruction and Programs:** Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions	**UNIT-II:** **Arithmetic :** Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers. **Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro **programd** Control - Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructions with Next –Address Field.
	UNIT-III: Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations	**UNIT-III:** **The Memory System:** Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache

		Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage.
	UNIT-IV: INPUT/OUTPUTORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)	**UNIT-IV: Input/Output Organization:** Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –**Programd** I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).
	UNIT-V: The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: MappingFunctions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,	**UNIT-V: Pipelining :** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.
	UNIT-VI Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Java Programming Lab	Java Programming Lab
Course Code	R1622058	171CS4L03
Syllabus	Exercise - 1 (Basics) a). Write a JAVA program to display default value of all primitive data type of JAVA b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root. c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers. d) Write a case study on public static void main(250 words) Exercise - 2 (Operations, Expressions, Control-flow, Strings) a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism. b). Write a JAVA program to sort for an element in a given list of elements using bubble sort (c). Write a JAVA program to sort for an element in a given list of elements using merge sort. (d) Write a JAVA program using StringBufferto delete, remove	1.1) Write a Java program to find the discriminent value D and find out the roots of **Week 1 (Basic Programs)** the quadratic equation of the form ax2+bx+c=0. 1.2) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers. **Week 2** (Control Flow Statements) 2.1) Write a Java program to select all the prime numbers within the range of 1 to 10000. 2.2) Write a Java program to Find the sum of all even terms in the Fibonacci sequence up to the given range N. 2.3) Write a Java program to check whether a given N digit number is Armstrong or not. **Week 3** (Class Mechanism) 3.1) Write a Java program to display the details of a person. Personal details should be given in one method and the qualification details in another method. 3.2) Write a Java program to implement constructor. 3.3) Write a Java program to implement

	character. Exercise - 3 (Class, Objects) a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method. b). Write a JAVA program to implement constructor. Exercise - 4 (Methods) a). Write a JAVA program to implement constructor overloading. b). Write a JAVA program implement method overloading. Exercise - 5 (Inheritance) a). Write a JAVA program to implement Single Inheritance b). Write a JAVA program to implement multi level Inheritance c). Write a java program for abstract class to find areas of different shapes Exercise - 6 (Inheritance - Continued) a). Write a JAVA program give example for "super" keyword. b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? **Exercise - 7** (Exception) a).Write a JAVA program that describes exception handling mechanism b).Write a JAVA program Illustrating Multiple catch clauses **Exercise – 8** (Runtime Polymorphism) a). Write a JAVA program that implements Runtime polymorphism b). Write a Case study on run time polymorphism, inheritance that implements in above problem **Exercise – 9** (User defined Exception) a). Write a JAVA program for creation of Illustrating throw b). Write a JAVA program for creation of Illustrating finally c). Write a JAVA program for creation of Java Built-in Exceptions	method overloading. **Week 4** (Arrays) 4.1) Write a Java program to perform addition and multiplication of two matrices. 4.2) Write a Java program to implement binary search. 4.3) Write a Java program to sort the elements using Quick sort. **Week 5** (Strings) 5.1) Write a Java program to sort given set of strings. 5.2) Write a Java program for using StringBuffer to remove or delete a character. 5.3) Write a Java program to find the number of tokens in a given string without using countTokens() method but by using other methods of StringTokenizer class. **Week 6** (Inheritance, Interface & Abstract Class) 6.1) Write a Java program to find the available balance in a customer account. Customer's account details should be taken as input in one class, Transaction details should be taken in another class. (Note: Make use of Multi-Level Inheritance.) 6.2) Take the details of internal exam marks in one Interface. Take the details of external exam marks in another interface. Write a Java program to find the total marks obtained in each subject by a student. (Note: Make use of Multiple Inheritance using interfaces.) 6.3) Write a Java program to find the areas of different shapes using abstract classes. **Week 7** (Packages) 7.1) Write a Java program to illustrate the use of classpath using Java code. 7.2) Write a Java program that import

	d).Write a JAVA program for creation of User Defined Exception **Exercise – 10** (Threads) a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable) b). Write a program illustrating **isAlive** and **join ()** c). Write a Program illustrating Daemon Threads. **Exercise - 11** (Threads continuity) a).Write a JAVA program Producer Consumer Problem b).Write a case study on thread Synchronization after solving the above producer consumer problem **Exercise – 12** (Packages) a). Write a JAVA program illustrate class path b). Write a case study on including in class path in your os environment of your package. c). Write a JAVA program that import and use the defined your package in the previous Problem **Exercise - 13** (Applet) a).Write a JAVA program to paint like paint brush in applet. b) Write a JAVA program to display analog clock using Applet. c). Write a JAVA program to create different shapes and fill colors using Applet. **Exercise - 14** (Event Handling) a).Write a JAVA program that display the x and y position of the cursor movement using Mouse. b).Write a JAVA program that identifies key-up key-down event user entering text in a	and use user defined package. 7.3) Write a Java program to illustrate the use of protected members in a package. **Week 8 (Exception Handling)** 8.1) Write a Java program to illustrate exception handling mechanism using multiple catch clauses. 8.2) Write a Java program to make use of Built-in and user-defined Exceptions in handling a run time exception. **Week 9** (Multithreading) 9.1) Write a Java program to demonstrate the use of demon thread. 9.2) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable). 9.3) Write a Java program to solve Producer-Consumer problem using synchronization. **Week 10** (Applets) 10.1) Write a Java program to demonstrate the Life Cycle of an applet. 10.2) Write a Java program to draw different shapes and fill each shape with a colour using applets. **Week 11** (Event Handling) 11.1)Write a Java program to illustrate the Keyboard Events by using an applet code. 11.2) Write a Java program to illustrate the Mouse Events by using an applet code. **Week 12 (AWT & Swings)** 12.1) Write a Java program to generate a simple calculator using AWT components. 12.2) Write a Java program to create a single ball bouncing inside a JPanel.

	Applet. **Exercise - 15** (Swings) a).Write a JAVA programto build a Calculator in Swings b). Write a JAVA program to display the digital watch in swing tutorial. **Exercise – 16 (Swings - Continued)** a). Write a JAVA program that to create a single ball bouncing inside a JPanel. b). Write a JAVA program JTree as displaying a real tree upside down	**List of Augmented Experiments:** (Any 2 of the following experiments can be performed) 13) Create an interface which consists of methods with the name's no of watt's consumable, luminescent value, efficiency in percentage. Write classes for different categories of bulbs like LED, tube light and find out which light is efficient in terms of consumption. 14) Write a Java program to display analog clock using Applet. 15) Write a Java program to create a menu of a restaurant which includes starters, veggies, delights etc. Ask the user to select the items from the menu and generate bill for those items which he has chosen. (Make use of Swing Components). 16) Write a Java program to display all drives in our system as a tree structure using JTree.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Database Management System Lab	Database Management System Lab
Course Code	R1631058	171CS4L04
Syllabus	SQL 1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions. 2. Queries using operators in SQL 3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update 4. Queries using Group By, Order By, and Having Clauses 5. Queries on Controlling Data: Commit, Rollback, and Save point 6. Queries to Build Report in SQL *PLUS 7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints 8. Queries on Joins and Correlated Sub-Queries 9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features PL/SQL 10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation 11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL	Week 1 1) Queries for Creating, Altering and Dropping Tables, Views and Constraints. Week 2 2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update. 4.1) Queries using Group By, Order By, and Having Clauses. 4.2) Queries on Controlling Data: Commit, Rollback, and Save point. Week 3 3.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions. 3.2) Queries using operators in SQL. Week 4 Week 5 5) Queries on Joins and Correlated Sub-queries. Week 6 6) Queries on Working with Index, Sequence, Synonyms. Week 7 7) Queries to Build Views. PL/SQL Week 8 8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation. Week 9 9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

	12. Write a PL/SQL block using SQL and Control Structures in PL/SQL 13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types 14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS 15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18 16. Demonstration of database connectivity	Week 10 10) Write a PL/SQL block using SQL and Control Structures. Week 11 11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types. Week 12 12) Write a PL/SQL Code using Procedures, Functions, Packages. List of Augmented Experiments: (Any 2 of the following experiments can be performed) 13) For a Sales Order Database System, based on the given E-R diagram

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Testing Methodologies	Software Testing Methodologies
Course Code	RT41054	R1632054
Syllabus	**UNIT-I:** **Software Testing:** Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing **Software Testing Terminology and Methodology:** Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to developmentlife cycle Software Testing Methodology.	**UNIT-I:** **Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs. **Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.
	UNIT-II: **Verification and Validation:** Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation **Dynamic Testing I: Black Box testing techniques:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing	**UNIT-II:** **Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application Of Dataflow Testing.
	UNIT-III: Dynamic Testing II: White-Box	**UNIT-III:** Domain Testing: Domains and Paths,

	Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing Static Testing: inspections, Structured Walkthroughs, Technical reviews	Nice & Ugly Domains, Domain testing, Domains And Interfaces Testing, Domain and Interface Testing, Domains and Testability. Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.
	UNIT-IV: **Validation activities:** Unit testing, Integration Testing,. Function testing, system testing, acceptance testing **Regression testing:** Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques	**UNIT-IV:** **Syntax Testing:** Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.
	UNIT-V: . **Efficient Test Suite Management:** Test case deisgnWhy does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite **Software Quality Management:** Software Quality metrics, SQA models Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira	**UNIT-V:** . **State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. **Graph Matrices and Application:-** Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.
	UNIT-VI **Automation and Testing Tools:** need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for	**UNIT-VI** **Software Testing Tools**: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools

	automated testing, overview of some commercial testing tools. **Testing Object Oriented Software:** basics, Object oriented testing **Testing Web based Systems:** Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems	like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Management Science	Management Science
Course Code	RT32054	R1632054
Syllabus	UNIT-I Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization-Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure	**UNIT-I** Introduction to Management: Concept nature and importance of Management, Generic Functions of Management, and Evaluation of Management thought, Theories of Motivation, Decision making process, Designing organization structure, Principles of organization & Organizational typology
	UNIT-II Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).	**UNIT-II** Operations Management : Principles and Types of Management, Work study, Statistical Quality Control, Control charts (P-chart, R-chart, and C-chart) Simple problems, Material Management: Need for Inventory control, EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis), Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma, Supply chain management
	UNIT-III: Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment	UNIT-III Functional Management :Concept of HRM, HRD and PMIR, Functions of HR Manager, Wage payment plans(Simple Problems),Job Evaluation

	plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing ManagementFunctions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.	and Merit Rating, Marketing Management, Functions of Marketing, Strategies based on product Life Cycle, Channels of distributions.
	UNIT-IV: Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)	**UNIT-IV:** Project Management: Development of Network, Difference between PERT and CPM, Identifying Critical Path, Probability, Project Crashing (Simple Problems).
	UNIT-V: . Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.	UNIT-V: . Strategic Management :Vision, Mission, Goals, Strategy, Elements of Corporate Planning Process, Environmental Scanning ,SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives, Basic concepts of MIS, ERP, Capability Maturity Model(CMM) Levels, Balanced Score Card.

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Program Name : B.Tech. in Petroleum Technology

Syllabus Revision for the Academic Year 2018-2019				
S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	171HS1T01	English - I	0
2	I	171BS1T01	Mathematics - I	0
3	I	171HS1T02	Environmental Studies	0
4	I	171BS1T03	Engineering Chemistry	0
5	I	171ES1T02	Engineering Mechanics	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab - I	0
8	I	171BS1L01	Engineering Chemistry Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English - II	0
11	II	171BS2T06	Mathematics - III	0
12	II	171BS2T02	Mathematics - II	0
13	II	171BS2T07	Engineering Physics	0
14	II	171ES2T03	Engineering Drawing	0
15	II	171ES2T07	Elements Of Mechanical Engineering	0
16	II	171HS2L02	English Communication Skills Lab - II	0
17	II	171BS2L02	Engineering Physics Lab	0
18	II	171ES2L02	Engineering Workshop And IT Workshop	0
19	III	171BS3T09	Complex Variables	25
20	III	171ES3T16	Materials Science And Engineering	0
21	III	171ES3T17	General Geology	0
22	III	171ES3T18	Surveying And Offshore Structures	0
23	III	171PT3T01	Chemical Process Calculations	0
24	III	171ES3T05	Basic Electrical And Electronics Engineering	0
25	III	171ES3L09	Basic Engineering Lab	0
26	III	171ES3L10	Geology And Surveying Lab	0
27	III	171HS3A10	Employability Skills - I	100
28	III	171HS3A09	Professional Ethics And Human Values	0
29	IV	171BS4T10	Probability And Statistics	25

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
30	IV	171PT4T02	Momentum Transfer	0
31	IV	171PT4T03	Petroleum Geology	0
32	IV	171PT4T04	Thermodynamics For Petroleum Engineers	0
33	IV	171PT4T05	Process Heat Transfer	0
34	IV	171HS4T05	Management Science	0
35	IV	171PT4L01	Momentum Transfer Lab	0
36	IV	171PT4L02	Process Heat Transfer Lab	0
37	IV	171HS4A11	Employability Skills - II	100
38	IV	171HS4A08	IPR And Patents	0
39	V	R1631011	Management Science	0
40	V	R1631271	Process Dynamics And Control	0
41	V	R1631272	Process Instrumentation	0
42	V	R1631273	Well Logging And Formation Evaluation	0
43	V	R1631274	Drilling Technology	72
44	V	R1631275	Mathematical Methods Lab	0
45	V	R1631276	Instrumentation Process Dynamics And Control Lab	0
46	V	R1631277	Drilling Fluids Lab	0
47	V	R1631278	Industrial Visits	0
48	V	R1631279	Mini Project-I	0
49	VI	R1632271	Well Completions Testing And Servicing	0
50	VI	R1632272	Petroleum Production Engineering	20
51	VI	R1632273	Petroleum Reservoir Engineering-I	0
52	VI	R1632274	Petroleum Refinery And Petrochemical Engineering	0
53	VI	R163227A	Electronoic Instrument	0
54	VI	R163227C	Big Data Analytics	0
55	VI	R163227D	Alternative Energy Sources For Automobiles	0
56	VI	R163227E	Computational Fluid Dynamics	0
57	VI	R163227B	Fundamentals Of Liquefied Natural Gas	0
58	VI	R1632276	Drilling Simulation Lab	0
59	VI	R1632277	Petroleum Analysis Lab	0
60	VI	R1632278	Petroleum Reservoir Engineering Lab	0
61	VI	R1632279	Summer Internship (4-6 Weeks)	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
62	VI	R1632280	Mini Project-II	0
63	VII	RT41271	Integrated Asset Management	0
64	VII	RT41272	Enhanced Oil Recovery Techniques	0
65	VII	RT41273	Hse And Fe In Petroleum Industry	0
66	VII	RT41274	Petroleum Reservoir Engineering Ii	0
67	VII	RT41016B	Fundamentals Of Petroleum Industry	0
68	VII	RT41016F	Green Technologies	0
69	VII	RT41016A	Energy Mangement	0
70	VII	RT41016C	Offshore Enginnering	0
71	VII	RT41016D	Pipeline Enginnering	0
72	VII	RT41279	Coal Bed Methane Engineering	0
73	VII	RT4127L	Petroleum Equipment Design And Simulation Lab	0
74	VII	RT4127M	Petroleum Reservoir Engineering Lab	0
75	VII	RT4127N	Presentation Of Sip Report	0
76	VIII	RT42275	Project	0
77	VIII	RT42271	Petroleum Economics And Regulations And Policies	0
78	VIII	RT42272A	Reservoir Modeling And Simulation	0
79	VIII	RT42272B	Horizontal Well Technology	0
80	VIII	RT42272C	Lng-Processes And Transportation And Storage	0
81	VIII	RT42273A	Reservoir Stimulation	0
82	VIII	RT42273B	Subsea Engineering	0
83	VIII	RT42273C	Fundamentals Of Multiphase Flow	0
84	VIII	RT42274A	Natural Gas Hydrates	0
85	VIII	RT42274B	Advanced Natural Gas Engineering	0
86	VIII	RT42274C	Petroleum Biotechnology	0

Total number of courses in the academic year 2018-2019	= 86
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 5
Percentage of syllabus revision carried out in the academic year 2018-2019 = (5/86)*100	= 5.81%

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18-19

PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171HS1T01	English - I	HSS	3	1	---	4	3
171BS1T01	Mathematics - I	BS	3	1	2	6	3
171HS1T02	Environmental Studies	HSS	2	1	---	3	2
171BS1T03	Engineering Chemistry	BS	3	1	---	4	3
171ES1T02	Engineering Mechanics	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab - I	HSS	---	---	3	3	2
171BS1L01	Engineering Chemistry Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
		TOTAL	17	6	11	34	23

II SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171HS2T03	English - II	HSS	3	1	---	4	3
171BS2T06	Mathematics - III	BS	3	1	2	6	3
171BS2T02	Mathematics - II	BS	3	1	---	4	3
171BS2T07	Engineering Physics	BS	3	1	---	4	3
171ES2T03	Engineering Drawing	ES	3	1	---	4	3
171ES2T07	Elements of Mechanical Engineering	ES	3	1	---	4	3
171HS2L02	English Communication Skills Lab - II	HSS	---	---	3	3	2
171BS2L02	Engineering Physics Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop and IT Workshop	ES	---	---	3	3	2
		TOTAL	18	6	11	35	24

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171BS3T09	Complex Variables	BS	3	1	0	4	3
171ES3T16	Materials Science and Engineering	ES	3	1	0	4	3
171ES3T17	General Geology	ES	3	1	0	4	3
171ES3T18	Surveying and Offshore Structures	ES	3	1	0	4	3
171PT3T01	Chemical Process Calculations	PC	3	1	0	4	3
171ES3T05	Basic Electrical and Electronics Engineering	ES	3	1	0	4	3
171ES3L09	Basic Engineering Lab	ES	0	0	3	3	2
171ES3L10	Geology and Surveying Lab	ES	0	0	3	3	2
171HS3A10	Employability Skills - I	HSS	0	0	2	2	0
171HS3A09	Professional Ethics and Human Values	HSS	2	0	0	2	0
		TOTAL	20	6	8	34	22

IV SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171BS4T10	Probability and Statistics	BS	3	1	0	4	3
171PT4T02	Momentum Transfer	PC	3	1	0	4	3
171PT4T03	Petroleum Geology	PC	3	1	0	4	3
171PT4T04	Thermodynamics for Petroleum Engineers	PC	3	1	0	4	3
171PT4T05	Process Heat Transfer	PC	3	1	0	4	3
171HS4T05	Management Science	HSS	3	1	0	4	3
171PT4L01	Momentum Transfer Lab	PC	0	0	3	3	2
171PT4L02	Process Heat Transfer Lab	PC	0	0	3	3	2
171HS4A11	Employability Skills - II	HSS	0	0	2	2	0
171HS4A08	IPR and Patents	HSS	2	0	0	2	0
		TOTAL	20	6	8	34	22

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III Year - I Semester

S. No.	Subjects	L	T	P	Credits
1	Management Science	4	–	–	3
2	Process Dynamics & Control	4	–	–	3
3	Process Instrumentation	4	–	–	3
4	Well Logging & Formation Evaluation	4	–	–	3
5	Drilling Technology	4	–	–	3
6	Mathematical Methods Lab	–	–	3	2
7	Instrumentation, Process Dynamics & Control Lab	–	–	3	2
8	Drilling Fluids Lab	–	–	3	2
9	Industrial Visits	–	–	-	-
MC	Mini Project-I	–	–	–	–
	Total Credits				21

III Year - II Semester

S. No.	Subjects	L	T	P	Credits
1	Well Completions, Testing & Servicing	4	–	–	3
2	Petroleum Production Engineering	4	–	–	3
3	Petroleum Reservoir Engineering-I	4	–	–	3
4	Petroleum Refinery & Petrochemical Engineering	4	–	–	3
5	**OPEN ELECTIVE** i. Electronic Instrumentation ii. Big Data Analytics iii. Alternative Energy Sources for Automobiles iv. Waste Water Management v. Fundamentals of Liquefied Natural Gas vi. Computational Fluid Dynamics	4	–	–	3
6	Drilling Simulation Lab	–	–	3	2
7	Petroleum Analysis Lab	–	–	3	2
8	Petroleum Reservoir Engineering Lab	–	–	3	2
9	Summer Internship (4-6 weeks)	–	–	–	–
MC	Mini Project-II	–	–	–	–
	Total Credits				21

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R-13

III Year

	I Semester	T	P	C		II Semester	T	P	C
1	Petroleum Exploration	3		3	1	Well Completions	3+1		3
2	Well Logging & Formation Evaluation	3		3	2	Petroleum Reservoir Engineering - I	3+1		3
3	Drilling Technology	3+1		3	3	Petroleum Production Engineering & Design	3+1		3
4	Well Engineering	3		3	4	Petroleum Refinery & Petrochemical Engineering	3		3
5	Process Instrumentation	3		3	5	Surface Production Operations	3		3
6	Process Dynamics & Control	3+1		3	6	IPR & Patents	2		2
7	Instrumentation & Process control Lab		3	2	7	Petroleum Analysis Lab		3	2
8	Drilling Fluids Lab		3	2	8	Drilling Simulation Lab		3	2
9	Industrial Visits				9	Summer Training (4-6 Weeks)		-	-
				22					21

IV Year

	I Semester	T	P	C		II Semester	T	P	C
1	Integrated Asset Management	3		3	1	Petroleum Economics, Regulations & Policies	3+1		3
2	Enhanced Oil Recovery Techniques	3+1		3	2	Elective – II ➢ Reservoir Modeling & Simulation ➢ Horizontal Well Technology ➢ LNG-Processes, transportation & Storage	3+1		3
3	HSE & FE in Petroleum Industry	3+1		3	3				
4	Petroleum Reservoir Engineering -II	3+1		3	4	Elective – III ➢ Reservoir Stimulation ➢ Subsea Engineering ➢ Fundamentals of Multiphase Flow	3+1		3
5	Open Elective (for the students of Other Branches) ➢ Fundamentals of Petroleum Industry ➢ Green Fuel Technologies ➢ Energy Management	3+1		3	5				
6	Elective – I ➢ Offshore Engineering ➢ Pipeline Engineering ➢ Coal Bed Methane Engineering	3+1		3	6	Elective – IV ➢ Natural Gas Hydrates ➢ Advanced Natural Gas Engineering ➢ Petroleum Biotechnology	3+1		3
7	Petroleum Equipment Design & Simulation Lab		3	2	7	Project			9
8	Petroleum Reservoir Engineering Lab		3	2	8				
9	Presentation of SIP Report			2	9				
				24					21

Total Credits: 48 + 44 + 43 + 45 = 180

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COMPLEX VARIABLES

III Semester
Course Code: 171BS3T09

L	T	P	C
3	1	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Examine the continuity and analyticity of functions of complex variables.
CO 2: Identify real and imaginary parts of elementary complex variable functions.
CO 3: Evaluate different types of complex integrals and expand a function of complex variable as Taylor and Laurent series.
CO 4: Evaluate real integrals using residue theorem.
CO 5: Apply the properties of conformal mapping.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PO	PSO 1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

UNIT-I

Analytic functions:

Introduction - Continuity - Differentiability - Analyticity – Properties of analytic functions - Cauchy-Riemann equations in Cartesian and polar coordinates - Harmonic and conjugate harmonic functions - Milne - Thompson method.

Applications: Fluid flow, Electric potential

UNIT-II

Elementary functions:

Exponential, trigonometric, hyperbolic functions and their properties - General power Z^c(c is complex), principal value.

UNIT-III

Complex integration and Power series:

Line integral - Cauchy's integral theorem - Cauchy's integral formula- Generalized integral formula-Liouville Theorem (without proof) - Morera's Theorem (without proof)- Radius of convergence - Taylor's series - Maclaurin's series - Laurent series (without proof)

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UNIT-IV

Singularities and Residues:

Singular point –Types of singularities-Isolated, Essential, Removable singularity - pole of order m - Residue –Cauchy residue theorem

Application: Evaluation of real integral of following types:

(a) $\int_{-\infty}^{+\infty} f(x)dx$

(b) $\int_{c}^{c+2\pi} f(\sin\theta, cos\theta)d\theta$

(c) $\int_{-\infty}^{+\infty} e^{imx} f(x)dx$

UNIT-V

Conformal Mappings:

Transformation by expz, lnz, z^2, z^n (n positive integer), Sin z, Cos z, translation, rotation, inversion and bilinear transformation –properties-fixed point- cross ratio -invariance of circles.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, 43rd Edition, Khanna Publishers.
2. A First course in Complex Analysis with Application, Dennis G. Zill and Patrick Shanahan,Jones and Bartlett Publishers,2011.
3. Advanced Engineering Mathematics, Micheael Greenberg, 2nd Edition,PearsonEdn.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition,Wiley-India.
2. Higher Engineering Mathematics, B.V.Ramana, 17th Edition, Tata Mc Graw Hill.
3. Complex Analysis for Mathematics and Engineering, John H athews, Russell W. Howell, 5th Edition, Jones and Bartlett Publishers,2006.
4. Fundamentals of Complex Analysis, Saff, E.B and A.D Snider, 3rd Edition,Pearson, 2003.

Web links:

1. http://www.nptel.ac.in/courses/111103070/
2. http://mathworld.wolfram.com/topics/AnalyticContinuation.html
3. http://mathworld.wolfram.com/topics/ComplexDerivatives.html
4. http://mathworld.wolfram.com/topics/ComplexNumbers.html
5. http://mathworld.wolfram.com/topics/ConformalMapping.html

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PROBABILITY AND STATISTICS

IV Semester **L T P C**
Course Code: 171BS4T10 **3 1 0 3**

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1 : Apply various Probability distributions for both discrete and continuous random variables.
- CO 2 : Compute men, and variance of sample means with replacement and without replacement.
- CO 3 : Apply various test to test the hypothesis concerning mean, Proportion, variance and perform ANOVA test.
- CO 4 : Apply the concepts of correlation and regression to the given statistical data.
- CO 5 : Examine quality of the product using control charts.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PO	PSO 1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

UNIT I:

Random variables and Distributions:

Review of elementary probability, Random variables- Discrete and Continuous Random Variable-Distribution function-Expectation, variance, Moment Generating function –Discrete Distributions- Binomial, Poisson Continuous Distributions -Normal distribution.

UNIT II:

Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (knownand unknown), proportion, sampling distribution of sums and difference-Central limit theorem-Point and interval estimation for means and proportions.

UNIT III:

Tests of Hypothesis:

Introduction –Statistical Hypothesis-Errors of sampling, level of significance - One tail and two-tail tests- Testing of hypothesis concerning single mean, proportion, two means and two

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proportions using Z-test. Testing of hypothesis concerning single mean, two means using t-test. Independence of attributes by χ^2 –test-ANOVA for one-way and two-way classified data.

UNIT I V:

Correlation and Regression:

Introduction –Simple correlation-properties-Pearson and rank correlation- Regression – straight line and quadratic curve by method of least squares.

UNIT V:

Statistical Quality Control Methods:

Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts.

Text Books:

1. Probability and Statistics for Engineering and the Sciences, Jay L.Devore, 8th edition, Cengage.
2. Probability, Statistics and Random processes, T.B.Veeraju, TMH

Reference Books:

1. Probability and Statistics Engineers and the Scientists, ShronL.Myers, Keying Ye, Ronald E Walpole, 8th Edition, Pearson 2007.
2. Introduction to probability and statistics, William Menden Hall, Robert J. Bever and Barbara Bever, Cengage learning.2009
3. Introduction to probability and statistics Engineers and the Scientists, Sheldon, M. Rosss, 4th edition, Academic Foundation,2011
4. Applied statistics for Engineers and Physical Scientists, Johannes Ledolter and Robert V.Hogg, 3rd Edition, Pearson,2010
5. Probability and Statistics for Engineering, Richards A Johnson, Irvin Miller and Johnson E Freund. 9th Edition,PHI.
6. Probability and statistics by T.K.V.Iyengar, S.Chand publishers.

Web Links:

1. http://nptel.ac.in/courses/111105041/1
2. http://mathworld.wolfram.com/Statistics.html
3. http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html
4. http://mathworld.wolfram.com/topics/Probability.html

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III Year - I Semester

L	T	P	C
4	0	0	3

DRILLING TECHNOLOGY

Learning Objectives:

- To understand various aspects involved in drilling a well including completion.
- To understand the plan of drilling a well, the process of drilling and various equipment used for drilling and design of the drill string.
- To know the drilling fluid importance and its properties and hydraulics.
- To understand different types of casings lowered in a well, the requirement of cementation in a well and cement slurry design.
- To understand different tools used for directional drilling and various techniques, fishing, stuck pipe and well control concepts.

UNIT-I:

Overview of drilling: Drilling plan- GTO -Types of drilling, Rotary bit technology- Drilling string basics. Drilling fluid properties- Drilling fluid hydraulics calculations- Bit Hydraulics-Optimization- Swab & Surge-pressures- Mud hydraulics analysis report- Lost circulation.Disposing of the drilling fluids waste and drill cuttings waste.

UNIT-II:

Hydrostatic pressure, Pore pressure, Causes of abnormal pore pressure, abnormal pore pressure evaluation- Mud logging methods - Measurement while drilling & logging while drilling data-Direct measurements of pore pressure -Formation integrity tests – Fracture gradient determination – Theory of wellbore – FIT procedural Guidelines – Predicting fracture gradientHPHT well design.

UNIT-III:

Wellbore stability–Determination of the magnitude and direction of the in situ stressDetermination of rock properties, Failure criteria – Stress distribution around a wellbore Procedure for determining safe mud weights to prevent hole collapse, Preventing borehole instabilityGas behavior in a well – Kick tolerance, How to calculate kick tolerance – Influence of FG on kick tolerance – Kick tolerance while drilling – Kick tolerance graph – Modifying the calculate kick tolerance – Use of kick tolerance to calculate wellbore pressures.

UNIT-IV:

Casing Functions of casing – Types of casing – Casing properties Casing specifications – Casing connections – Factors influencing casing design – Collapse criterion – Burst criterion – Combination strings – Tension criterion Compression loads – Biaxial effects – Triaxial analysis – Triaxial load capacity diagram, Casing seat selection method.

Cementation: Introduction cement slurries-Typical field calculations- Cementing nomenclature-Cement additives – Cementation of liners.

UNIT-V:

Directional drilling: Applications- Well planning- Down-hole motors- Deflection tools and techniques- Face orientation- Direction control with rotary assemblies- Navigation drilling systems;.Horizontal wells–Well profile design considerations – Torque and drag – Horizontal borehole stability – Extended reach well design – Multilateral wells.

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UNIT-VI:

Stuck pipe, well control: Kicks- Kick control- Pressure control theory- BOP-Special kick problems and procedures to free the pipes and Fishing operations. Types of fishing tools, Case studies of blow out control.

Outcomes:

The students will be able to:

- Apply drilling concepts of a well from planning to rig mobilization to the location.
- Apply the concept of a drill string design for drilling.
- Select the suitable drilling fluids during drilling.
- Do casing and cementation design.
- Carry out directional drilling.
- Troubles shoot well control, stuck pipe and fishing problems.
- Select the proper drilling equipment.

Text Books:

1. Petroleum Engineering: Drilling and Well Completion, Carl Gatlin, Prentice-Hall, Inc., 1960.
2. Drilling Engineering, J.J. Azar and G. Robello Samuel, Pennwell Books, 2007.
3. Working Guide to Drilling Equipment and Operations, William Lyons, Gulf Publishing, 2009.

Reference Books:

1. Oil Well Drilling Engineering: Principles and Practice, H. Rabia, Graham & Trotman, 1985.
2. Drilling Engineering: A Complete Well Planning Approach, Neal Adams, Tommie CharrierPennwell, 1985.
3. Practical Well Planning and Drilling Manual, Steve Devereux, Pennwell, 1998.
4. Primer of Oil Well Service, Workover and Completion, Petroleum Extension Service, University of Texas at Austin, 1997.
5. Formulas and Calculation for Drilling, Production and Workover, Norton J. Lapeyrouse, 2nd Edition, Gulf Publishing, 2002.
6. Applied Drilling Engineering, Adam T. Bourgoyne Jr., Keith K. Millheim, Martine E. Chenevert and F. S. Young Jr., Society of Petroleum Engineers, 1991.
7. Well Engineering and Construction, HussainRabia, Entrac Consulting, 2002.
8. Drilling Fluids Processing Handbook, ASME Shale Shaker Committee, Gulf Professional Publishing, 2005.
9. Fundamentals of Drilling Engineering, Robert F. Mitchell, Stefan Z. Miska, Society of Petroleum Engineers, 2011.

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III Year - II Semester

L	T	P	C
4	0	0	3

PETROLEUM PRODUCTION ENGINEERING

Learning Objectives:

The students will be made to learn:

- Fundamental concepts in petroleum production engineering.
- Reservoir fluids, efficient flow to the surface without damaging the reservoir dynamics/drive mechanisms.
- Various surface equipment's for process oil and gas after flow from wells.
- Sick well identification and remedial stimulation operations.
- Application of suitable artificial lifts on reservoir energy depletion.
- Crisis management.

UNIT-I:

Petroleum production system over all view: Production from various types of reservoir based on drive mechanisms field development method, Properties of Oil GOR, density, viscosity, pour point, properties of gas specific gravity, compressibility, molecular weight, calorific value, formation volume factor.

UNIT-II:

Reservoir deliverability: Flow regimes- transient, steady state, pseudo steady state IPR for various types of wells, Well bore performance – single & multiphase liquid flow in oil wells, single phase & mist flow in gas wells; Choke performance – sonic & subsonic flow, single & multiphase flow in oil & gas wells;, Well deliverability nodal analysis, Well decline analysis.

UNIT-III:

Artificial lift methods-I: Sucker rod pumping system- Selection of unit and types of unit, Load & power requirements, Performance analysis, dynagraph;Other lift systems- electrical submersible pumps principle design & operation, hydraulic piston pumping, progressive cavity pumping, plunger lift, hydraulic jet pumping.

UNIT-IV:

Artificial Lift Methods-II: Gas lift system evaluation of potential compression requirements, study of flow characteristics, principles of compression, types of compressors, selection of gas lift valves, types of valves, principles of valve operation, setting & testing, design installations.

UNIT-V:

Production Stimulation: Well problem identification- sick well analysis;, Matrix acidizing-Design for sandstone & carbonate reservoirs, Hydraulic fracturing – formation fracture pressure, geometry, productivity of fractured wells, hydro-fracture design, selection of fracturing fluid, propant, post frac evaluation.

UNIT-VI:

Production Optimization: Self flowing wells, wells on gas lift, wells on sucker rod, separator, pipeline network, gas lift facilities, producing fields.

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Outcomes:

After the course, the students will be able to:

- Determine the well head pressure, down-hole pressure and operating oil/ gas flow rates of the reservoir.
- Identify formation damage and find remedial methods to bring the well back into production.
- Screen, design and operate artificial lifts on reservoir pressure depletions.
- Handle in case of any crisis at drilling/production installations.
- Process oil and gas before supply to refinery/consumers.
- Contribute to reservoir management as production engineers to prolong the reservoir life with optimum production.

Text Books:

1. Petroleum Production Engineering: A Computer Assisted Approach, BoyunGuo, William C. Lyons, Ali Ghalambor, Elesevier Science & Technology Books, 2007.
2. Petroleum Production Systems, M.J. Economides, A.Daniel Hill &C.E.Economides, Prentice Hall, 1994.

Reference Books:

1. Production Technology I-II, Institute of Petroleum Engineering, Herriot Watt University.
2. The Technology of Artificial Lift Method, Vol. 1, Brown E., Pennwell Books, 1977.

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Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956

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Department of Petroleum Technology

Syllabus revision Index 2018-2019

S.No	Name of the course	Percentage of syllabus change
1.	Probability & Statistics	25
2.	Complex Variables	25
3.	Drilling Technology	72
4.	Petroleum Production Engineering	20

Signature of the course coordinator

Signature of the HOD

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Department of Petroleum Technology

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	PETROLEUM PRODUCTION ENGINEERING AND DESIGN	PETROLEUM PRODUCTION ENGINEERING
Course Code	RT32273	R1632272
Syllabus	UNIT-VI Production Stimulation: Well problem identification - Matrix acidizing-Hydraulic fracturing	UNIT-VI: Production Optimization: Self flowing wells, wells on gas lift, wells on sucker rod, separator, pipeline network, gas lift facilities, producing fields.

Signature of the course coordinator

Signature of the HOD

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		selection method. Cementation: Introduction cement slurries- Typical field calculations- Cementing nomenclature- Cement additives – Cementation of liners.
	UNIT-V Directional drilling: Applications- Well planning- Down-hole motors- Deflection tools and techniques- Face orientation- Direction control with rotary assemblies- Navigation drilling systems- Fishing operations- Bi-centric bits.	UNIT-V: Directional drilling: Applications- Well planning- Down-hole motors- Deflection tools and techniques- Face orientation- Direction control with rotary assemblies- Navigation drilling systems;. Horizontal wells–Well profile design considerations – Torque and drag – Horizontal borehole stability – Extended reach well design – Multilateral wells.
	UNIT-VI Stuck pipe, well control: Kicks- Kick control- Pressure control theory- BOP-Special kick problems and procedures to free the pipes and Fishing operations. Driller's logs: Sample logs- Miscellaneous logging devices.	UNIT-VI: Stuck pipe, well control: Kicks- Kick control- Pressure control theory- BOP-Special kick problems and procedures to free the pipes and Fishing operations. Types of fishing tools, Case studies of blow out control.

Signature of the course coordinator

Signature of the HOD

Head of the Department
Department of Petroleum Technology
Aditya Engineering College (A)
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ADITYA ENGINEERING COLLEGE
An Autonomous Institutuion
Approved by AICTE • Permanently Affiliated to JNTUK • Accredited by NAAC with 'A' Grade
Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956
Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Program Name : B.Tech. in Mining Engineering

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	1	171HS1T01	English - I	0
2	1	171BS1T01	Mathematics - I	0
3	1	171HS1T02	Environmental Studies	0
4	1	171BS1T03	Engineering Chemistry	0
5	1	171ES1T02	Engineering Mechanics	0
6	1	171ES1T01	Computer Programming	0
7	1	171HS1L01	English Communication Skills Lab - I	0
8	1	171BS1L01	Engineering Chemistry Lab	0
9	1	171ES1L01	Computer Programming Lab	0
10	2	171HS2T03	English - II	0
11	2	171BS2T02	Mathematics - II	0
12	2	171BS2T06	Mathematics - III	0
13	2	171BS2T07	Engineering Physics	0

14	2	171ES2T03	Engineering Drawing	0
15	2	171ES2T05	Basic Electrical and Electronics Engineering	0
16	2	171HS2L02	English Communication Skills Lab – II	0
17	2	171BS2L02	Engineering Physics Lab	0
18	2	171ES2L02	Engineering Workshop and ITWorkshop	0
19	3	171MI3T01	Introduction To Mining Technology	20
20	3	171MI3T02	Basic Mechanical Engineering For Mines	60
21	3	171BS3T10	Probability and Statistics	100
22	3	171ES3T22	Material Engineering	0
23	3	171MI3T03	Mining Geology-I	15
24	3	171ME3T01	Computer Aided Engineering Drawing Practice	0
25	3	171ES3L12	Electrical and Electronics Lab	30
26	3	171ES3L13	Basic Mechanical Engineering Lab	100
27	3	171HS3A09	Professional Ethics and Human Values	0
28	3	171HS3A10	Employability Skills-I	100
29	4	171ES4T27	Kinematics Of Machinery	0
30	4	171MI4T04	Computer Application In Mining	0

31	4	171MI4T05	Mining Geology –II	0
32	4	171MI4T06	Mine Surveying – I	10
33	4	171MI4T07	Surface Mining	0
34	4	171MI4T08	Fundamentals Of Rock Mechanics	50
35	4	171MI4L01	Geology Lab	0
36	4	171MI4L02	Computer Application In Mining Lab	0
37	4	171HS4A08	Intellectual Property Rights and Patents	0
38	4	171HS4A11	Employability Skills-II	100
39	5	R1631261	Underground Coal Mining Technology	0
40	5	R1631262	Mine Environment Engineering – I	0
41	5	R1631263	Electrical Equipment in Mines	0
42	5	R1631264	Mine Surveying– II	0
43	5	R1631265	Mining Machinery & Mechanization – I	0
44	5	R1631266	Advanced English Communication Skills Lab	0
45	5	R1631267	Mine Surveying Lab	0
46	5	R1631268	Mechanical Engineering Lab	90
47	5	R1631269	Mine Field visit(Mandatory)	

48	6	R1632261	Mine Systems Engineering	0
49	6	R1632262	Mineral Engineering and Fuel Technology	0
50	6	R1632263	Mine Environmental Engineering – II	0
51	6	R1632264	Mining Machinery & Mechanization – II	0
52	6	R1632035C	Industrial Robotics	0
53	6	R1632035A	Entrepreneurship	100
54	6	R1632265A	Quality and Reliability Engineering	0
55	6	R1632015D	Waste Water Management	100
56	6	R1632265B	Rock Excavation Engineering	0
57	6	R163226C	Mine Safety Engineering	30
58	6	R1632266	Mineral Engineering Lab	0
59	6	R1632267	Environmental Engineering Lab	0
60	6	R1632268	Mine Planning & Design Lab	0
61	6	R1632268	Industrial Training	0
62	7	RT41261	Mine Economics	0
63	7	RT41262	Computer Applications in Mining	0
64	7	RT41263	Rock Mechanics & Ground Control	0

65	7	RT41264	Mine Legislation & General Safety	0
66	7	RT41265	Industrial Robotics	0
67	7	RT41266	Environmental Impact Assesment	0
68	7	RT41267	Numerical Methods	0
69	7	RT41268	Industrial Management	0
70	7	RT4126L	Computer Applications in Mining Lab	0
71	7	RT4126M	Rock Mechanics & Ground Control Lab	0
72	7	RT4126N	Short Survey Camp (One Week)	0
73	8	RT42031	Production Planning and Control	0
74	8	RT42262A	Deep Sea Mining	0
75	8	RT42262B	Mine Construction	0
76	8	RT42262C	Tunneling Engineering	0
77	8	RT42263A	Planning of Under Ground Metal Mining Project	0
78	8	RT42263B	Planning of Under Ground Coal Mining Project	0
79	8	RT42263C	Planning of Surface Mining Projects	0
80	8	RT42264A	Maintenance & Reliability Engineering	0
81	8	RT42264B	Rock Excavation Engineering	0

82	8	RT42264C	Mine Health and Safety Engineering	0
83	8	RT42265	Project	0
Total number of courses in the academic year 2018-2019				83
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				12
Percentage of syllabus revision carried out in the academic year 2018-2019 = (12/83)*100				14.46

Program Coordinator

Head of the Department

Head of the Department
DEPARTMENT OF MINING ENGINEERING
ADITYA ENGINEERING COLLEGE (A9)

PROGRAM STRUCTURE

2018-19

I SEMESTER

Course Code	Name of the Course	Course Component	Total number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS1T01	English - I	HSS	3	1	0	4	3
171BS1T01	Mathematics - I	BS	3	1	2	6	3
171HS1T02	Environmental Studies	HSS	2	1	0	3	2
171BS1T03	Engineering Chemistry	BS	3	1	0	4	3
171ES1T02	Engineering Mechanics	ES	3	1	0	4	3
171ES1T01	Computer Programming	ES	3	1	0	4	3
171HS1L01	English Communication Skills Lab - I	HSS	0	0	3	3	2
171BS1L01	Engineering Chemistry Lab	BS	0	0	3	3	2
171ES1L01	Computer Programming Lab	ES	0	0	3	3	2
		TOTAL	17	6	11	34	23

II SEMESTER

Course Code	Name of the Course	Course Component	Total number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
171HS2T03	English - II	HSS	3	1	0		3
171BS2T02	Mathematics - II	BS	3	1	0	4	3
171BS2T06	Mathematics - III	BS	3	1	2	6	3
171BS2T07	Engineering Physics	BS	3	1	0	4	3
171ES2T03	Engineering Drawing	ES	3	0	3	6	3
171ES2T05	Basic Electrical and Electronics Engineering	ES	3	1	0	4	3
171HS2L02	English Communication Skills Lab – II	HSS	0	0	3	3	2
171BS2L02	Engineering Physics Lab	BS	0	0	3	3	2
171ES2L02	Engineering Workshop and IT Workshop	ES	0	0	3	3	2
		TOTAL	18	6	11	37	24

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Course Title	Course Component	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171MI3T01	Introduction To Mining Technology	PC	3	1	0	4	3
171MI3T02	Basic Mechanical Engineering For Mines	PC	3	1	0	4	3
171BS3T10	Probability and Statistics	BS	3	1	0	4	3
171ES3T22	Material Engineering	ES	3	1	0	4	3
171MI3T03	Mining Geology-I	PC	3	1	0	4	3
171ME3T01	Computer Aided Engineering Drawing Practice	ES	3	0	3	6	3
171ES3L12	Electrical and Electronics Lab	ES	0	0	3	3	2
171ES3L13	Basic Mechanical Engineering Lab	ES	0	0	3	3	2
171HS3A09	Professional Ethics and Human Values	HSS	2	0	0	2	0
171HS3A10	Employability Skills-I	HSS	0	0	2	2	0
TOTAL			18	5	11	34	22

IV SEMESTER

Course Code	Course Title	Course Component	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171ES4T27	Kinematics Of Machinery	ES	3	1	0	4	3
171MI4T04	Computer Application In Mining	PC	3	1	0	4	3
171MI4T05	Mining Geology –II	PC	3	1	0	4	3
171MI4T06	Mine Surveying – I	PC	3	1	0	4	3
171MI4T07	Surface Mining	PC	3	1	0	4	3
171MI4T08	Fundamentals Of Rock Mechanics	PC	3	1	0	4	3
171MI4L01	Geology Lab	PC	0	0	3	3	2
171MI4L02	Computer Application In Mining Lab	PC	0	0	3	3	2
171HS4A08	Intellectual Property Rights and Patents	HSS	2	0	0	2	0
171HS4A11	Employability Skills-II	HSS	0	0	2	2	0
TOTAL			20	6	8	34	22

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II Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Development of Mineral Deposits	4	--	--	3
2	Thermal Engineering for Mining	4	--	--	3
3	Fluid Mechanics and Hydraulic Machines	4	--	--	3
4	Computer Aided Engineering Drawing Practice	4	--	--	3
5	Mining Geology – I	4	--	--	3
6	Managerial Economics & Financial Analysis	4	--	--	3
7	Electrical and Electronics Engineering Lab	--	--	3	2
8	Fluid Mechanics and Hydraulic Machines Lab	--	--	3	2
	Total Credits				**22**

II Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Kinematics of Machinery	4	--	--	3
2	Materials Engineering	4	--	--	3
3	Mining Geology – II	4	--	--	3
4	Mine Surveying – I	4	--	--	3
5	Surface Mining	4	--	--	3
6	Industrial Engineering and Management	4	--	--	3
7	Geology Lab	--	--	3	2
8	Materials Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**22**

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III Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Underground Coal Mining Technology	4	--	--	3
2	Mine Environment Engineering – I	4	--	--	3
3	Electrical Equipment in Mines	4	--	--	3
4	Mine Surveying– II	4	--	--	3
5	Mining Machinery & Mechanization – I	4	--	--	3
6	Advanced English Communication Skills Lab	--	--	3	2
7	Mine Surveying Lab	--	--	3	2
8	Mechanical Engineering Lab	--	--	3	2
9	Mine Field visit(Mandatory)	--	--	--	0
	Total Credits				**21**

III Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Mine Systems Engineering	4	--	--	3
2	Mineral Engineering and Fuel Technology	4	--	--	3
3	Mine Environmental Engineering – II	4	--	--	3
4	Mining Machinery & Mechanization – I	4	--	--	3
5	**OPEN ELECTIVE** 1. Industrial Robotics 2. Entrepreneurship 3. Quality and Reliability Engineering 4. Waste Water Management 5. Rock Excavation Engineering 6. Mine Safety Engineering	4	--	--	3
6	Mineral Engineering Lab	--	--	3	2
7	Environmental Engineering Lab	--	--	3	2
8	Mine Planning & Design Lab	--	--	3	2
9	Industrial Training (3-4weeks)	--	--	--	0
	Total Credits				**21**

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Programe Name : B.Tech in Mining Engineering

Academic Year	Total Number of Courses	Number of courses Revised	% of Revision
2021-22	134	56	41.79
2020-21	88	25	28.41
2019-20	88	39	44.31
2018-19	83	12	14.46
2017-18	78	30	38.46

Program Coordinator

Head of the Department

Head of the Department
DEPARTMENT OF MINING ENGINEERING
ADITYA ENGINEERING COLLEGE (A9)

2013-14

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
B.TECH (MINING ENGINEERING)

IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Mine Economics	3+1*		3
2	Computer Applications in Mining	3+1*		3
3	Rock Mechanics & Ground Control	3+1*		3
4	Mine Legislation & General Safety	3+1*		3
5	**Open Elective**	3+1*		3
6	Industrial Management	3+1*		3
7	Computer Applications in Mining lab		3	2
8	Rock Mechanics Lab		3	2
9	Short survey camp (1 WEEK)			
Total Credits				22

IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Production Planning and Control	3+1*		3
2	**Departmental Elective - II**	3+1*		3
3	**Departmental Elective - III**	3+1*		3
4	**Departmental Elective - IV**	3+1*		3
5	Project Work			9
Total Credits				**21**

OPEN ELECTIVE:
1. Industrial Robotics
2. Environmental Impact Assessment.
3. Numerical Methods

Elective-I:
1. Rock Slope Engineering
2. Mine Subsidence Engineering
3. Rock Fragmentation Engineering

Elective-II:
1. Deep Sea mining
2. Mine Construction
3. Tunneling Engineering

Elective-III:
1. Planning of Under Ground Metal Mining Project
2. Planning of Under Ground Coal Mining Project
3. Planning of Surface Mining Project

Elective-IV:
1. Maintenance & Reliability Engineering
2. Rock Excavation Engineering
3. Mine Health & Safety Engineering

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ADITYA ENGINEERING COLLEGE (A)

INTRODUCTION TO MINING TECHNOLOGY

III Semester L T P C
Course Code: 171MI3T01 3 1 0 3

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Analyze different stages in the life of a mine.
CO 2: Choose a suitable location for opening to a deposit.
CO 3: Select for building appropriate permanent lining, drift with proper ventilation and lighting arrangements.
CO 4: Analyze the special methods need to be adopted for a particular situation.
CO 5: Distinguish the uses of explosives.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	1	-	-	-	-	-	3	-	-	-	-	-
CO2	1	-	-	3	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	2	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Outcomes:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

UNIT I :
Distribution of mineral deposits in India and other countries:
Mining contribution to civilization, Mining terminologies, Stages in the life of the mines-Prospecting, Exploration, Development, Exploitation, Reclamation. Brief overview of Surface & Underground Mining Methods.

UNIT II :
Transportation and Handling of Materials in Mines:
Various types of development openings shape and size, Selection of suitable type for actual situations. Raises, winzes, ore passes, ore chutes. Shafts

UNIT III :
Access to Deposits Introduction to Development of Shafts Inclines:
Location, shape and size of shafts/ incline. Drilling, blasting and removal of debris. Surface arrangements for sinking shafts, tools and equipment. Methods of shaft sinking.

UNIT IV :
Drivage of drifts, organization and cycle of operations:
drilling, blasting, loading, transport, support, drainage, ventilation and lighting. Mechanized drifting, road heading and tunnel boring.

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UNIT V

Classification and properties of explosive:

Detonators. Detonating cords, and detonating fuse and nonel detonator. Blasting systems, electrical and non electrical methods, delay blasting techniques. Mechanics of blasting.

Text Books:

1. D.J.Deshmukh, Elements of Mining Technology, Denett & Co., Nagpur Vol. I, 1998
2. Dr T.N.Singh, Surface Mining, Lovely Prakashan, Dhanbad ,2nd edition 2002
3. B.V.Gokhale, Blasthole drilling Technology, multifields, Bombay, 1st edition 2001

Reference Books:

1. Indian Bureau of Mines, Minerals Year Book & other publications, Latest Edition
2. Dr C.M.Kole, Khuli Khan Ka Ayojan (Hindi), CMPDIL, Ranchi , 1st edition 1996
3. Dr. Calvin Konya; "Rock Blasting and Overbreak Control" Precision Blasting Services, Montville, Ohio 2nd edition, 2004

Web Links:

1. http://www.miningglobal.com/operations/gifs-5-stages-mining-life-cycle
2. https://www.slideshare.net/umer_1/stages-in-life-of-mine
3. https://www.minecationstandards.org/fileadmin/MAS/documents/nmas-national-stabdards/afghanistan/AMAS_07.04_Storage_Transportation_ Handling_of_Explosives.pdf

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ADITYA ENGINEERING COLLEGE (A9)

BASIC MECHANICAL ENGINEERING FOR MINES

III SEMESTER
Course Code: 171MI3T02

L	T	P	C
3	1	0	3

Courses Outcomes:
At the end of this course the student will be able to

CO 1: Apply different laws of thermodynamics.
CO 2: Analyze various engine system along with the function and working
CO 3: Explain the concepts of Fluid statics.
CO 4: Explain the concepts of kinematics and dynamics.
CO 5: Explain the concepts of Boundary layer theory.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Outcome:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

UNIT-I:
Laws of Thermodynamics:
First, Second& Third law of Thermodynamics and their applications.

UNIT-II:
I. C. ENGINES:
Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of Wankle engine, principles of supercharging and turbo charging.

UNIT-III:
Fluid statics:
Dimensions and units: physical properties of fluids- specific gravity, viscosity and its significance, surface tension, capillarity, and vapor pressure. Atmospheric gauge and vacuum pressure – measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law.

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UNIT-IV:

Fluid kinematics:

Introduction, flow types. Equation of continuity for one dimensional flow. Circulation and vorticity. Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for rotational flow, flow net, source and sink, doublet and vortex flow.

Fluid dynamics:

Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend. Closed conduit flow: Reynolds's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT–V:

Boundary Layer Theory:

Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Text Books:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.3rd edition,1996.
2. Fluid Mechanics and Hydraulic Machines by Rajput.2nd edition, 1991.
3. Thermal Engineering/R S Kurmi/J K Gupta, S Chand Publications.1st edition, 1990.

Reference Books:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria& Sons,1stedition,1998
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International,5thedition,2000
3. Hydraulic Machines by Banga& Sharma, Khanna Publishers,6th edition,2001

Web Links:

1. www.nptel.ac.in/courses/112104118/ui/Course_home-2.htm
2. www.nptel.ac.in/courses/112104118/ui/Course_home-3.htm
3. www.nptel.ac.in/courses/112104118/ui/Course_home-9.htm

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ADITYA ENGINEERING COLLEGE (A9)

PROBABILITY AND STATISTICS
(Common to CE & Min.E)

III SEMESTER L T P C
Course Code: 171BS3T10 3 1 0 3

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1 : Apply various Probability distributions for both discrete and continuous random variables.
CO 2 : Compute men, and variance of sample means with replacement and without replacement.
CO 3 : Apply various test to test the hypothesis concerning mean, Proportion, variance and perform ANOVA test.
CO 4 : Apply the concepts of correlation and regression to the given statistical data.
CO 5 : Examine quality of the product using control charts.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Outcomes:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

UNIT-I:
Random variables and Distributions:
Random variables- Discrete and Continuous Random variable-Distribution function-Expectation,Variance,Moment Generating function –Discrete Distrinbutions- Binomial, Poisson Continuous Distributions -Normal distribution.

UNIT-II:
Sampling Theory:
Introduction - Population and samples- Sampling distribution of means ($_\sigma$knownand $_\sigma$unknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.

UNIT-III:
Tests of Hypothesis:
Introduction –statistical Hypothesis-Errors of Sampling, Level of significance - One tail and two-tail tests- Testing of hypothesis concerning means, proportions, and their differences using Z-test and t-test, testing of single variance and goodness of fit and independence of attributes by χ^2 –test-test,ANOVA for one-way classified data.

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UNIT-IV:

Curve fitting and Correlation:

Introduction - Fitting a straight line –Second degree curve- exponential curve-power curve by method of least squares-Correlation and Regression –Properties (without proofs).

UNIT-V:

Statistical Quality Control Methods:

Introduction - Methods for preparing control charts Problems using x-bar, p, R charts and attribute charts.

Text Books:

1. Jay l.devore, Probability and Statistics for Engineering and the Sciences.8thEdition, Cengage.
2. Richards A Johnson, Irvin Miller and Johnson E Freund. Probability andStatistics for Engineering, 9th Edition,PHI.
3. Probability and statstics by S.Chand

Reference Books:

1. Shron L.Myers, Keying Ye, Ronald E Walpole, Probability and StatisticsEngineers and the Scientists,8th Edition, Pearson 2007.
2. William Menden Hall, Robert J. Bever and Barbara Bever, Introduction toprobability and statistics, Cengage learning.2009.
3. Sheldon, M. Rosss, Introduction to probability and statistics Engineers and the Scientists,4th edition, Academic Foundation,2011.

Web Links:

1. http://nptel.ac.in/courses/111105041/1
2. http://mathworld.wolfram.com/Statistics.html
3. http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html

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Head of the Department
DEPARTMENT OF MINING ENGINEERING
ADITYA ENGINEERING COLLEGE (A9)

ELECTRICAL AND ELECTRONICS LAB

III Semester
Course Code: 171ES3L12

L	T	P	C
0	0	3	2

Course Outcomes:
At the end of the Course, Student will be able to:

- CO1: Illustrate the efficiency of a a DC machines, transformer and 3-Phase induction motor
- CO2: Apply Synchronous impedance method to Pre-determine the regulation of an alternator
- CO3: Apply the Field flux control method & Armature Voltage control method to Control the speed of a DC shunt motor
- CO4: Explain the working of PN junction diode, BJT and CE amplifier
- CO5: Develop rectifier circuits for signal conversion from AC to DC
- CO 6: Explain the simple mathematical operations using Operational Amplifier-IC-741(inverting, non-inverting, integrator and differentiator)

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	1	1	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	1	1	-	-	-	-	-	-	-	-
CO6	2	1	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-
CO6	-	-	-

The following experiments are required to be conducted as compulsory experiments:

Section A: Electrical Engineering

The following experiments are required to be conducted as compulsory experiments:

Week 1. 1.To pre determine the efficiency of a given D.C. Shunt machine working as motor and generator using Swinburne'stest

Week 2. 2.To pre determine the efficiency and regulation of single phase transformer at given power factors by conducting OC and SC tests.

Week 3. 3.To determine of performance characteristics of 3-phaseInduction motor by conducting Brake test.

Week 4. 4.To determine the Regulation of alternator by using Synchronous impedance method.

Week 5. 5.To determine the Speed control of D.C. Shunt motor by

a. Armature Voltage control method

b. Field flux control method

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Week 6. 6. To determination of performance characteristics of D.C Shunt Motor (Brake test).

Section B: Electronics Engineering

The following experiments are required to be conducted as compulsory experiments:

Week 7. 7.To plot the characteristics of PN junction diode forward bias & reverse bias, calculate cut in voltage, static & dynamic resistance.

Week 8. 8.To draw the input & output characteristics in a graph in common emitter configuration

Week 9. 9.To calculate the ripple factor &percentage regulation of a half wave rectifier with and without filters

Week 10. 10.To calculate the ripple factor &percentage regulation of a full wave rectifier with and without filters

Week 11. 11.To calculate the gain and bandwidth for a common emitter amplifier

Week 12. 12.To calculate the gain and bandwidth for a common field effect amplifier

List of Augmented experiments (Week 13 - Week16):

(Any two of the following experiment can be performed)

Section A: Electrical Engineering

13. To make scott connection on the given two 1-Ø transformer and verifying the voltage on the secondary side of the Scott connected transformer.
14. To verification of Parallel Operation of Two Identical 1-ØTransformers
15. To separate the hysteresis losses and eddy current losses of a 1-Ø transformer

Section B: Electronics Engineering

16. To draw the V I characteristics of a P-N Junction Diode (Ge &Si).
17. To draw the V I characteristics of a Zener Diode.
18. To verify the operation of Zener Diode as a voltage regulator

Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications. Vol. I and Vol. II
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI.

Reference Books:

1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering by Sukhija and Nagsarkar, Oxford Publications, 2nd edition
4. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

Web links:

1. https://www.iare.ac.in/sites/default/files/lab2/EEE%20LAB.pdf
2. https://www3.nd.edu/~lemmon/courses/ee224/ee224-lab-manual.pdf
3. https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BEE%201 L1(BEE%20&%20BEC)%20%20LAB%20MANUAL.pdf
4. http://www.clemson.edu/cecas/departments/ece/document_resource/undergrad/electro nics/CInquiryLabManual.pdf

FUNDAMENTALS OF ROCK MECHANICS

IV Semester **L T P C**

Course Code: 171MI4T08 **3 1 0 3**

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Estimate stress and strain in various mining applications.
CO 2: Evaluate the properties of rocks.
CO 3: Use various measuring devices to measure the load.
CO 4: Analyze the failure criteria in mines.
CO 5: Analyze stress concentration around mine openings.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1	PSO 2	PSO 3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

UNIT – I :

Historical Development:

Definition, scope and development of the science of Rock Mechanics. Analysis of stress and strain in three dimensions, stress ellipsoid and stress directors surface; Determine of principal stress stressinvariants Determination of maximum shearing stress, Octahedral stresses Homogeneous Deformation Strain at a point principal axes of strains Differential equations of equilibrium. Compatibility equation of stains Compatibility equation in terms of stress components, stress function.

UNIT – II:

Geo-Engineering Studies:

Physico – mechanical properties and strength indices of rock and their determination. Compressive, Tensile and shear strength, Young's modulus, Poisson's ratio, Protodyakonov's index, point load index. Slake durability index. Dynamic elastic properties.

UNIT – III :

Rock Behavior:

Confining pressures, effect of water, time temperature In-situ stresses and their estimation, Horizontal stress and vertical stress, intact rock strength and deformability; measuring devices Load, stress, strain Dynamic loading of rocks.

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UNIT –IV :

Rock stress:

Stresses around mine openings of different cross sections,

UNIT – V :

Rock mass failure theories:

Theories of failure of rocks and their applications. Mohr's theory, Mohr-Coulomb failure criteria, Griffiths' theory, Different modes of failure of rocks.

Text Books:

1. R.E Goodman, introduction to rock mechanics, john Wiley and sons,1980
2. V.S Vutukuri and K. Katsuyama, Introduction to rock mechanics, Industrial publishing &Consulting Inc, Tokyo,1994

Reference Books:

1. B.H. G Brady and E.T.Brown, Rock mechanics for underground mining,George Allen and Unwi Ltd ,1979
2. J.C.Jeager and N.G.W.Cook, Fundamentals of rock mechanics,chapman and Hall,1979
3. Fundamentals and Applications of Rock Mechanics **by** Debasis Deb **(Author),** Abiram Kumar Verma**(Author)**

Web Links:

1. http://webapps.unitn.it/Biblioteca/it/Web/EngibankFile/5841921.pdf
2. http://nptel.ac.in/courses/105106055/Mod2/Lecture4.pdf
3. file:///C:/Users/mining/Downloads/Chap4.pdf
4. http://www.isrm.net/fotos/editor2/newsletter10/book_rock_failure_ mechanisms _introduction.pdf

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III Year - I Semester

L	T	P	C
0	0	3	2

MECHANICAL ENGINEERING LAB

Course Objectives:

Students should able to verify the principles studied in thermal and engineering design course by performing experiments in the laboratory

THERMAL EXPERIMENTS

1. Study of I.C. engines and components
2. Performance test on 4 S diesel engine
3. Performance test on reciprocating air-compressor
4. Study of refrigeration system
5. Study of Boilers
6. Disassembly /Assembly of Engines

ENGINEERING DESIGN

1. Cam displacement and velocity analysis
2. Whirling of shaft-determination of critical speed of shaft with concentrated loads
3. Determination of moment of inertia by oscillation method for connecting rod and flywheel.
4. Vibrating system – spring mass system – determination of damping co-efficient of single degree of freedom system.
5. Transverse vibration – free – beam, determination of natural frequency and deflection of beam.
6. Study of Gears and linkage mechanisms

OUTCOMES:

- ability to use of thermal experiments related to IC and refrigeration and air conditioning
- ability to use of various engineering design experiments

REFERENCE BOOKS:

1. Nag, P.K. Basic and Applied Thermodynamics, 8th Edition, Tata Mc Graw Hill, 2008.
2. Rajput, R.K. Thermal Engineering, 6th Edition, Laxmi Publications, 2007
3. Ballaney, P.L. Thermal Engineering, Khanna Publishers, 24th Edition, 2003.
4. Shigley J.E., Pennock G.R. and Uicker J.J. Theory of Machines and Mechanisms, Oxford University Press, 2003

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III Year - II Semester

L	T	P	C
4	0	0	3

MINE SYSTEMS ENGINEERING

Course Objectives: To expose the students to advanced optimization procedures to be adapted in mining. Further to understand the job sequencing and transportation models to maximize the productivity of the mining industry.

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – Operations Research models– applications.

ALLOCATION: Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

SEQUENCING – Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – IV

THEORY OF GAMES: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

WAITING LINES : Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

UNIT – V

INVENTORY : Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – VI

DYNAMIC PROGRAMMING: Introduction – Bellman's Principle of optimality – Applications of dynamic Programming- capital budgeting problem – shortest path problem – linear programming problem.

SIMULATION: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

Course Outcome: The student will be in a position to maximize the production by implementing different optimization technique.

TEXT BOOKS :

1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).

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MINE SAFETY ENGINEERING

(OPEN ELECTIVE)

Course Objective:

To learn the level of risk associated with mining, risk assessment and management
To know the occupational diseases, mine disasters and mitigation

UNIT I MINE ACCIDENTS

Accident in mines;- different types, accident investigations; accident analysis; accident prevention and corrective action, accident proneness, creating and maintaining safety awareness, ZAP and MAP, job safety analysis, safety meeting and committee.

UNIT II HEALTH ÁND MINE SAFETY

Definition of health and safety, management's role – function; evolution of management involvement, management's training, responsibility, cost of health and safety, role of labour organizations – Union impact and involvement, role of government – statutory controls and directions, spot and regular inspections, enforcement of standards, penalties for violations, collection and distribution of statistical data.

UNIT III FAULT TREE ANALYSIS

Introduction – methodology, symbols and Boolean techniques, qualitative analysis, computerized methods, statistical analysis, safety information, systems design.

UNIT IV RISK ASSESSEMENT

Principles, risk and hazard control, risk and hazard evaluation and data collection for identified health risks, exposure assessment and risk characterization, probabilistic risk analysis,

UNIT V DISASTER MANAGEMENT

Risk management, safety culture, human factors, reliability evaluation, safety audit. Identification of causes of mine disasters, preventive action, disaster management and mitigation, typical cases of mine disasters in India

UNIT VI MINER'S OCCUPATIONAL DISEASES AND ENQUIRY COMMITTEE

Miner's occupational health and diseases, preventive medical examinations, various types of injuries, compensable diseases, medical attention and removable of causative factors in the mines. Recommendations of inquiry committee carried out for safety and health issues in India.

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Course Outcome:

- The students will have deep knowledge about the mine accidents, disaster, disease and mine safety with risk assessment, mitigation and management.

TEXTBOOKS:

1 Brown, D.B., System Analysis and Design for Safety, Prentice Hall, 1976.

2 Stranks, J., Management Systems for Safety, Pitman Publishing, 1994.

REFERENCES

1 DeReamer, R., Modern Safety Practices, John Wiley and Sons.

2 Wahab Khair. A., New Technology in Health and Safety, SMME, 1992.

3 Zyl, D.A., Koval, M, Li Ta, M. (Ed.). Risk Assessment / Management Issues in the Environmental Planning in Mines, SMME, 1992.

4 Prasad, S.D. and Rakesh., A Critical Appraisal of Mine Legislations. Lovely Prakashan, 1995. Dhanbad.

5 Mine Disasters of India, NCSM Publication.

6 Kejriwal, B.K., Safety in Mines, Gyan Khan Prakashan, Dhanbad, 1994.

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Dt-25-05-2018

Department of Mining Engineering
Syllabus revision Index
2018-2019

S.No	Name of the course	Percentage of syllabus change
1	Introduction To Mining Technology	20
2	Basic Mechanical Engineering For Mines	50
3	Electrical and Electronics Lab	30
4	Fundamentals Of Rock Mechanics	50
5	Mechanical Engineering Lab	90
6	Mine Safety Engineering	30

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ADITYA ENGINEERING COLLEGE
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Approved by AICTE • Permanently Affiliated to JNTUK • Accredited by NAAC with 'A' Grade
Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956
Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Dt-25-05-2018

Department of Mining Engineering
1.1.2. Table-Prior/Post revision of syllabus
2018-2019

Regulation	Pre-Revision	Post-Revision
Course Title	Development of Mineral Deposits	Introduction To Mining Technology
Course Code	R1621261	171MI3T01
	UNIT I: Various types of development openings shape and size, Selection of suitable type for actual situations raises, winzes or passes, ore chutes.	**UNIT I**: Distribution of mineral deposits in India and other countries: Mining contribution to civilization, Mining terminologies, Stages in the life of the mines Prospecting, Exploration, Development, Exploitation, Reclamation. Brief overview of Surface & Underground Mining Methods.
	UNIT II Location of shaft shape and size, incline and vertical shafts. Surface arrangements for sinking shafts, tools and equipments ordinary methods of sinking drilling, blasting removal of debris and water.	**UNIT II**: Transportation and Handling of Materials in Mines: Various types of development openings shape and size, Selection of suitable type for actual situations. Raises, winzes, ore passes, ore chutes. Shafts
	UNIT III Ventilation and lighting, temporary and permanent lining, widening and deepening of shafts	**UNIT III**: Access to Deposits Introduction to Development of Shafts Inclines: Location, shape and size of shafts/ incline. Drilling, blasting and removal of debris. Surface arrangements for sinking shafts, tools and equipment. Methods of shaft sinking.
	UNIT IV Special methods of shaft sinking piling, caisson, freezing and cementation method of shaft sinking Modern techniques of shaft sinking. Design of shafts inserts and pit bottoms	**UNIT IV**: Drivage of drifts, organization and cycle of operations: drilling, blasting, loading, transport, support, drainage, ventilation and lighting. Mechanized drifting, road heading and tunnel boring.

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Syllabus	**UNIT -V** Classification and properties of explosives, detonators. Detonating cords, and detonating fuse and nonel detonator. Blasting systems, electrical and non electrical methods, delay blasting techniques. Blasting in open pit mines, blasting in underground coal and metal mines. Mechanics of blasting.	**UNIT V** Classification and properties of explosive: Detonators. Detonating cords, and detonating fuse and nonel detonator. Blasting systems, electrical and non electrical methods, delay blasting techniques. Mechanics of blasting.
	UNIT -VI: Drivage of drifts, organization and cycle of operations, drilling, blasting, blasting patterns, loading, transport, support, drainage, ventilation and lighting. Mechanized drifting, road heading and tunnel boring.	

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Regulation	Pre-Revision	Post-Revision
Course Title	Fluid mechanics and Hydraulic machines	Basic mechanical engineering for mines
Course Code	R1621034	171MI3T02
Syllabus	**UNIT I** Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric gauge and vacuum pressure – measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law. Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height. Stability analysis and applications.	**UNIT-I**: Laws of Thermodynamics: First, Second & Third law of Thermodynamics and their applications.
	UNIT-II Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow. circulation and vorticity. Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow. Fluid dynamics: surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend. Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line- hydraulic gradient line.	**UNIT-II**: I. C. ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of Wankle engine, principles of supercharging and turbo charging.
	UNIT-III: Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles. Dimensional Analysis: Similitude and modeling – Dimensionless numbers.	**UNIT-III:** Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity and its significance, surface tension, capillarity, and vapor pressure. Atmospheric gauge and vacuum pressure – measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law.
	UNIT-IV	**UNIT-IV**:

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Syllabus	Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.	Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow. Circulation and vorticity. Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for rotational flow, flow net, source and sink, doublet and vortex flow. Fluid dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend. Closed conduit flow: Reynolds's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.
	UNIT-V Centrifugal pumps: classification, working, work done – manometric head-losses and efficiencies- specific speed-pumps in series and parallel-performance characteristic curves, cavitation & NPSH. Reciprocating pumps: Working, Discharge, slip, indicator diagrams.	**UNIT-V:** Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.
	UNIT-VI Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube-theory- functions and efficiency. Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Hydraulic systems- hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages, limitations and applications	

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Regulation	Pre-Revision	Post-Revision
Course Title	Electrical and Electronics Engineering Lab	Electrical and Electronics Lab
Course Code	R1621036	171ES3L12
Syllabus **Syllabus**	The following experiments are required to be conducted as compulsory experiments: 1. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator). 2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors). 3. Brake test on 3-phase Induction motor (Determination of performance characteristics) 4. Regulation of alternator by Synchronous impedance method. 5. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method 6. Brake test on D.C. Shunt Motor. Section B: Electronics Engineering. The following experiments are required to be conducted as compulsory experiments: 1.PNjunction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations) 2. Transistor CE characteristics (Input and output) 3. Half wave rectifier with and with out filters. 4. Full wave rectifier with and with out filters. 5. CE amplifiers. 6. OP- Amp applications (inverting, non inverting, integrator and differentiator)	Section A: Electrical Engineering The following experiments are required to be conducted as compulsory experiments: Week 1. 1.To predetermine the efficiency of a given D.C. Shunt machine working as motor and generator using Swinburne's test Week 2. 2.To predetermine the efficiency and regulation of single phase transformer at given power factors by conducting OC and SC tests. Week 3. 3.To determine of performance characteristics of 3-phaseInduction motor by conducting Brake test. Week 4. 4.To determine the Regulation of alternator by using Synchronous impedance method. Week 5. 5.To determine the Speed control of D.C. Shunt motor by a. Armature Voltage control method b. Field flux control method Week 6. 6. To determination of performance characteristics of D.C Shunt Motor (Braketest). Section B: Electronics Engineering The following experiments are required to be conducted as compulsory experiments: Week 7. 7.To plot the characteristics of PN junction diode forward bias & reverse bias, calculate cut in voltage, static & dynamic resistance. Week 8. 8.To draw the input & output characteristics in a graph in common emitter configuration Week 9. 9.To calculate the ripple factor &percentage regulation of a half wave rectifier with and without filters Week 10. 10.To calculate the ripple factor &percentage regulation of a full wave rectifier with and without filters Week 11. 11.To calculate the gain and bandwidth for a common emitter amplifier Week 12. 12.To calculate the gain and bandwidth for a common field effect

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		amplifier
		List of Augmented experiments Section A: Electrical Engineering 13. To make scott connection on the given two 1-Ø transformer and verifying the voltage on the secondary side of the Scott connected transformer. 14. To verification of Parallel Operation of Two Identical 1-ØTransformers 15. To separate the hysteresis losses and eddy current losses of a 1-Ø transformer Section B: Electronics Engineering 16. To draw the V I characteristics of a P-N Junction Diode (Ge &Si). 17. To draw the V I characteristics of a Zener Diode. 18. To verify the operation of Zener Diode as a voltage regulator

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Regulation	Pre-Revision	Post-Revision
Course Title	Rock Mechanics and Ground Control	Fundamentals Of Rock Mechanics
Course Code	RT41263	171MI4T08
	UNIT - I Historical Development: Definition, scope and development of the science of Rock Mechanics. Analysis of stress and strain in three dimensions, principal stress, stress ellipsoid and stress directors surface; Determine of principal stress stress invariants Determination of maximum shearing stress, Octahedral stresses Homogeneous deformation Strain at a point principal axes of strains Differential equations of equilibrium.Compatibility equation of stains Compatibility equation in terms of stress components, stress function.	**UNIT – I** : Historical Development: Definition, scope and development of the science of Rock Mechanics. Analysis of stress and strain in three dimensions, stress ellipsoid and stress directors surface; Determine of principal stress stress invariants Determination of maximum shearing stress, Octahedral stresses Homogeneous Deformation Strain at a point principal axes of strains Differential equations of equilibrium. Compatibility equation of stains Compatibility equation in terms of stress components, stress function
	UNIT – II Geo-Engineering Studies:- Under ground geo-technical mapping. Physico – mechanical properties and strength indices of rock and their determination: density, Tensile Compressive and shear strength young's modulus, Poissin's ratio Impact strength and protodya Konov's strength index, point load index, Rock quality designation (RQD); Slack durability index. Rock mass rating (RMR) Cavability index Brinnels hard ness and contact strengths.	**UNIT – II**: Geo-Engineering Studies: Physico – mechanical properties and strength indices of rock and their determination. Compressive, Tensile and shear strength, Young's modulus, Poisson's ratio, Protodyakonov's index, point load index. Slake durability index. Dynamic elastic properties.
Syllabus	**UNIT – III** Rock Behavior: Confining pressures, effect of water, time temperature In-situ stresses and their estimation, Horizontal stress and vertical stress, Intact rock strength and defomability; measuring devices Load, stress, strain Dynamic loading of rocks. Photo – elastic experimental methods: Photo elastic stress measurement, circular Polariscope, Photo elastic stress determination, Determination of the principal stesses –	**UNIT – III**: Rock Behavior: Confining pressures, effect of water, time temperature In-situ stresses and their estimation, Horizontal stress and vertical stress, intact rock strength and deformability; measuring devices Load, stress, strain Dynamic loading of rocks

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	Moire method Engineering classification of rocks. Theories of failure of rock and their applications.	
	UNIT –IV Definition and concept of ground control in mines, ground control practices in mines. Constraints on ground control design, characterestics of coal measures strata. Pre mining stresses. Theories of mechanics of strata behavior	**UNIT –IV**: Rock stress: Stresses around mine openings of different cross sections
	UNIT – V Roof supports: timber and steel supports, friction and hydraulic prop arches, shorcret, roof truss, roof bolts, powered supports, stowing caving strip packing pump packing rock reinforcement. Design of structures and rock, design of underground openings, design of pillars, design of open pit slopes, waste dumps and embankments. Design of stopes.	**UNIT – V**: Rock mass failure theories: Theories of failure of rocks and their applications. Mohr's theory, Mohr-Coulomb failure criteria, Griffiths' theory, Different modes of failure of rocks.
	UNIT – VI Subsidence: theories of subsidence, factors affecting subsidence, prediction and measurement of subsidence. Damage and prevention of damage due to subsidence. Bumps and rock bursts – causes ,occurrence and control.	

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Regulation	Pre-Revision	Post-Revision
Course Title	Fluid Mechanics and Hydraulics machines lab	Mechanical Engineering Lab
Course Code	R1621264	R1631268
Syllabus	(A) Mechanics of solids lab: 1. Direct tension test 2. Bending test on a) Simply supported b) Cantilever beam 3. Torsion test 4. Hardness test a) Brinells hardness test b) Rockwell hardness test 5. Compression test on cubes 6. Impact test	THERMAL EXPERIMENTS 1.Study of I.C. engines and components 2. Performance test on 4 S diesel engine 3. Performance test on reciprocating air-compressor 4. Study of refrigeration system 5. Study of Boilers 6. Disassembly /Assembly of Engines.
	(B) Metallurgy Lab : 1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al. 2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels. 3. Study of the Micro Structures of Cast Irons. 4. Study of the Micro Structures of Non-Ferrous alloys. 5. Study of the Micro structures of Heat treated steels. 6. Hardenability of steels by Jominy End Quench Test. 7. To find out the hardness of various treated and untreated steels.	Engineering Design 1. Cam displacement and velocity analysis 2. Whirling of shaft-determination of critical speed of shaft with concentrated loads 3. Determination of moment of inertia by oscillation method for connecting rod and flywheel. 4. Vibrating system – spring mass system – determination of damping co-efficient of single degree of freedom system. 5. Transverse vibration – free – beam, determination of natural frequency and deflection of beam. 6. Study of Gears and linkage mechanisms

Signature of the course coordinator

Signature of the HOD

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Regulation	Pre-Revision	Post-Revision
Course Title	Mine Health and Safety Engineering	Mine Safety Engineering
Course Code	RT42264C	R163226C
Syllabus	**UNIT I** Mine accidents, types of accidents, roof fall accidents.	**UNIT I** MINE ACCIDENTS Accident in mines;- different types, accident investigations; accident analysis; accident prevention and corrective action, accident proneness, creating and maintaining safety awareness, ZAP and MAP, job safety analysis, safety meeting and committee.
	UNIT II Planning for safety, Safety analysis, Safety prevention and precautions.	**UNIT II** HEALTH AND MINE SAFETY Definition of health and safety, management's role – function; evolution of management involvement, management's training, responsibility, cost of health and safety, role of labour organizations – Union impact and involvement, role of government – statutory controls and directions, spot and regular inspections, enforcement of standards, penalties for violations, collection and distribution of statistical data.
	UNIT III Information system and safety audits.	**UNIT III** FAULT TREE ANALYSIS Introduction – methodology, symbols and Boolean techniques, qualitative analysis, computerized methods, statistical analysis, safety information, systems design
	UNIT IV Hazard control- engineering approach, systems approach, Hazard analysis	**UNIT IV** RISK ASSESSEMENT Principles, risk and hazard control, risk and hazard evaluation and data collection for identified health risks, exposure assessment and risk characterization, probabilistic risk analysis,
Syllabus	**UNIT V** Safety management, Economics of safety and cost- effectiveness.	**UNIT V** DISASTER MANAGEMENT Risk management, safety culture, human factors, reliability evaluation, safety audit. Identification of causes of mine disasters, preventive action, disaster management and mitigation, typical cases of mine disasters in India
	UNIT VI Occupational hygiene, occupational diseases, Occupational hazards in	**UNIT VI** MINER'S OCCUPATIONAL DISEASES AND ENQUIRY COMMITTEE Miner's occupational health and diseases, preventive

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	mines.	medical examinations, various types of injuries, compensable diseases, medical attention and removable of causative factors in the mines. Recommendations of inquiry committee carried out for safety and health issues in India.

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Program Name : B.Tech. in Agricultural Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	171HS1T01	English – I	0
2	I	171BS1T01	Mathematics – I	0
3	I	171HS1T02	Environmental Studies	0
4	I	171BS1T03	Engineering Chemistry	0
5	I	171ES1T02	Engineering Mechanics	0
6	I	171ES1T01	Computer Programming	0
7	I	171HS1L01	English Communication Skills Lab – I	0
8	I	171BS1L01	Engineering Chemistry Lab	0
9	I	171ES1L01	Computer Programming Lab	0
10	II	171HS2T03	English – II	0
11	II	171BS2T02	Mathematics - II	0
12	II	171BS2T06	Mathematics - III	0
13	II	171BS2T07	Engineering Physics	0
14	II	171ES2T03	Engineering Drawing	0
15	II	171ES2T08	Theory of Machines	0

16	II	171HS2L02	English Communication Skills Lab – II	0
17	II	171BS2L02	Engineering Physics Lab	0
18	II	171ES2L02	Engineering Workshop & IT Workshop	0
19	III	171AG3T01	Principles of Soil Science and Agronomy	20
20	III	171AG3T02	Renewable Energy Sources	20
21	III	171AG3T03	Ground Water Hydrology, Wells and Pumps	10
22	III	171ES3T19	Properties and Strength of Materials	20
23	III	171ES3T20	Electrical and Electronics Engineering	25
24	III	171ES3T21	Surveying and Leveling	0
25	III	171AG3L01	Soil Science and Agronomy Field Lab	10
26	III	171ES3L11	Surveying and Leveling Lab	0
27	III	171HS3A10	Employability Skills - I	100
28	III	171HS3A09	Professional Ethics and Human Values	0
29	IV	171AG4T04	Thermodynamics and Refrigeration Systems	0
30	IV	171AG4T05	Heat and Mass Transfer	20
31	IV	171ES4T25	Fluid Mechanics and Open Channel Hydraulics	20
32	IV	171AG4T06	Soil Mechanics	0
33	IV	171AG4T07	Surface Water Hydrology	20
34	IV	171AG4T08	Engineering Properties of Biological Materials and Food Quality	0
35	IV	171ES4L14	Fluid Mechanics and Open Channel Hydraulics Lab	10
36	IV	171ES4L15	Machine Drawing and Computer Graphics Lab	0

37	IV	171HS4A11	Employability Skills – II	100
38	IV	171HS4A08	Intellectual Property Rights and Patents	0
39	V	R1631351	Thermodynamics and Refrigeration systems	0
40	V	R1631352	Soil and Water Conservation Engineering	0
41	V	R1631353	Agricultural Process Engineering	0
42	V	R1631354	Engineering Properties of Biological Materials and Food Quality	0
43	V	R1631355	Managerial Economics & Financial Analysis	0
44	V	R1631356	Agricultural Process Engineering Lab	0
45	V	R1631357	Advanced English Communications Skills Lab	0
46	V	R1631358	Field Operation and Maintenance of Tractors Lab - 1	0
47	V	R1631029	IPR & Patents	0
48	VI	R1632029	Professional Ethics & Human Values	0
49	VI	R1632351	Irrigation and Drainage Engineering	0
50	VI	R1632352	Farm Machinery and Equipment - I	0
51	VI	R1632353	Design of Soil Water Conservation and Farm Structures	0
52	VI	R1632354	Dairy and Food Engineering	0
53	VI	R163235A	Operations Research	0
54	VI	R163235B	Digital Control Systems	0
55	VI	R163235C	Robotics& Automation	0
56	VI	R163235D	Industrial Pollution Control Engineering	0
57	VI	R163235E	Finite Element Method	0

58	VI	R163235F	Water Resources System Planning and Management	0
59	VI	R1632356	Farm Machinery Lab - 1	0
60	VI	R1632357	Field Operation and Maintenance of Tractors Lab - 2	0
61	VI	R1632358	Soil and Water Engineering Lab	0
62	VII	RT41351	Micro irrigation engineering	0
63	VII	RT41352	Farm machinery and equipments II	0
64	VII	RT41353	Post harvest engineering for horticulture produce	0
65	VII	RT41354	Mechanical measurements and instrumentation	0
66	VII	RT41355	Seed processing and storage engineering	0
67	VII	RT41356	Managerial economics & financial Analysis	0
68	VII	RT41357	Food processing plant design and layout	0
69	VII	RT41358	Watershed management	0
70	VII	RT41359	Food packaging technology	0
71	VII	RT41310	Computational Fluid Dynamics	0
72	VII	RT4135L	Field operation and maintenance of tractors and farm machinery lab	0
73	VII	RT4135M	Dairy and food engineering lab	0
74	VIII	RT42351	Design of agricultural machinery	0
75	VIII	RT42352	Agro industries and bi-product utilization	0
76	VIII	RT42353A	GIS and remote sensing	0
77	VIII	RT42353B	Human engineering and safety	0
78	VIII	RT42353C	Production Technology of Agricultural Machinery	0

79	VIII	RT42354C	Principles of entrepreneurship	0
80	VIII	RT42354A	Minor Irrigation and Command area development	0
81	VIII	RT42354B	Hydraulic Devices and Control	0
82	VIII	RT42355	Project work	0
Total number of courses in the academic year 2018-2019				82
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				9
Percentage of syllabus revision carried out in the academic year 2018-2019 = (9/82)*100				10.97

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total hours	
171HS1T01	English – I	HSS	3	1	---	4	3
171BS1T01	Mathematics – I	BS	3	1	2	6	3
171HS1T02	Environmental Studies	HSS	2	1	---	3	2
171BS1T03	Engineering Chemistry	BS	3	1	---	4	3
171ES1T02	Engineering Mechanics	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab – I	HSS	---	---	3	3	2
171BS1L01	Engineering Chemistry Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
		TOTAL	17	6	11	34	23

II SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total hours	
171HS2T03	English – II	HSS	3	1	---	4	3
171BS2T02	Mathematics - II	BS	3	1	---	4	3
171BS2T06	Mathematics - III	BS	3	1	2	6	3
171BS2T07	Engineering Physics	BS	3	1	---	4	3
171ES2T03	Engineering Drawing	ES	3	0	3	6	3
171ES2T08	Theory of Machines	ES	3	1	---	4	3
171HS2L02	English Communication Skills Lab – II	HSS	---	---	3	3	2
171BS2L02	Engineering Physics Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop & IT Workshop	ES	---	---	3	3	2
		TOTAL	18	5	14	37	24

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core;PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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III SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total hours	
171AG3T01	Principles of Soil Science and Agronomy	PC	3	1	---	4	3
171AG3T02	Renewable Energy Sources	PC	3	1	---	4	3
171AG3T03	Ground Water Hydrology , Wells and Pumps	PC	3	1	---	4	3
171ES3T19	Properties and Strength of Materials	ES	3	1	---	4	3
171ES3T20	Electrical and Electronics Engineering	ES	3	1	---	4	3
171ES3T21	Surveying and Leveling	ES	3	1	---	4	3
171AG3L01	Soil Science and Agronomy Field Lab	PC	---	---	3	3	2
171ES3L11	Surveying and Leveling Lab	ES	---	---	3	3	2
171HS3A10	Employability Skills - I	HSS	---	---	2	2	---
171HS3A09	Professional Ethics and Human Values	HSS	2	---	---	2	---
		TOTAL	**20**	**6**	**8**	**34**	**22**

IV SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total hours	
171AG4T04	Thermodynamics and Refrigeration Systems	PC	3	1	---	4	3
171AG4T05	Heat and Mass Transfer	PC	3	1	---	4	3
171ES4T25	Fluid Mechanics and Open Channel Hydraulics	ES	3	1	---	4	3
171AG4T06	Soil Mechanics	PC	3	1	---	4	3
171AG4T07	Surface Water Hydrology	PC	3	1	---	4	3
171AG4T08	Engineering Properties of Biological Materials and Food Quality	PC	3	1	---	4	3
171ES4L14	Fluid Mechanics and Open Channel Hydraulics Lab	ES	---	---	3	3	2
171ES4L15	Machine Drawing and Computer Graphics Lab	ES	---	---	3	3	2
171HS4A11	Employability Skills – II	HSS	---	---	2	2	---
171HS4A08	Intellectual Property Rights and Patents	HSS	2	---	---	2	---
		TOTAL	**20**	**6**	**8**	**34**	**22**

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III Year I Semester

S. No.	Subject	L	T	P	Credits
1	Thermodynamics and Refrigeration systems	4	--	--	3
2	Soil and Water Conservation Engineering	4	--	--	3
3	Agricultural Process Engineering	4	--	--	3
4	Engineering Properties of Biological Materials and Food Quality	4	--	--	3
5	Managerial Economics & Financial Analysis	4	--	--	3
6	Agricultural Process Engineering Lab	-	--	3	2
7	Advanced English Communications Skills Lab	-	--	3	2
8	Field Operation and Maintenance of Tractors Lab - 1	-	--	3	2
MC 9	IPR & Patents	-	2	--	-
	Total Credits				21

III Year II Semester

S. No.	Subject	L	T	P	Credits
1	Irrigation and Drainage Engineering	4	--	--	3
2	Farm Machinery and Equipment – I	4	--	--	3
3	Design of Soil, Water Conservation and Farm Structures	4	--	--	3
4	Dairy and Food Engineering	4	--	--	3
5	**Open Elective** Operations Research Digital Control systems Robotics & Automation Industrial Pollution Control Engineering Finite Element Method Water Resources System Planning and Management	4	--	--	3
6	Farm Machinery Lab - 1	-	--	3	2
7	Field Operation and Maintenance of Tractors Lab - 2	-	--	3	2
8	Soil and Water Engineering Lab	-	--	3	2
MC 9	Professional Ethics & Human Values	--	--	--	--
	Total Credits	--	--	--	21

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IV Year I Semester

S. No.	Subject	L	T	P	Credits
1	Micro Irrigation Engineering	4	--	--	3
2	Farm Machinery and Equipments – II	4	--	--	3
3	Post Harvest Engineering for Horticulture Produce	4	--	--	3
4	Mechanical Measurements and Instrumentation	4	--	--	3
5	**ELECTIVE – I** 1. Seed Processing and Storage Engineering 2. Green House Technologies 3. Food Processing Plant Design and Layout	4	--	--	3
6	**ELECTIVE – II** 1. Watershed Management 2. Food Packaging Technology 3. Minor Irrigation and Command area development	4	--	--	3
7	Farm Machinery Lab - 2	--	--	3	2
8	Dairy and Food Engineering Lab	--	--	3	2
	Total Credits				22

IV Year II Semester

S. No.	Subject	L	T	P	Credits
1	Design of Agricultural Machinery	4	--	--	3
2	Agricultural Extension Techniques and Business Management	4	--	--	3
3	Agro Industries and Bi-product Utilization	4	--	--	3
4	**ELECTIVE – III** 1. GIS and Remote Sensing 2. Human Engineering and Safety 3. Production Technology of Agricultural Machinery	4	--	--	3
5	Seminar	--	--	3	2
6	Project Work	--	--	15	10
	Total Credits				24

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1.
2. Principles of Food Sanitation, Marriott N G 1985. AVI Publishing Co. Inc., Westport, Connecticut.

IV Year B.Tech. Ag. Engg II Sem. L T/P/D

III YEAR I SEMESTER

S. No.	Subject	L	T/P/D	C
1	Thermodynamics and Refrigeration systems	4	1	3
2	Soil and Water Conservation Engineering	4	1	3
3	Agricultural Process Engineering	4	-	3
4	IPR & Patents		2	2
5	Engineering Properties of Biological Materials and Food Quality	4	0	3
6	Agricultural Extension Techniques and Business Management	4	1	3
7	Farm Machinery Lab	-	3	2
8	Advanced English Communications Skills Lab	-	3	2
9	Seminar		2	2
10	**Total**	**20**	**13**	**23**

III YEAR II SEMESTER

S. No.	Subject	L	T/P/D	C
1	Irrigation and Drainage Engineering	4	1	3
2	Farm Machinery and Equipment – I	4	1	3
3	Design of Soil, Water Conservation and Farm Structures	4	1	3
4	Dairy and Food Engineering	4	1	3
5	Theory of Structures	4	1	3
6	**Open Elective** Operations Research Digital Control systems Robotics & Automation Industrial Pollution Control Engineering Advanced Separation Technology Mechatronics Finite Element Method Soil Dynamics and Machine Foundations Water Resources System Planning and Management Green Technologies	4	1	3
7	Agricultural Process Engineering Lab	-	3	2
8	Soil and Water Engineering Lab	-	3	2
	Total	**21**	**11**	**22**

IV YEAR I SEMESTER

S. No.	Subject	L	T/P/D	C
1	Micro Irrigation Engineering	4	1	3
2	Farm Machinery and Equipments – II	4	-	3
3	Post Harvest Engineering for Horticulture Produce	4	1	3
4	Mechanical Measurements and Instrumentation	4	1	3
5	**ELECTIVE – I** Seed Processing and Storage Engineering Managerial economics & financial Analysis Food Processing Plant Design and Layout	4	1	3
6	**ELECTIVE – II** Watershed Management Food Packaging Technology Computational Fluid Dynamics	4	1	3
7	Field Operation and Maintenance of Tractors and Farm Machinery Lab	-	3	2
8	Dairy and Food Engineering Lab	-	3	2
	Total	**21**	**11**	**22**

IV YEAR II SEMESTER

S. No.	Subject	L	T/P/D	C
1	Design of Agricultural Machinery	4	1	3
2	**ELECTIVE – III** GIS and Remote Sensing Human Engineering and Safety Production Technology of Agricultural Machinery	4	1	3
3	**ELECTIVE – IV** Minor Irrigation and Command area development Hydraulic Devices and Control Principles of Entrepreneurship	4	1	3
4	Agro Industries and Bi-product Utilization	4	0	3
5	Project Work	-	15	9
	Total	**16**	**18**	**21**

L T/P/D

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1.
2. Principles of Food Sanitation, Marriott N G 1985. AVI Publishing Co. Inc., Westport, Connecticut.

IV Year B.Tech. Ag. Engg II Sem. L T/P/D

I Year – I SEMESTER

S. No.	Subject	L	T	P	Credits
1	English – I	3	1	--	3
2	Mathematics - I	3	1	--	3
3	Mathematics – II (Mathematical Methods)	3	1	--	3
4	Engineering Physics	3	1	--	3
5	Professional Ethics and Human Values	3	1	--	3
6	Engineering Drawing	3	1	--	3
7	English – Communication Skills Lab -1		--	3	2
8	Engineering Physics Laboratory		--	3	2
9	Engineering Physics – Virtual Labs - Assignments		--	2	--
10	Engineering Workshop& IT Workshop		--	3	2
	Total Credits				24

I Year – II SEMESTER

S. No.	Subject	L	T	P	Credits
1	English – II	3	1	--	3
2	Mathematics – III	3	1	--	3
3	Engineering Chemistry	3	1	--	3
4	Engineering Mechanics	3	1	--	3
5	Environmental Studies	3	1	--	3
6	Computer Programming	3	1	--	3
7	Engineering Chemistry Laboratory		--	3	2
8	English - Communication Skills Lab - II		--	3	2
9	C Programming Lab		--	3	2
	Total Credits				24

II YEAR I SEMESTER

S. No.	Subject	L	T/P/D	C
1	Fluid Mechanics and Open Channel Hydraulics	4	1	3
2	Renewable Energy Sources	4	1	3
3	Ground Water Hydrology , Well and Pumps	4	1	3
4	Properties and Strength of Materials	4	1	3
5	Electrical Systems	4	1	3
6	Surveying	4	1	3
7	Fluid Mechanics and Open Channel Hydraulics Lab	-	3	2
8	Surveying Lab	-	3	2
9	**Total**	**21**	**11**	**22**

II YEAR II SEMESTER

S. No.	Subject	L	T/P/D	C
1	Principles of Soil Science and Agronomy	4	1	3
2	Heat and Mass Transfer	4	1	3
3	Theory of Machines	4	-	3
4	Soil Mechanics	4	1	3
5	Surface Water Hydrology	4	1	3
6	Farm Power and Tractor Systems	4	1	3
7	Soil Science and Agronomy Field Lab	-	3	2
8	Machine Drawing and Computer Graphics Lab	-	3	2
9	Total	22	11	22

L T/P/D

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PRINCIPLES OF SOIL SCIENCE AND AGRONOMY

	L	T	P	C
III Semester	L	T	P	C
Course Code: 171AG3T01	3	1	0	3

Course Objectives:

COB 1: To make the students to know the fundamental concepts of soil science and agronomy

COB 2: To enable students to know the effect of soil properties on soil function and crop production

COB 3: To enable students to acquire knowledge on farming principles and practices

COB 4: To impart knowledge on crop management practices adopted for increasing the crop productivity

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Classify rocks and minerals based on mode of formation

CO 2: Categorize different agents causing weathering

CO 3: Explain about soil forming factors and soil formation processes

CO 4: Classify soil structure based on type, class and grade.

CO 5: Explain the functions of soil consistency, soil air and soil temperature.

CO 6: Explain the role of beneficial organisms in enriching the soil

CO 7: Categorize various biotic and a biotic factors influencing plant growth

CO 8: Make use of latest crop management practices for increasing crop productivity

Mapping of course outcome with program outcome:

CO's/PO's	PO1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	3	-	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	3	3	-	-	-	-	-	-	-	-	-	-
CO3(K2)	2	-	-	-	-	-	3	-	-	-	-	-
CO4 (K4)	3	-	-	-	-	-	3	-	-	-	-	-
CO5 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO6 (K3)	3	-	-	-	-	-	3	-	-	-	-	-
CO7(K4)	3	-	-	-	-	-	3	-	-	-	-	-
CO8 (K3)	-	2	-	-	-	-	3	-	-	-	3	-

Mapping of course outcome with program specific outcome:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K4)	3	-	3
CO2 (K4)	3	-	3
CO3(K2)	2	-	1
CO4 (K4)	3	-	3
CO5 (K2)	2	-	1
CO6 (K3)	3	-	2
CO7(K4)	3	-	3
CO8 (K3)	3	-	2

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UNIT –I

Soil: Definition -branches of Soil science difference between surface and sub surface soil, Rocks: Definition – classification of rocks based on mode of formation igneous, sedimentary and metamorphic rocks, Minerals: Definition, classification, primary, secondary, essential, accessory, silicate, non-silicate minerals, light and heavy minerals primary silicate minerals; quartz, feldspars micas pyroxenes amphiboles secondary silicate; secondary minerals, Ca, Mg, S and Micronutrient containing minerals-chemical formulate.

Weathering: Definition-types of weathering physical weathering of rocks, agents of physical weathering, temperature, water, wind and glaciers, Chemical weathering, solution, hydration, hydrolysis carbonation-oxidation-reduction biological weathering role of plants and animals in weathering. Soil formation: Soil forming factors –active and passive soil factors and their role in soil formation, Soil forming processes: Eluviations, illuviation, humification, calcification, laterization, podzolozation, salinization, alkalization and gleization, Soil Profile, Detailed description of theoretical soil profile,

UNIT- II

Physical properties of soil

Soil structure: Definition-classification based on type, class and grade, factors influencing formation of aggregates-importance and management of soil structure, Soil structure; Definition-classification based on type, class and grade-factors influencing formation of aggregates-importance and management of soil structure.

Soil consistency: Definition-forms of consistency and importance of soil consistency, Soil air; Composition of soil air-processes of gaseous exchange –soil aeration indices –and their importance (oxygen content-ODR-aeration porosity-redox potential) management of soil air, Soil temperature; influence of soil temperature on plant growth-factors influencing soil temperature-management of soil temperature. Soil color determination and importance.

UNIT-III

Ion exchange: Cation and anion exchange –factors influencing ion exchange capacity of soils importance of ion exchange calculation of base saturation and exchangeable acidity, Soil organic matter: importance of organic matter CN ration of organic matter and its importance.

Soil biology: Soil flora and fauna their characteristics role of beneficial organisms mineralization–immobilization, nitrogen fixation, nitrification, denitrification, solubilization of phosphorus and sulphur, Soil fertility; Concepts of soil fertility and soil productivity; definitions and differences Arnon's criteria of essentiality-essential and beneficial elements-factors influencing availability of nutrients. Chemical problems –classification acid, saline, saline saline-sodic and calcareous soils characteristics-nutrient availability in problem soils and their reclamation.

UNIT-IV

Classification of field crops: National and International Agricultural Research Institutes in India, Classification of crops, Classification of field crops, According to Origin, Botanical Commercial, Economical, seasonal, Ontogeny, Agronomic, Lead Morphology and Special Purpose crops, Definition of climate and weather, Definition of meteorology, Climatology, Agri-meteorology, Introduction, scope and practical utility of Agricultural meteorology, composition and structure of atmosphere, Influence of weather on crop grain development, essential Resources for crop production, factors influencing plant growth, Biotic and A biotic factors.-Agro climatic zones of A.P. and India.

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UNIT-V

Tillage and tilth: Objective of tillage, characteristic of good seed bed, effect of tillage on soil properties (Pore space, texture, structure, bulk density, colour of the soil), Types of Tillage.
Sowing: Methods of sowing, time and depth of sowing of major agricultural crops, Methods and time of application of manure and fertilizers.
Weeds: Influence of weeds on crop production, principles and practices of weed management., Dry land Agriculture, Problems of crop production in dry farming, Agronomic measure in reducing evapo-transpiration losses, Organic farming-Sustainable Agriculture.

Text Books:

1. Principles of Agronomy, Yella Manda Reddy T & Shankar Reddy, kalyan Publications, 2010.
2. Nature and Properties of soils, Brady Nyle C and Ray R Well, Pearson Education Inc., New Delhi, 2005.
3. Fundamentals of Soil Science, Indian Society of Soil Science, IARI, Jain publications New Delhi, 1998.

Reference books:

1. Meteorology, William L Donn, McGraw-Hill Book. Co. New York.
2. Crop Production in Dry Regions, Arnon L, Leonard Hill Publishing Co., London.
3. Manures and Fertilizers, Yawalkar K S and Agrawal J P, Agricultural Horticultural Publishing House, Nagpur.
4. Introduction to Soil Physics, Hillel D. Academic Press, London.

Web Links:

1. http://ecoursesonline.iasri.res.in/Courses/Introduction%20to%20Soil%20Science/SSAC121/Start%20to%20read%20the%20Course.html
2. http://ecoursesonline.iasri.res.in/Courses/Principles%20of%20Agronomy%20&%20agrcltrl%20Meteorology/AGRO101/Start%20to%20read%20the%20Course.html
3. http://www.hrsacademy.in/wp-content/uploads/2017/02/Principles-of-Agronomy-and-Agricultural-Meteorology.pdf
4. https://www.unaab.edu.ng/attachments/483_SOS%20211%20LECTURE%20NOTE.pdf

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RENEWABLE ENERGY SOURCES

	L	T	P	C
III Semester	L	T	P	C
Course Code: 171AG3T02	3	1	0	3

Course Objectives:

COB 1: To make the students know the concepts of renewable and non-renewable energy sources.

COB 2: To enable the students to understand the basic scientific and technical principles behind large-scale applications of renewable energy

COB 3: To impart the knowledge on application of renewable energy sources and identify a wide variety of applications for renewable energy.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Classify the different solar geometry, solar measuring devices and solar collectors.

CO 2: Identify storage and application techniques of solar energy.

CO 3: Analyze the wind energy concepts and wind mill.

CO 4: Identify the methods and principles of bio mass conversion and different biogas plants.

CO 5: Categorize different geothermal and ocean energy resources

CO 6: Identify the different modern energy conversion technologies.

Mapping of course outcome with program outcome:

CO's/PO's	PO1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	2	-	3	-	-	-	-	3
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	3	-	3
CO5 (K4)	3	3	-	2	-	-	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	3	-	-	-	-	-	-	3

Mapping of course outcome with program specific outcome:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	1
CO2 (K3)	3	3	2
CO3 (K4)	3	3	3
CO4 (K3)	3	3	2
CO5 (K4)	3	3	3
CO6 (K3)	3	3	2

UNIT – I

Introduction: Role and potential of renewable energy source, Status of renewable energy in India.

Principle of solar radiation: Physics of the sun, the solar constant, solar radiation at the earth surface, solar radiation geometry, problems, solar radiation measurements, solar radiation on titled surface.

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Solar energy collectors: Flat plate and concentrating collectors, classification of concentrating collectors, advanced collectors, performance parameter.

UNIT – II

Solar energy storage and applications: Different methods, Sensible, latent heat, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion, problems, solar water pumping and cooking. Environmental impact of solar power,

Wind Energy: Potentials, site selection, horizontal and vertical axis windmills, power in the wind, problems, applications (wind pump), performance characteristics, Betz criteria.

UNIT – III

Bio-energy:

biomass, classification, methods and principle of bio mass conversion, Anaerobic / aerobic digestion, biogas, types of Bio-gas digesters, combustion characteristics of bio-gas, classification of biogas plants, biogas plant design, problems.

Bio-diesel: Need, feed stock, bio-diesel production methods (Transesterification), applications.

UNIT – IV

Geothermal energy:

Resources, methods of harnessing the energy, applications, potential in India.

Ocean energy: OTEC, Principles utilization, method of OTEC power generation, Tidal and wave energy: Potential, principle and conversion techniques, mini-hydel power plants, and their economics.

UNIT – V

Direct energy conversion:

Thermo-electric generators, seebeck, peltier and Joule-Thomson effects, Figure of merit, materials, applications, MHD generators, principles, power generation systems, MHD accelerator, materials, applications. Fuel cells, principles, classification, applications.

Text books:

1. Non-Conventional Energy Sources, G.D. Rai, Khanna publishers, 2004.
2. Renewable energy resources, Tiwari and Ghosal, Narosa publishers, 2004.

Reference books:

1. Renewable Energy Sources, Twidell& Weir, Rutledge publishers 3 edition
2. Solar Energy, Sukhatme, McGraw Hill Education; Fourth edition.
3. Introduction to solar principle, Thomas E. Kissell, Pearson Prentice Hall
4. Non-Conventional Energy sources and utilization, Rajput R.K, S Chand & Company.

Web links:

1. http://www.mnre.gov.in/
2. http://nptel.ac.in/courses/112105051/
3. http://ecoursesonline.iasri.res.in/course/view.php?id=71
4. http://www.ren21.net/
5. http://www.nptelvideos.in/2012/11/energy-resources-and-technology.html

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PROPERTIES AND STRENGTH OF MATERIALS

		L	T	P	C
III Semester					
Course Code: 171ES3T19		3	1	0	3

Course Objectives:

COB 1: To make the students to know basic building and construction materials.

COB 2: To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity, Stress strain behaviour of materials and their governing Laws.

COB 3: To enable the students to calculate slope & deflections in beams under Various loading and support conditions.

COB 4: To enable the students to classify columns and calculation of load carrying Capacity using different empirical formulae.

COB 5: To introduce the concept of basic steel connections.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Compare the physical properties and uses of basic building and construction materials.

CO 2: Illustrate types of stresses, strains and elastic constants.

CO 3: Explain the basic concepts of Oblique stresses developed when subjected to Direct stresses in one plane and two planes- accompanied by shear stress.

CO 4: Analyse the deflections in beams under various loading and support conditions.

CO 5 Solve the load carrying capacity of columns for different end conditions.

CO 6: Design of riveted and welded joints.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	2	2	-	-	-	-	-	3
CO2 (K2)	2	1	-	-	2	2	-	-	-	-	-	3
CO3 (K2)	2	1	-	-	2	2	-	-	-	-	-	3
CO4 (K4)	3	3	2	2	3	3	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	3	-	-	-	-	-	3
CO6 (K3)	3	2	1	1	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	-
CO2 (K2)	2	-	1
CO3 (K2)	2	-	1
CO4 (K4)	3	3	-
CO5 (K3)	3	3	2
CO6 (K3)	3	3	2

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UNIT I

Properties of Engineering Materials: Properties of Engineering Materials, Properties, Composition and uses of Bricks; Classification and tests of bricks; Properties and uses of Tiles, Lime, Cement, Cement Mortar, Concrete, Sand, Paints, Varnishes, and Distempers.

UNIT II

Characteristics and Uses of Engineering Materials: Characteristics and uses of Glass, Rubber, Plywood, Wrought Iron, Cast Iron, Steel, Aluminium, Copper, Nickel; Alloys of Aluminium, Copper, Nickel and its properties. Definition and Types of Timber (Seasoning of Timber, Industrial Timber) and uses of Timber.

UNIT III

Simple Stresses and Strains: Introduction – Stresses, Tensile, Compressive and Shear-strains, Units-Elastic Curve- Elastic Limit – Poisons Ratio, Stresses in uniformity tapered circular sections- Stresses in bars of composite , Sections, Thermal Stresses and Strains in simple bars and composite bars, Elastic Constants- Young's Modulus (E), Bulk Modulus (K) and shear Modulus (G)- Relation between them.

Complex Stresses and Strains: Stresses on oblique planes, Mohr's Circle method- Direct stresses in one plane and two planes- accompanied by shear stress.

UNIT IV

SFD and BMD for Beams: Shear force and bending moment diagrams for different beams under point loads and udl loading condition.

Deflection of Beams: Deflection of beams, Relation between slope, deflection and radios of curvature. Methods of finding out slopes & deflections of beams, Double integration method. Slope and Deflection equations off a simply supported beam with a central point load, simply supported beam with eccentric point load. Simply supported beam with a uniformly distributed load.

Columns: Euler's column theory. Assumptions of Euler's column theory, Buckling load, Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other hinged, Expression for buckling load of a column with one end fixed other free- with one end fixed and other hinged Expression for buckling load of a column with both ends hinged- with both ends. Limitations of Euler's formula- Rankine's formula for columns.

UNIT V

Connections in Steel Structures: Riveted joints, types of joints- strength of a rivet and riveted joint-efficiency of a riveted joint. Design of riveted joints, Welded joint, types of welded joints, Strength of welded joints and technical terms. Design of welded joints.

Text Books:

1. Strength of Materials, Kurmi R S, Kurmi N, S Chand Publications, 2013.
2. Engineering Materials, Rangwala, S.C., Charotar Publishing House, Anand, 1993.
3. Strength of Materials by Ramamrutham S. Dhanapathrai & Sons, Nai Sarak, New Delhi, 2003.

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Reference Books:

1. Material of constructions Deshpande R S 1977. United Book Corporation, Poona.
2. Manufacturing Process. Hazra Choudhury 1985. Media Promoters and Publishers Private Limited, Bombay.
3. Workshop Technology (Part-I) Chapman W.A.J. 1994. Aronold Publishers, New Delhi.
4. Mechanics of Structures (Vol.I) Junarkar S.B. 2001 - Charotar Publishing House, Anand.

Web Links:

1. http://nptel.ac.in/courses/105102088/
2. http://nptel.ac.in/courses/105105108/2
3. http://nptel.ac.in/courses/112107147/20
4. http://freevideolectures.com/Course/2361/Strength-of-Materials/2

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ELECTRICAL AND ELECTRONICS ENGINEERING

	L	T	P	C
III Semester	L	T	P	C
Course Code: 171ES3T20	3	1	0	3

Course Objectives:

COB 1: To help the students acquire basic principles of electrical circuits and analysis of networks.

COB 2: To equip the students study the knowledge about DC Machines and Transformers and understand the principle of operation and construction details of DC Machines & Transformers.

COB 3: To train the students with principle of operation and construction details of 1-Phase and 3-Phase induction motor.

COB 4: To enable the student about the usage of PN junction diode in half wave and full wave rectifiers.

COB 5: To help the students acquire knowledge about the operation of PNP and NPN transistors.

Course Outcomes:

At the end of the course the students will be able to:

CO 1: Analyze the various electrical networks.

CO 2: Explain the operation of DC generators, 3-point starter and DC machine testing by Swinburne's Test.

CO 3: Examine the performance of single-phase transformer.

CO 4: Compare the operation of 1-Phase and 3-phase induction motors.

CO 5: Distinguish the operation of half wave, full wave bridge rectifiers, and types of transistors.

Mapping of course outcomes with program outcomes:

urse outcomes	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	3	3	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	-	-	-	-	-	3	-	-	-	-	-
CO3 (K4)	3	-	2	-	-	3	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	2	-	-	-	-	-	-
CO5 (K4)	3	3	2	2	-	-	3	-	-	-	-	-

Mapping of course outcomes with program specific outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K4)	3	3	3
CO2 (K2)	2	-	1
CO3 (K4)	3	3	3
CO4 (K2)	2	-	1
CO5 (K4)	3	3	3

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UNIT – I

Electrical Circuits: Independent, Dependent Sources, Ohm's law and Kirchhoff's Laws – mesh analysis - Series - Parallel circuits–Thevenin's Theorem and its problems, Superposition Theorem and its problems, Star-Delta Conversion Method and its problems. Various stators and batteries for agricultural machinery. Basic introduction to ac circuits.

UNIT – II

Transformers: Construction of single phase transformer, EMF equation of transfer, Core type transformer, shall type and difference between shell and core type transformer, transformer test - open circuit and short circuit tests, Losses in a transformer, efficiency and Voltage regulation of transformer for various power factors.

UNIT – III

DC Machines: Principle of operation of DC generator – EMF equation - types of DC generator – applications-DC Motor-working principle, value of back EMF, voltage equation of DC motor, types of DC motors-torque equation - Factors controlling the speed, Flux control and armature control of shunt motors, three point starter and their necessity.

UNIT – IV

AC Rotating Machines: Principle of operation of single phase induction motor, double field revolving theory, Equivalent circuit of single phase induction motor. Three phase induction motor – working principle, production of rotation field, Construction – Stator, rotor, Slip-torque characteristics.

UNIT V

Rectifiers &Transistors: PN junction diodes - diode applications (Half wave and Full wave rectifiers) - PNP and NPN junction transistor - transistor as an amplifier

Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications. Vol. I and Vol. II
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI.

Reference Books:

1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering by Sukhija and Nagsarkar, Oxford Publications, 2nd edition
4. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

Web Links:

1. http://www.nptelvideos.in/2012/11/electrical-machines-i.html
2. http://nptel.ac.in/courses/108105017/
3. http://nptel.ac.in/courses/108106071/
4. http://www.nptelvideos.com/electrical_engineering/

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HEAT AND MASS TRANSFER

IV Semester L T P C
Course Code: 171AG4T05 3 1 0 3

Course Objectives:

- COB1 : To familiarize the student with conduction, convection and radiation heat transfer
- COB2 : To understand the concepts of heat transfer through extended surfaces.
- COB3: To understand the mechanisms of heat transfer under steady and transient conditions.
- COB4: To impart basic knowledge of mass transfer.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO1: Describe the basic modes of heat transfer.
- CO2: Solve the critical thickness of insulation for cylinders.
- CO3: Determine the heat transfer performance of the extended surfaces.
- CO4: Interpret forced and free convection heat transfer mechanism.
- CO5: Explain the principles of radiation heat transfer and mass transfer.
- CO6: Apply LMTD & NTU for designing of heat exchangers.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO3 (K4)	3	3	2	2	3	3	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	-	2	1
CO2 (K3)	3	-	2
CO3 (K4)	2.	-	3
CO4 (K3)	3	-	2
CO5 (K2)	-	-	1
CO6 (K3)	-	3	2

UNIT-I

Introduction: Application of Heat and mass transfer-modes of heat transfer examples, Fourier's law of heat transport, Introduction to steady state heat transfer –one state heat conduction equation, dimensional steady

Thermal conductivity of different materials: Measurement-Insulation Materials, One dimensional steady state conduction through plane and composite walls, Conduction through tubes and spheres with and without heat generation, Conduction through multilayer tubes.

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UNIT-II

Convective Heat Transfer: Electrical analogy-conduction through materials in parallel, Combined convection and conduction and overall heat transfer coefficients-problem solving, Concept of critical thickness of insulation for a cylinder, sphere-problem solving.

UNIT-III

Unsteady State Heat Transfer: Unsteady state system with negligible internal thermal resistance equation for different geometries, Fins-heat transfer from extended surfaces-types of fins-numerical. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection.

UNIT-IV

Heat Exchangers: Equation of laminar boundary layer on flat plate and a tube, Laminar forced convection on a flat plate and in a tube, Combined free and forced convection, Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units, Heat exchanger analysis restricted to parallel and counter flow heat exchangers.

UNIT-V

Radiative Heat Transfer: Introduction. Absorptivity, Reflectivity and Transmissivity, Black body and monochromatic radiation, Plank's law, Stefan-Boltzman law, Kichoff's law, grey bodies and emissive power, solid angle intensity of radiation, Radiation exchange between black surfaces, geometric configuration factor.

Mass Transfer:

Steady state molecular diffusion in fluids at rest and in laminar flow-Flick's law mass transfer Coefficients-Reynold's analogy.

Text Books:

1. Heat and Mass Transfer, R.K.Rajput S. Chand Limited, Revised Edition 2014.
2. Heat & mass transfer, R.C.Sachdeva, New Academic Science, 5th Edition, 2017.

Reference books:

1. Transport processes and Unit Operations, Geankoplis C.J.Allyn and Bacon Inc., Newton,Massachusetts.
2. Heat Transfer, Holman JP. McGraw Hill Book CoNew Delhi ,6th Edition
3. Fundamentals of Heat and Mass Transfer, F P Incropera and De Witt D P John, Wiley
4. Engineering Heat Transfer, Gupta CP and Prakash R. Nem Chand and Bros., Roorkee.

Web links:

1. http://nptel.ac.in/courses/112101097/
2. http://www.mechanicalgeek.com/heat-mass-transfer
3. http://www.uotechnology.edu.iq/dep-MechanicsandEquipment/Lectures%20and%20Syllabus/Lectures/Same/Third%20Grade/Heat%20Transfer5
4. http://nptel.ac.in/courses/112105192/

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FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS

IV Semester
Course Code: 171ES4T25

L	T	P	C
3	1	0	3

Course Objectives:

COB 1: To make the students to know fluid properties and their influence on fluid motion, fluid pressure on submerged bodies and kinematics of flow

COB 2: To impart the students with knowledge of Euler's equation of motion, Bernoulli's equation and their applications and boundary layer theory

COB 3: To enable the student to calculate meta centric heights of floating bodies, discharges in pipes and open channel

COB 4: To enable the students to analyze losses in pipes

COB 5: To incorporate the knowledge on open channel hydraulics

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Interpret the various properties of fluids and their influence on fluid motion

CO 2: Solve problems on pressure measurement, hydrostatic forces on submerged bodies and continuity equation

CO 3: Apply the knowledge of Dynamics to Solve problems on Bernoulli's equation and its applications and also calculating thickness of boundary layer

CO 4: Solve problems on meta centric heights of floating bodies and measurement of discharge in closed and open channels

CO 5: Determining losses and discharges in simple and compound pipes

CO 6: Solve the problems on economical sections, critical depth and specific energy for various channels

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	-	-	3	-	-	-	-	-
CO2 (K3)	3	2	1	1	-	-	3	-	-	-	-	-
CO3 (K3)	3	2	1	1	-	-	3	-	-	-	-	-
CO4 (K3)	3	2	1	1	-	-	3	-	-	-	-	-
CO5 (K3)	3	2	1	1	-	-	3	-	-	-	-	-
CO6 (K3)	3	2	1	1	-	-	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	1
CO2 (K3)	3	3	2
CO3 (K3)	3	3	-
CO4 (K3)	3	3	2
CO5 (K3)	3	3	2
CO6 (K3)	3	3	-

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UNIT I

Introduction: Fluids- definitions-classification-properties, dimensions. Fluid pressure–introduction– Measurement of fluid pressure–piezometer tube manometry–types of manometers. Mechanical gauges-Bourdon's tube pressure gauge-Diaphragm pressure gauge–Dead weight pressure gauge. Buoyancy and flotation – metacentric height

Hydro Statics & Kinematics: Fluid Static force on submerged surfaces–Total force on horizontal, vertical and inclined surfaces. Center of pressure of an inclined immersed surface. Pressure on a curved surface and its applications. Kinematics of fluid flow– introduction – continuity of fluid flow – Types of flow lines.

UNIT II

Fluid Dynamics: Dynamics of fluid flow –Various forms of energy in fluid flow, frictional loss general equation. Euler's equation of motion, Bernoulli's theorem and Practical applications of Bernoulli's theorem, Venturimeter, Orifice meter, pitot tube.

Boundary layer theory: Boundary layer theory- Thickness of Boundary layer, Thickness of Boundary layer in a laminar flow, Thickness of Boundary layer in a turbulent flow.

UNIT III

Measurement of flow: Flow through orifices (Measurement of Discharge) – Types of orifices, Jet of water, vena contracta, Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Mouthpieces – Types of Mouthpieces – Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece. Flow over Notches-Types of notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch. Time of emptying a tank over a Rectangular Notch, Triangular Notch. Flow over weirs – Types of weirs, formula for Discharge over a rectangular weir, velocity of approach, Determination of Velocity of Approach.

UNIT IV

Flow through pipes: Flow through simple pipes – Loss of head in pipes, Darcy's formula for loss of Head in pipes, Chezy's formula for loss of head in pipes. Transmission of power through pipes. Flow through compound pipes – Discharge through a compound pipe (Pipes in series)-Discharge through pipes in parallel, Equivalent size of a pipe

UNIT V

Open channel hydraulics: classification of open channel and definitions. Chezy's formula for discharge through an open channel, Bazin's formula for discharge through open channel, Manning's formula for discharge through an open channel. Numerical Problems on design through open channel, Kutter's formula for discharge, Problems on design; Channels of most economical cross sections – Conditions for maximum discharge through a channel of rectangular section, trapezoidal section, circular section; Specific energy concept-Specific energy of a following fluid, specific energy diagram, critical depth, Type of flows, critical velocity. Velocity and Pressure profiles in open channels.

Text Books:

1. A text book of Fluid mechanics and hydraulic machines, Dr.R.K.Bansal - Laxmi Publications (P) ltd., New Delhi, 2017.
2. Hydraulics and Fluid Mechanics including machines, Dr.P.N.Modi and Dr.S.M.Seth, Standard book house, New Delhi – Rajsons Publications Pvt. Ltd, 19th edition, 2009.
3. A text of Fluid mechanics and hydraulic machines, Er. R. K. Rajput – S.Chand, 9th edition, 2017.

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Reference Books:

1. Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, CENGAGE Learning
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education
3. Fluid Mechanics including Hydraulic machines, Dr. A.K.Jain – Khanna publishers, 12th edition, 2016.

Web Links:

1. http://nptel.ac.in/courses/105103095/
2. https://lecturenotes.in/subject/240/fluid-mechanics
3. https://www.smartzworld.com/downloads/download/fluid-mechanics-complete-pdf-notes/
4. http://www.colincaprani.com/files/notes/Fluid%20Mechanics.pdf
5. https://drive.google.com/file/d/0B-IbNSAhk4D2azFLZnV1M0ZFbkU/view

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SURFACE WATER HYDROLOGY

IV Semester **L T P C**
Course Code: 171AG4T07 **3 1 0 3**

Course Objectives:

- COB 1: To impart knowledge and skills on hydrological (rainfall and runoff) measurements in watershed.
- COB2: To make the students to predict the volume and rates of runoff with hydrographs and unit hydrograph, hyetograph.
- COB3: To enable the students to study reservoir planning with flood routing techniques for application in natural resources management.
- COB4: To enable the students to apply hydrology in land & water management and watershed management.

Course Outcomes:
On the successful completion of the course, students will be able to:

- CO 1: Explain rainfall characteristics and measuring devices in India.
- CO 2: Calculate the mean areal precipitation using various methods.
- CO 3: Explain runoff and stream flow measurement methods.
- CO 4: Estimate discharge volume of runoff with hydrographs and unit hydrographs.
- CO5: Apply various hydrograph techniques to convert multiple duration graph into single duration vice-versa.
- CO 6: Plan a reservoir with flood routing techniques for application in natural resource management.

Mapping of course outcome with program outcome:

CO's/PO's	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	-	1	-	-	2	-	-	-	-	3	-	3
CO2 (K4)	-	3	2	2	3	-	-	-	-	3	-	-
CO3 (K2)	-	1	-	-	2	-	-	-	-	3	-	3
CO4 (K5)	-	3	3	3	3	-	-	-	-	-	-	-
CO5 (K3)	-	2	1	1	3	-	-	-	-	3	-	3
CO6 (K3)	3	2	1	1	3	-	-	-	-	3	-	3

Mapping of course outcome with program specific outcome:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	1
CO2 (K4)	3	3	3
CO3 (K2)	2	-	1
CO4 (K5)	3	3	3
CO5 (K3)	3	3	2
CO6 (K3)	3	3	2

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UNIT-I

Precipitation: Hydrology-definition, hydrological cycle and its components. Forms of Precipitation, Characteristics of rainfall in India (types of monsoon). Measurement of Rainfall – Recording and Non-Recording Rain gauges- Rain gauge network density for different topographic conditions – Point rainfall analysis - Presentation of Rainfall data – Mass Curve and hyetograph, Mean Precipitation over an area – Arithmetic Mean, Thiessen Polygon, Isohyetal methods, DAD Relationships and curves. Probability Analysis of Rainfall – Return Period, Plotting position by Weibull's method – Rainfall events at different probability levels (20%, 40%, 60%, 80%).

UNIT-II

Runoff: definition-components of runoff-direct runoff and base flow, overload flow and interflows, pictorial representation of different routes of runoff. Runoff characteristics of streams – perennial, intermittent and ephemeral streams. Definition and Estimation of peak runoff using rational method. **Stream flow measurement:** Measurement of stream flows. Measurement of stage and velocities, staff gauge, wire gauge, automatic stage recorders, current meters (horizontal and vertical axis meters), calibration ($V= a\ N_s + b$). Rainfall-Runoff relations ($R=a\ P + b$), curve fitting and determination of 'a' and 'b' and (correlation coefficient).Intensity-Duration-Frequency-Relationship ($i= ((KT^x)/(D+A)^n)$). Determination of net effective rainfall-infiltration indices- Phi index.

UNIT-III

Hydrographs: definition and components, factors affecting flood hydrographs, hydrograph separation for simple and complex storms – Method I, II and III. Unit Hydrograph-concept and the three implications of the definitions and the two basic assumptions. Effects of the characteristics of storms (duration of rain, time-intensity pattern, areal distribution of runoff and amount of runoff) on the shape of the resulting hydrographs. Derivation of Unit hydrographs for simple and complex storms. Derivation of an average unit hydrographs from several storms of the same duration (proper procedure of computing average peak flow and time to peak).

UNIT-IV

Unit Hydrographs: The methods for conversion of unit hydrograph of different durations, (1) method of superposition and (2) S-curve. Concept of S-curve method, explanation application and determination of lower duration graph from the given higher duration graph and vice-versa. Concepts of Synthetic unit hydrograph, Snyder' synthetic unit hydrograph and formulas relating to hydrograph features (basin lag, Peak flow and time base of the unit hydrograph). Concept and application of Instantaneous unit hydrograph and SCS Triangular Hydrograph.

UNIT V

Flood Routing: Flood Routing-introduction, two broad categories of flood routing and channel routing, hydrologic routing and hydraulic routing, basic equations. Hydrologic storage routing, Schematic representation of storage routing, modified Pul's method (semi-graphical method). Explanation of the features of the modified Pul's method. Flood routing through a reservoir by modified Pul's method. Applications of Hydrology in land and water management, watershed management, Flood mitigation, Floodplain mapping, Retards, Flood control and Regulation.

Text Books:

1. Engineering Hydrology, Raghunath H.M., Willey Eastern Limited, New Delhi, 3rd edition, 2016.
2. Watershed Hydrology, Suresh R., Standard Publisher and Distributors, New Delhi, 2017.

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Reference Books:

1. Engineering Hydrology, Subramanyam K., Tata Mc. Graw – Hill Publishing Co., Limited, New Delhi.
2. Hydrology for Engineers, Linsley R.K. Kholer A. & Paul Hus J.L.H., Mc-Graw Hill Book Co. New Delhi.
3. Watershed Management, Dhruvanarayana, VV., ICAR Publication, New Delhi.

Web Links:

1. http://www.nptelvideos.in/2012/11/advanced-hydrology.html
2. https://www.slideshare.net/MohammedSalahat1/chapter-3-surface-water-hydrology
3. https://theconstructor.org/water-resources/types-of-rain-gauges/12801/
4. http://nptel.ac.in/downloads/105101002/

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Syllabus revision Index 2018-19

S.No	Name of the course	Percentage of syllabus change
1	Principles of Soil Science and Agronomy	20
2	Renewable Energy Sources	20
3	Properties and Strength of Materials	20
4	Electrical and Electronics Engineering	25
5	Heat and Mass Transfer	20
6	Fluid Mechanics and Open Channel Hydraulics	20
7	Surface Water Hydrology	20

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1.1.2. Table-Prior/Post revision of syllabus

1	**Regulation**	**Pre-Revision**	**Post-Revision**
	Course Title	Principles of soil science and agronomy	Principles of soil science and agronomy
	Course Code	16A91A3501	171AG3T01
	Syllabus	**Unit –I:** Soil: Definition –soil as a three phase four component system-branches of Soil science difference between surface and sub surface soil, Rocks: Definition – classification of rocks based on mode of formationigneous sedimentary and metamorphic rocks, Minerals: Definition, classification, primary, secondary, essential, accessory, silicate, non silicate minerals, light and heavy minerals primary silicate minerals; quartz, feldsparsmicas pyroxenes amphiboles secondary silicate; secondary minerals, Ca, Mg, S and Micronutrient containing minerals-chemical formulate, Weathering:-Definition-types of weathering physical weathering of rocks, agents of physical weathering, temperature, water, wind and glaciers, Chemical weathering, solution, hydration, hydrolysis carbonation-oxidation-reduction biological weathering role of plants and animals in weathering. Soil formation: Soil forming factors – active and passive soil factors and their role in soil formation, Soil forming processes: Elluviation, illuviation, humification, calcification, laterization, podzolozation, salinization, alkalization and gleization, Soil Profile, Detailed description of theoretical soil profile, Soil physical properties:- Soil separates and their properties. Specific surface, soil texture-definition-textural classes-	**UNIT –I** **Soil:** Definition -branches of Soil science difference between surface and sub surface soil, Rocks: Definition – classification of rocks based on mode of formation igneous, sedimentary and metamorphic rocks, Minerals: Definition, classification, primary, secondary, essential, accessory, silicate, non-silicate minerals, light and heavy minerals primary silicate minerals; quartz, feldsparsmicas pyroxenes amphiboles secondary silicate; secondary minerals, Ca, Mg, S and Micronutrient containing minerals-chemical formulate. **Weathering:** Definition-types of weathering physical weathering of rocks, agents of physical weathering, temperature, water, wind and glaciers, Chemical weathering, solution, hydration, hydrolysis carbonation-oxidation-reduction biological weathering role of plants and animals in weathering. Soil formation: Soil forming factors –active and passive soil factors and their role in soil formation, Soil forming processes: Eluviations, illuviation, humification, calcification, laterization, podzolozation, salinization, alkalization and gleization, Soil Profile, Detailed description of theoretical soil profile.

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		methods of determination of soil texture, importance of soil structure	
		Unit:- II Soil structure; Definition-classification based on type, class and grade, factors influencing formation of aggregates-importance and management of soil structure, Soil structure; Definition-classification based on type, class and grade-factors influencing formation of aggregates-importance and management of soil structure, Soil consistency; Definition-forms of consistency and importance of soil consistency, Bulk density and particle density; factors influencing and their importance; porosity – types-calculation-importance, Soil water; structure o f water and the effect of H-bonding on properties of water retention of water in soils-soil moisture tension-soil moisture potential –soil moisture constants. Soil water movement; saturated, unsaturated and vapour flows, laws governing water flow-Darcy's and poiseuille's law- Infiltration; Factors-importance. Evaporation; Factors influencing evaporation-Ways to minimize it-soil mulch-organic mulch etc, Soil air; Composition of soil air-processes of gaseous exchange –soil aeration indices –and their importance (oxygen content-ODR-aeration porosity-redox potential) management of soil air, Soil temperature; influence of soil temperature on plant growth-factors influencing soil temperature-management of soil temperature. Soil color determination importance, Soil colloids:-Definition-general properties-inorganic and organic colloids origin of charge on colloids (positive & negative)	**UNIT- II** **Physical properties of soil** **Soil structure:** Definition-classification based on type, class and grade, factors influencing formation of aggregates-importance and management of soil structure, Soil structure; Definition- classification based on type, class and grade-factors influencing formation of aggregates-importance and management of soil structure. **Soil consistency:** Definition-forms of consistency and importance of soil consistency, Soil air; Composition of soil air-processes of gaseous exchange –soil aeration indices –and their importance (oxygen content-ODR-aeration porosity-redox potential) management of soil air, Soil temperature; influence of soil temperature on plant growth-factors influencing soil temperature-management of soil temperature. Soil color determination and importance
		Unit-III: Secondary silicate clay minerals (inorganic soil colloids) Kaolinite montmoriloniteillite their tructures and properties, Ion exchange, Cation and anion exchange –factors influencing ion exchange capacity	**UNIT-III** **Ion exchange**: Cation and anion exchange –factors influencing ion exchange capacity of soils importance of ion exchange calculation of base saturation and exchangeable acidity, Soil organic matter: importance of

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		of soils importance of ion exchange calculation of base saturation and exchangeable acidity, Soil organic matter: importance of organic matter CN ration of organic matter and its importance, Soil biology;- Soil flora and fauna their characteristics role of beneficial organisms mineralization–immobilization, nitrogen fixation, nitrification, denitrification, solubilization of phosphorus and sulphur, Soil fertility:- Concepts of soil fertility and soil productivity:- definitions and differences Arnon's criteria of essentiality-essential and beneficial elements-factors influencing availability of nutrients. Problem Soils:- Definition – Physical problems soil depth slope soil crust soil compaction drainage submergence (formation-adverse effects-effect on soil properties and plant growth management), Chemical problems –classification acid, saline, saline saline-sodic and calcareous soilscharacteristics-nutrient availability in problem soils and their reclamation	organic matter CN ration of organic matter and its importance. **Soil biology:** Soil flora and fauna their characteristics role of beneficial organisms mineralization–immobilization, nitrogen fixation, nitrification, denitrification, solubilization of phosphorus and sulphur, Soil fertility; Concepts of soil fertility and soil productivity; definitions and differences Arnon's criteria of essentiality-essential and beneficial elements-factors influencing availability of nutrients. Chemical · problems –classification acid, saline, saline saline-sodic and calcareous soils characteristics-nutrient availability in problem soils and their reclamation
		Unit-IV: Irrigation water:- Quality of irrigation water-classification based on EC, SAR,RSC and Boron content-use of saline waters in agriculture, Soil taxonomy:- New comprehensive system of soil classification (7^{th} approximation) soil orders and their characteristics, Important soil groups of India:- Alluvial soils-black soils –red soils laterite soils and coastal soils. Meaning and scope of agronomy, History of agricultural development in ancient India, Agriculture in civilization era, National and International Agricultural Research Institutes in India, Classification of crops, Classification of field crops, According to Origin, Botanical Commercial, Economical, seasonal, Ontogeny, Agronomic, Lead Morphology and Special Purpose crops, Definition of climate and weather, Definition of meteorology, Climatology, Agri-meteorology,	**UNIT-IV** **Classification of field crops:**National and International Agricultural Research Institutes in India, Classification of crops, Classification of field crops, According to Origin, Botanical Commercial, Economical, seasonal, Ontogeny, Agronomic, Lead Morphology and Special Purpose crops, Definition of climate and weather, Definition of meteorology, Climatology, Agri-meteorology, Introduction, scope and practical utility of Agricultural meteorology, composition and structure of atmosphere, Influence of weather on crop grain development, essential Resources for crop production, factors influencing plant growth, Biotic and A biotic factors.-Agro climatic zones of A.P. and India

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		Introduction, scope and practical utility of Agricultural meteorology, composition and structure of atmosphere, Influence of weather on crop grain development, essential Resources for crop production, factors influencing plant growth, Biotic and Abiotic factors, Crop seasons, Kharif, Rabi and summer seasons in A.P.-Agro climatic zones of A.P. and India	
		Unit-V: Tillage and tilth, Objective of tillage, characteristic of good seed bed, effect of tillage on soil properties (Pore space, texture, structure, bulk density, colour of the soil), Types of Tillage, preparatory cultivation, inter cultivation, after cultivation and preparatory cultivation for lowland rice pudding, implement used for seed bed preparation, sowing, inter-cultivation and special operation, Sowing, Methods of sowing, time and depth of sowing of major agricultural crops, Methods and time of application of manure and fertilizers. **Unit – VI:** Weeds- Influence of weeds on crop production, principles and practices of weed management, Basics on soil plant-water relationship, Types of Soil Erosion, Factors influencing soil erosion, Soil conservation, erosion preventive measures, Agronomic measures for soil and water conservation, Dry land Agriculture, Problems of Crop production in dry farming, Agronomic measure in reducing evapo-transpiration losses, Watershed management, aims and Objectives, Organic farming-Sustainable Agriculture, Definition, Principles and importance	**UNIT-V** **Tillage and Tilth:** Objective of tillage, characteristic of good seed bed, effect of tillage on soil properties (Pore space, texture, structure, bulk density, colour of the soil), Types of Tillage. **Sowing:** Methods of sowing, time and depth of sowing of major agricultural crops, Methods and time of application of manure and fertilizers. **Weeds:** Influence of weeds on crop production, principles and practices of weed management., Dry land Agriculture, Problems of crop production in dry farming, Agronomic measure in reducing evapo-transpiration losses, Organic farming-Sustainable Agriculture

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2	Regulation	Pre-Revision	Post-Revision
	Course Title	Renewable Energy Sources	Renewable Energy Sources
	Course Code	R1621352	171AG3T02
	Syllabus	**UNIT – I** **PRINCIPLES OF SOLAR RADIATION**: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data. Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors	**UNIT – I** **Introduction:** Role and potential of renewable energy source, Status of renewable energy in India. **Principle of solar radiation:** Physics of the sun, the solar constant, solar radiation at the earth surface, solar radiation geometry, problems, solar radiation measurements, solar radiation on titledsurface. **Solar energy collectors:** Flat plate and concentrating collectors, classification of concentrating collectors, advanced collectors, performance parameter
		UNIT-II **SOLAR ENERGY STORAGE AND APPLICATIONS:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion. Wind Energy Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria	**UNIT – II** **Solar Energy Storage and Applications:** Different methods, Sensible, latent heat, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion, problems, solar water pumping and cooking. Environmental impact of solar power, **Wind Energy:** Potentials, site selection, horizontal and vertical axis windmills, power in the wind, problems, applications (wind pump), performance characteristics, Betz criteria
		UNIT-III **BIO-MASS:** Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects	**UNIT – III** **Bio-nergy:** biomass,classification, methods and principle of bio mass conversion, Anaerobic/aerobic digestion, biogas, types of Bio-gas digesters, combustion characteristics of bio-gas, classification of biogas plants, biogas plant design, problems. **Bio-diesel:** Need, feed stock, bio-diesel production methods (Transesterification), applications

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		UNIT-IV **GEOTHERMAL ENERGY:** Resources, types of wells, methods of harnessing the energy, potential inIndia	**UNIT – IV** **Geothermal Energy:** Resources, methods of harnessing the energy, applications, potential in India. **Ocean energy:** OTEC, Principles utilization, method of OTEC power generation, Tidal and wave energy: Potential, principle and conversion techniques, mini-hydel power plants, and their economics
		UNIT-V **OCEAN ENERGY:** OTEC, Principles utilization, setting of ΘTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics. **UNIT-VI** **DIRECT ENERGY CONVERSION**: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and Joule-Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions	**UNIT – V** **Direct Energy Conversion**: Thermo-electric generators, seebeck, peltier and Joule-Thomson effects, Figure of merit, materials, applications, MHD generators, principles, power generation systems, MHD accelerator, materials, applications. Fuel cells, principles, classification, applications

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3	Regulation	Pre-Revision	Post-Revision
	Course Title	Properties and Strength of Materials	Properties and Strength of Materials
	Course Code	R1621354	171ES3T19
	Syllabus	**Unit- I:** Properties of Engineering Materials, Classifications of Rocks, Sources of Stones and Natural bed of Stones, Properties, Varieties and uses of stones, Properties, Composition and uses of Bricks, Classification and tests of bricks, Properties, varieties and uses of Tiles, Properties, varieties and uses of Lime, Properties, varieties and uses of Cement, Properties, varieties and uses of Cement Mortar, Properties	**UNIT I** **Properties of Engineering Materials:** Properties of Engineering Materials, Properties, Composition and uses of Bricks; Classification and tests of bricks; Properties and uses of Tiles, Lime, Cement, Cement Mortar, Concrete, Sand, Paints, Varnishes, and Distempers
		Unit - II Varieties and uses of Concrete, Properties, varieties and uses of Sand, Properties, varieties and usesof Paints, Properties, varieties and uses of Varnishes, Properties, varieties and uses of Distempers. Characteristics and uses of Glass, Characteristics and uses of Rubber, Characteristics and uses of Plywood, Characteristics and uses of Plastics	**UNIT II** **Characteristics and Uses of Engineering Materials:** Characteristics and uses of Glass, Rubber, Plywood, Wrought Iron, Cast Iron, Steel, Aluminium, Copper, Nickel; Alloys of Aluminium, Copper, Nickel and its properties. Definition and Types of Timber (Seasoning of Timber, Industrial Timber) and uses of Timber
		Unit-III: Characteristics and uses of Wrought Iron, Characteristics and uses of Cast Iron, Characteristics and uses of Steel, Characteristics and uses of Aluminium, Characteristics and uses of Copper, Characteristics and uses of Nickel, Alloys of Aluminium and its properties, Alloys of Copper and its properties, Alloys of Nickel and its properties, Definition and Types of Timber, Seasoning of Timber, Industrial Timber and uses of Timber, Methods of heat treatment of Steel	**UNIT III** **Simple Stresses and Strains:** Introduction – Stresses, Tensile, Compressive and Shear-strains, Units-Elastic Curve- Elastic Limit – Poisons Ratio, Stresses in uniformity tapered circular sections- Stresses in bars of composite, Sections, Thermal Stresses and Strains in simple bars and composite bars, Elastic Constants- Young's Modulus (E), Bulk Modulus (K) and shear Modulus (G)- Relation between them. **Complex Stresses and Strains:** Stresses on oblique planes, Mohr's Circle method- Direct stresses in one plane and two planes- accompanied by shear stress

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		Unit-IV: Introduction – Stresses, Tensile, Compressive and Shear-strains, Units-Elastic Curve- Elastic Limit – Poisons Ratio, Stresses in uniformity tapered circular sections- Stresses in bars of composite , Sections, Thermal Stresses and Strains in simple bars and composite bars, Elastic Constants- Young's Modulus (E), Bulk Modulus 9K0 and shear Modulus (G)- Relation between them, Stresses on oblique planes, Mohr's Circle method- Direct stresses in one plane, Direct Stresses in two planes-accompanied by shear stress. Deflection of beams, Relation between slope, deflection and radios of curvature. Methods of finding out slopes & deflections of beams, Double integration method. Slope and Deflection equations off a simply supported beam with a central point load, simply supported beam with eccentric point load. Simply supported beam with a uniformly distributed load, Columns and Struts	**UNIT – IV** **SFD and BMD for Beams:** Shear force and bending moment diagrams for different beams underpoint loads and udl loading condition. **Deflection of Beams:** Deflection of beams, Relation between slope, deflection and radios of curvature. Methods of finding out slopes & deflections of beams, Double integration method. Slope and Deflection equations off a simply supported beam with a central point load, simply supported beam with eccentric point load. Simply supported beam with a uniformly distributed load. **Columns:** Euler's column theory. Assumptions of Euler's column theory, Buckling load, Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other hinged, Expression for buckling load of a column with one end fixed other free- with one end fixed and other hinged Expression for buckling load of a column with both ends hinged- with both ends. Limitations of Euler's formula-Rankine's formula for columns
		Unit-V: Euler's column theory. Assumptions of Euler's column theory, Buckling load-derivations, Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other hinged, Expression for buckling load of a column with one end fixed other free- with one end fixed and other hinged Expression for buckling load of a column with both ends hinged- with both ends. Fixed Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and other end is free. Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and other end is free. Limitations of euler's formula-Rankine's formula for columns.	**UNIT V** **Connections in Steel Structures:** Riveted joints, types of joints-strength of a rivet and riveted joint-efficiency of a riveted joint. Design of riveted joints, Welded joint, types of welded joints, Strength of welded joints and technical terms. Design of welded joints

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		Unit-VI: Riveted joints, types of joints-strength of a rivet and riveted joint-efficiency of a riveted joint Design ofriveted joints, Eccentric riveted connections, Welded joist, types of welded joints, Strength of welded joints, technical terms. Design of welded joints, eccentric welded joints. Design of welded joints, eccentric welded joints. Dams, forces acting, stressed at the base of dam. Stability of dams, design of base width of dams. Propped cantilever and beams – Deflection and slope Equations, Fixed and continuous beams – Deflection and Slope Equations, Super position theorem – claypeyron's theorem of three moments, Application of Clayperon's theorem of three moments, Moment distribution methods. Analysis of statistically indeterminate beams	

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4	Regulation	Pre-Revision	Post-Revision
	Course Title	Electrical Systems	Electrical and Electronics Engineering
	Course Code	R1621355	171ES3T20
	Syllabus	**Unit- I:** Independent, Dependent Sources and Kirchoff's Laws, Maxwell's Loop current method and its problems, Nodal Voltage Method and its problems, Thevenin's Theorem and its problems, Norton's Theorem and its problems, Superposition Theorem and its problems, Reciprocity and Maximum power Transfer, Star-Delta Conversion Method and its problems. Solution of DC circuit by Network Theorems, Sinusoidal steady state response of circuits, Instantaneous and Average Methods, Concept of Power Factor, Reactive and Apparent Poser, Concept and Analysis of Balanced Polyphase circuits, Laplace Transform method of finding step response of DC circuits, Series and Parallel Resonance	**UNIT – I** **Electrical Circuits:** Independent, Dependent Sources, Ohm's law and Kirchhoff's Laws – mesh analysis - Series - Parallel circuits–Thevenin's Theorem and its problems, Superposition Theorem and its problems, Star-Delta Conversion Method and its problems. Various stators and batteries for agricultural machinery. Basic introduction to ac circuits
		Unit-II: Electromotive force, Reluctance, Magnetic circuit, Determination of Ampere Turn Hysteretic losses and eddy current losses, Transformer-working principle, Construction of single phase transformer, EMF equation of transfer, Core type transformer, shall type and difference between shell and core type transformer, Electric circuit, dielectric insulation, leakage reactance in transformer	**UNIT – II** **Transformers:** Construction of single phase transformer, EMF equation of transfer, Core type transformer, shall type and difference between shell and core type transformer, transformer test - open circuit and short circuit tests, Losses in a transformer, efficiency and Voltage regulation of transformer for various power factors
		Unit III: Voltage regulation, transformer test, open circuit and short circuit tests, Losses in a transformer efficiency of transformer, condition for maximum	**UNIT – III** **DC Machines:** Principle of operation of DC generator – EMF equation - types of DC generator –applications- DC Motor-working principle, value of back EMF, voltage equation of DC

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		efficiency, Equivalent circuit of transformer, theory of an ideal transformer, Phaser diagram of an ideal transformer, transformer on non load, Phaser diagram of transformer on load, problems solved. DC Generator, Principle of working construction, field system, armature, Commentator, other accessories of DC generator, EMF equation of DC generator, Torque equation, DC armature winding, lap winding wave winding terms used in armature winding, Armature reaction, Demagnetizing & Cross magnetizing ampere turns, methods of compensating armature reaction	motor, types of DC motors-torque equation - Factors controlling the speed, Flux control and armature control of shunt motors, three point starter and their necessity
		Unit – IV Excitation of DC generator-shunt generator, series generator, compound generator, Commutation- Resistance commutation, EMF commutation, Characteristics of DC generator-separately exited, shunt, series, compound generator, DC Motor-working principle, value of back EMF, voltage equation of DC motor, Characteristics of DC motor–Characteristics of series, shunt, compound motor, Torque of DC motor, Armature Torque, shaft Torque-efficiency of DC motor	**UNIT – IV** **AC Rotating Machines:** Principle of operation of single phase induction motor, double field revolving theory, Equivalent circuit of single phase induction motor. Three phase induction motor – working principle, production of rotation field, Construction – Stator, rotor, Slip-torque characteristics
		Unit-V: Factors controlling the speed, Flux control and armature control of shunt motors, Motors starters and their necessity, shunt motor and series motor starter, Principle of operation of single phase induction motor, double field revolving theory Equivalent circuit of single phase induction motor without core loss and with core loss, Single phase – split induction motor, shaded pole, motor, Power factor, disadvantage low power factor, power factor improvement. **Unit – VI** Measurement of power in three phase system, single watt meter,	**UNIT V** **Rectifiers &Transistors:** PN junction diodes - diode applications (Half wave and Full waverectifiers) - PNP and NPN junction transistor - transistor as an amplifier

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		two watt meter method, Measurement of power in single phase system, using current transformer and voltage transformer, Three phase induction motor – working principle, production of rotation field, Construction – Starter, rotor, operation, Torque equation, Starting (DOL, Autotransformer, Star delta starter) and speed control methods	

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5	**Regulation**	**Pre-Revision**	**Post-Revision**
	Course Title	Heat and Mass Transfer	Heat and Mass Transfer
	Course Code	R1622352	171AG4T05
	Syllabus	**Unit – I:** Introductory concepts, application of Heat and mass transfer-modes of heat transfer examples, Fourier's law of heat transport, Introduction to steady state heat transfer –one dimensional steady state heat conduction equation. Thermal conductivity of different materials – measurement-Insulation Materials, One dimensional steady state conduction through plane and composite walls, Conduction through tubes and spheres with and without heat generation, Conduction through multilayer tubes	**UNIT-I** **Introduction:** Application of Heat and mass transfer-modes of heat transfer examples, Fourier's law of heat transport, Introduction to steady state heat transfer –one state heat conduction equation, dimensional steady **Thermal conductivity of different materials**: Measurement-Insulation Materials, One dimensional steady state conduction through plane and composite walls, Conduction through tubes and spheres with and without heat generation, Conduction through multilayer tubes
		Unit – II: Electrical analogy-conduction through materials in parallel, Combined convection and conduction and overall heat transfer coefficients-problem solving, Concept of critical thickness of insulation for a cylinder-problem solving	**UNIT-II** **Convective Heat Transfer:** Electrical analogy-conduction through materials in parallel, Combined convection and conduction and overall heat transfer coefficients-problem solving, Concept of critical thickness of insulation for a cylinder, sphere-problem solving
		Unit III: Radiation heat transfer-Introduction. Absorptivity, reflectivity and transmissivity. Black body and monochromatic radiation, Plank's law, Stefan-Boltzman law, Kichoff's law, grey bodies and emissive power, solid angle intensity of radiation, Radiation exchange between black surfaces, geometric configuration factor. Heat transfer analysis involving conduction, convection and radiation by networks	**UNIT-III** **Unsteady State Heat Transfer:** Unsteady state system with negligible internal thermal resistance equation for different geometries, Fins-heat transfer from extended surfaces-types of fins- numerical. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection
		Unit IV: Unsteady state heat transfer-unsteady state system with	**UNIT-IV** **Heat Exchangers**: Equation of laminar boundary layer on flat plate

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		negligible internal thermal resistance- equation for different geometries, Fins-heat transfer from extended surfaces-types of fins-numiricals, Free and force convection. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Useful non dimensional numbers and empirical relationships for free and forced convection	and a tube, Laminar forced convection on a flat plate and in a tube, Combined free and forced convection, Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units, Heat exchanger analysis restricted to parallel and counter flow heat exchangers
		Unit V: Equation of laminar boundary layer on flat plate and a tube, Laminar forced convection on a flat plate and in a tube, Combined free and forced convection, Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units, Heat exchanger analysis restricted to parallel and counter flow heat exchangers. **Unit – VI:** Steady state molecular diffusion in fluids at rest and in laminar flow-Flick's law mass transfer coefficients-Reynold's analogy	**UNIT-V** **Radiative Heat Transfer**: Introduction. Absorptivity, Reflectivity and Transmissivity, Black body and monochromatic radiation, Plank's law, Stefan-Boltzman law, Kichoff's law, grey bodiesand emissive power, solid angle intensity of radiation, Radiation exchange between black surfaces, geometric configuration factor. **Mass Transfer:** Steady state molecular diffusion in fluids at rest and in laminar flow-Flick's law mass transfer Coefficients-Reynold's analogy

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6	**Regulation**	**Pre-Revision**	**Post-Revision**
	Course Title	Fluid Mechanics and Open Channel Hydraulics	Fluid Mechanics and Open Channel Hydraulics
	Course Code	R1621351	171ES4T25
	Syllabus	**Unit – I:** Fluids-definitions-classification-properties, dimensions. Fluid pressure–introduction–Measurement of fluid pressure–peizometer tube manometry–types of manometers. Mechanical gauges-Bourdon's tube pressure gauges-Diaphragm pressure gauge–Dead weight pressure gauge. Fluid Static force on submerged surfaces–Total force on horizontal, vertical and inclined surfaces. Center of pressure of an inclined immersed surface-Centre of pressure of a composite section. Pressure on a curved surface and its applications. Kinematics of fluid flow– introduction – continuity of fluid flow – Types of flow lines	**UNIT I** **Introduction:** Fluids- definitions-classification-properties, dimensions. Fluid pressure– introduction–Measurement of fluid pressure–piezometer tube manometry–types of manometers. Mechanical gauges-Bourdon's tube pressure gauge-Diaphragm pressure gauge–Dead weightpressure gauge. Buoyancy and flotation – metacentric height **Hydro Statics & Kinematics:** Fluid Static force on submerged surfaces–Total force on horizontal, vertical and inclined surfaces. Center of pressure of an inclined immersed surface. Pressure on a curved surface and its applications. Kinematics of fluid flow– introduction – continuity of fluid flow – Types of flow lines
		Unit –II: Boundary layer theory- Thickness of Boundary layer, Thickness of Boundary layer in a laminar flow, Thickness of Boundary layer in a turbulent flow, Prandtl's Experiment of Boundary Layer separation. Dynamics of fluid flow – Various forms of energy in fluid flow, frictional loss, general equation. Bernoulli's theorem, Euler's equation of motion. Practical applications of Bernoulli's theorem, Verturimeter, pitot tube, Orifice meter	**UNIT II** **Fluid Dynamics:** Dynamics of fluid flow –Various forms of energy in fluid flow, frictional loss general equation. Euler's equation of motion, Bernoulli's theorem and Practical applications of Bernoulli's theorem, Venturimeter, Orifice meter, pitot tube. **Boundary layer theory:** Boundary layer theory- Thickness of Boundary layer, Thickness of Boundary layer in a laminar flow, Thickness of Boundary layer in a turbulent flow, **Measurement of flow:** Flow through orifices (Measurement of Discharge) – Types of orifices
		Unit – III: Buoyancy of flotation – metacentric height. Flow through orifices (Measurement of Discharge) – Types of orifices, Jet of water, vena contracta,	**UNIT-III** Jet of water, vena contracta, Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Mouthpieces –

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		Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Orifices (Measurement of Time) – Time of Emptying a square, rectangular or circular tank through an orifice at its bottom, time of emptying a hemispherical tank through an orifice at its bottom. Time of emptying a circular horizontal tank through an orifice at its bottom. Time of emptying a tank of variable cross-section through an orifice. Flow through Mouthpieces – Types of Mouthpieces – Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece. Flow over Notches- Types of notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch. Time of emptying a tank over a Rectangular Notch, Triangular Notch. Flow over weirs – Types of weirs, Discharge over a weir, Francis's formula for Discharge over a Rectangular weir (Effect of End Contractions), Bazin's formula for Discharge over a rectangular weir, velocity of approach, Determination of Velocity of Approach	Types of Mouthpieces – Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece. Flowover Notches-Types of notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch. Time of emptying a tank over a Rectangular Notch, Triangular Notch. Flow over weirs – Types of weirs, formula for Discharge over a rectangular weir, velocity of approach, Determination of Velocity of Approach
		Unit – IV: Flow through simple pipes – Loss of head in pipes, Darcy's formula for loss of Head in pipes, Chezy's formula for loss of head in pipes. Transmission of power through pipes, Time of emptying a tank through a long pipe, Time of flow from one tank into another through a long pipe. Flow through compound pipes – Discharge through a compound pipe (Pipes in series)-Discharge through pipes in parallel, Equivalent size of a pipe, Discharge through branded pipes from one reservoir to another	**UNIT IV** **Flow through pipes:** Flow through simple pipes – Loss of head in pipes, Darcy's formula for lossof Head in pipes, Chezy's formula for loss of head in pipes. Transmission of power through pipes. Flow through compound pipes – Discharge through a compound pipe (Pipes in series)-Discharge through pipes in parallel, Equivalent size of a pipe
		Unit – V Dimensional analysis and similitude – Rayleigh's method & Buckingham's pi theorem. Types	**UNIT V** **Open channel hydraulics:** classification of open channel and definitions. Chezy's formula for

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		of similarities, Dimensional analysis, dimensionless numbers, introduction to fluid machinery. Open channel hydraulics-classification of open channel and definitions. Chezy's formula for discharge through an open channel. **Unit – VI:** Bazin's formula for discharge through open channel, Numerical Problems on design through open channel, Kutter's formula for discharge, Problems on design. Manning's formula for discharge throughan open channel. Channels of most economical cross sections – Conditions for maximum discharge through a channel of rectangular section, trapezoidal section, circular section. Specific energy concept-Specific energy of a following fluid, specific energy diagram, critical depth, Type of flows, critical velocity. Velocity and Pressure profiles in open channels. Hydraulic jump, Types of Hydraulic Jumps, Depth of Hydraulic Jump, Loss of Head due to Hydraulic Jump	discharge through an open channel, Bazin's formula for discharge through open channel, Manning's formula for discharge through an open channel. Numerical Problems on design through open channel, Kutter's formula for discharge, Problems on design; Channels of most economical cross sections – Conditions for maximum discharge through a channel of rectangular section, trapezoidal section, circular section; Specific energy concept-Specific energy of a following fluid, specific energy diagram, critical depth, Type of flows, critical velocity. Velocity and Pressure profiles in open channels

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7	Regulation	Pre-Revision	Post-Revision
	Course Title	Surface Water Hydrology	Surface Water Hydrology
	Course Code	R1622355	171AG4T07
	Syllabus	**Unit-I:** Hydrology-definition, hydrology cycle and its components. Forms of Precipitation Rainfall, Characteristics of rainfall in India (types of monsoon). Measurement of Rainfall – Recording and Non-Recording Rain gauges- Rain gauge network density for different topographic conditions – Point rainfall analysis - Presentation of Rainfall data – Mass Curve and hyetograph, Mean Precipitation over an area – Arithmetic Mean, Thiessen Polygon, Isohyetal methods, DAD Relationships and curves. Probability Analysis of Rainfall – Return Period, Plotting position by Weibull's method – Rainfall events at different probability levels (20% , 40%, 60%, 80%)	**UNIT-I** **Precipitation:** Hydrology-definition, hydrological cycle and its components. Forms of Precipitation, Characteristics of rainfall in India (types of monsoon). Measurement of Rainfall – Recording and Non-Recording Rain gauges- Rain gauge network density for different topographic conditions – Point rainfall analysis - Presentation of Rainfall data – Mass Curve and hyetograph, Mean Precipitation over an area – Arithmetic Mean, Thiessen Polygon, Isohyetal methods, DAD Relationships and curves. Probability Analysis of Rainfall – Return Period, Plotting position by Weibull's method – Rainfall events at different probability levels (20%, 40%, 60%, 80%).
		Unit-II: Intensity-Duration-Frequency-Relationship ($i=((KT^x)/(D+A)^n)$)Determination of net effective rainfall- infiltration indices- Phi index. Runoff-definition-components of runoff-direct runoff and base flow, overload flow and interflows, pictorial representation of different routes of runoff. Runoff characteristics of streams – perennial, intermittent and ephemeral streams, Measurement of stream flows.	**UNIT-II** **Runoff:** definition-components of runoff-direct runoff and base flow, overload flow and interflows, pictorial representation of different routes of runoff. Runoff characteristics of streams – perennial, intermittent and ephemeral streams. Definition and Estimation of peak runoff using rational method. **Stream flow measurement:** Measurement of stream flows. Measurement of stage and velocities, staff gauge, wire gauge, automatic stage recorders, current meters (horizontal and vertical axis meters), calibration ($V= a\ N_S + b$). Rainfall-Runoff relations ($R=a\ P + b$), curve fitting and determination of 'a' and 'b' and (correlation coefficient).Intensity-Duration-Frequency- Relationship (i=

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			$((KT^x)/(D+A)^n)$. Determination of net effective rainfall-infiltration indices-Phi
		Unit-III: Measurement of stage and velocities, staff gauge, wire gauge, automatic stage recorders, current meters (horizontal and vertical axis meters), calibration ($V = a\ N_s + b$). Rainfall-Runoff relations ($R = a\ P + b$), curve fitting and determination of 'a' and 'b' and (correlation coefficient), factors affecting runoff. Definition and Estimation of peak runoff and design peak runoff rate, rational method and curve number techniques	**UNIT-III** **Hydrographs:** definition and components, factors affecting flood hydrographs, hydrograph separation for simple and complex storms – Method I, II and III. Unit Hydrograph-concept and the three implications of the definitions and the two basic assumptions. Effects of the characteristics of storms (duration of rain, time-intensity pattern, areal distribution of runoff and amount of runoff) on the shape of the resulting hydrographs. Derivation of Unit hydrographs for simple and complex storms. Derivation of an average unit hydrographs from several storms of thesame duration (proper procedure of computing average peak flow and time to peak)
		Unit-IV: Hydrographs-definitions and components, factors affecting flood hydrographs, hydrograph separationfor simple and complex storms – Method I (straight line method, $N = b\ A^{0.2}$), other Methods II and III. Unit Hydrographs-concept and the three implications of the definitions and the two basic assumptions (linear response and time invariance). Effects of the characteristics of storms(duration of rain, time- intensity pattern, areal distribution of runoff and amount of runoff) on the shape of the resulting hydrographs .Derivation of Unit hydrographs, average unit hydrographs from several storms of the same duration (proper procedure of computing average perk flow and time to peak). Derivation of unit hydrographs for complex storms	**UNIT-IV** **Unit Hydrographs:** The methods for conversion of unit hydrograph of different durations, (1) method of superposition and (2) S-curve. Concept of S-curve method, explanation application and determination of lower duration graph from the given higher duration graph and vice-versa. Concepts of Synthetic unit hydrograph, Snyder' synthetic unit hydrograph and formulas relating to hydrograph features (basin lag, Peak flow and time base of the unit hydrograph). Concept and application of Instantaneous unit hydrograph and SCS Triangular Hydrograph.
		Unit-V: The conversion of unit hydrograph duration, methods for unit hydrographs of different durations, (1) method of superposition and (2) S-curve. S-curve method, explanation of	**UNIT V** **Flood Routing:** Flood Routing-introduction, two broad categories of flood routing and channel routing, hydrologic routing and hydraulic routing, basic equations. Hydrologic storage routing, Schematic

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		concept and application. conversion of unit graph duration by S-curve method, determination of lower duration graph from the given higher duration graph and vice-versa. Synthetic unit hydrograph, Concept, Snyder' synthetic unit hydrograph, formulas relating hydrograph features (basin lag, Peak flow and time base of the unithydrograph). Instantaneous unit hydrograph, Concept and application, SCS Triangular Hydrograph - Application of Hydrology - Flood control and Regulation, Flood mitigation, Floodplain mapping, Retards. **Unit VI** : Flood Routing- introduction, two broad categories of flood routing and channel routing, hydrologic routing and hydraulic routing, basic equations. Hydrologic storage routing, Schematic representation of storage routing, modified Pul's method (semi-graphical method). Explanation of the features of the modified Pul's method. Flood routing through a reservoir by modified Pul's method. Applications of Hydrology in land and water management, watershed management	representation of storage routing, modified Pul's method (semi-graphical method). Explanation of the features of the modified Pul's method. Flood routing through a reservoir by modified Pul's method. Applications of Hydrology in land and water management, watershed management, Flood mitigation, Floodplain mapping, Retards, Flood control and Regulation

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Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	172SE1T01	Advanced Mathematics	0
2	I	172SE1T02	Theory of Elasticity	0
3	I	172SE1T03	Matrix Analysis of Structures	0
4	I	172SE1T04	Structural Dynamics	0
5	I	172SE1E01	Experimental Stress Analysis	0
6	I	172SE1E02	Sub Structure Design	0
7	I	172SE1E03	Structural Optimization	0
8	I	172SE1E04	Repair and Rehabilitation of Structures	0
9	I	172SE1E05	Analysis and Design of Tall Building	0
10	I	172SE1E06	Plastic Analysis ansd Design	0
11	I	172SE1L01	Advanced Structural Engineering Laboratory	0
12	II	172SE2T05	Finite Element Method	0
13	II	172SE2T06	Earthquake Resistant Design	0
14	II	172SE2T07	Stability of Structures	0
15	II	172SE2T08	Theory of Plates & Shells	0
16	II	172SE2E07	Prestressed Concrete	0
17	II	172SE2E08	Mechanics of Composite Materials	30
18	II	172SE2E09	Fracture Mechanics	20

19	II	172SE2E10	Industrial Structures	20
20	II	172SE2E11	Bridge Engineering	20
21	II	172SE2E12	Earth Retaining Structures	0
22	II	172SE2L02	CAD Laboratory	0
23	III	172SE3C01	Comprehensive Viva - Voce	0
24	III	172SE3R01	Seminar-1	0
25	III	-----	Project Work Part -1	0
26	IV	172SE4R02	Seminar -II	0
27	IV	172SE4P01	Project Work Part -II	0

Total number of courses in the academic year 2018-2019	= 27
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 4
Percentage of syllabus revision carried out in the academic year 2018-2019 = (4/27)*100	= 14.81%

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Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE1T01	Advanced Mathematics	4	---	3
172SE1T02	Theory of Elasticity	4	---	3
172SE1T03	Matrix Analysis of Structures	4	---	3
172SE1T04	Structural Dynamics	4	---	3
Elective – I				
172SE1E01	Experimental Stress Analysis	4	---	3
172SE1E02	Sub-Structure Design			
172SE1E03	Structural Optimization			
Elective – II				
172SE1E04	Repair and Rehabilitation of Structures	4	---	3
172SE1E05	Analysis and Design of Tall Buildings			
172SE1E06	Plastic Analysis and Design			
172SE1L01	Advanced Structural Engineering Laboratory	---	3	2
			TOTAL	20

II SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE2T05	Finite Element Method	4	---	3
172SE2T06	Earthquake Resistant Design	4	---	3
172SE2T07	Stability of Structures	4	---	3
172SE2T08	Theory of Plates & Shells	4	---	3
Elective – III				
172SE2E07	Pre-Stressed Concrete	4	---	3
172SE2E08	Mechanics of Composite Materials			
172SE2E09	Fracture Mechanics			
Elective – IV				
172SE2E10	Industrial Structures	4	---	3
172SE2E11	Bridge Engineering			
172SE2E12	Earth Retaining Structures			
172SE2L02	CAD Laboratory	---	3	2
			TOTAL	20

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE3C01	Comprehensive Viva-Voce	---	---	2
172SE3R01	Seminar - I	---	---	2
---	Project Work Part - I	---	---	16
			TOTAL	20

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE4R02	Seminar - II	---	---	2
172SE4P01	Project Work Part- - II	---	---	18
			TOTAL	20

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2018-19

PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week Lecture (L)	Periods /Week Practice (P)	Credits (C)
172SE1T01	Advanced Mathematics	4	---	3
172SE1T02	Theory of Elasticity	4	---	3
172SE1T03	Matrix Analysis of Structures	4	---	3
172SE1T04	Structural Dynamics	4	---	3
Elective – I				
172SE1E01	Experimental Stress Analysis	4	---	3
172SE1E02	Sub-Structure Design			
172SE1E03	Structural Optimization			
Elective – II				
172SE1E04	Repair and Rehabilitation of Structures	4	---	3
172SE1E05	Analysis and Design of Tall Buildings			
172SE1E06	Plastic Analysis and Design			
172SE1L01	Advanced Structural Engineering Laboratory	---	3	2
			TOTAL	**20**

II SEMESTER

Course Code	Name of the Course	Periods /Week Lecture (L)	Periods /Week Practice (P)	Credits (C)
172SE2T05	Finite Element Method	4	---	3
172SE2T06	Earthquake Resistant Design	4	---	3
172SE2T07	Stability of Structures	4	---	3
172SE2T08	Theory of Plates & Shells	4	---	3
Elective – III				
172SE2E07	Pre-Stressed Concrete	4	---	3
172SE2E08	Mechanics of Composite Materials			
172SE2E09	Fracture Mechanics			
Elective – IV				
172SE2E10	Industrial Structures	4	---	3
172SE2E11	Bridge Engineering			
172SE2E12	Earth Retaining Structures			
172SE2L02	CAD Laboratory	---	3	2
			TOTAL	**20**

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE3C01	Comprehensive Viva-Voce	---	---	2
172SE3R01	Seminar - I	---	---	2
---	Project Work Part - I	---	---	16
			TOTAL	20

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SE4R02	Seminar - II	---	---	2
172SE4P01	Project Work Part- - II	---	---	18
			TOTAL	20

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MECHANICS OF COMPOSITE MATERIALS
(ELECTIVE –III)

II Semester	**L**	**P**	**C**
Course Code: 172SE2E08	**4**	**0**	**3**

Course Objectives:

COB 1: To make the students to know the properties of fiber and matrix materials used in commercial composites.

COB 2: To enable the students to know the elastic stiffness of laminate based on the elastic moduli of individual laminas and the stacking sequence.

COB 3: To impart knowledge on significance of stiffness, and hydrothermal and mechanical response of special cases of laminates.

COB 4: To make the students to know nine mechanical and four hydrothermal constants.

COB 5: To train the students on mechanical and hydrothermal loads applied to a laminate to strains and stresses in each lamina.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Illustrate the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.

CO 2: Analyze problems on macro mechanical behavior of lamina.

CO 3: Determine stresses and strains in composites.

CO 4: Apply hook's law for a two dimensional angle lamina.

CO 5: Explain failure criteria and critically evaluate the result.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO11 (K4)
CO1 (K2)	-	1	-	-	-	-	-	-	-	-	-
CO2 (K4)	2	3	2	-	-	-	-	-	-	-	-
CO3 (K3)	1	2	1	-	-	-	-	-	-	-	-
CO4 (K3)	1	2	1	-	-	-	-	-	-	-	-
CO5 (K3)	1	2	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K4)	PSO 2 (K6)	PSO 3 (K3)
CO1 (K2)	1	-	-
CO2 (K4)	3	-	-
CO3 (K3)	2	-	-
CO4 (K3)	2	-	-
CO5 (K3)	2	-	-

UNIT-I

Introduction to Composite Materials

Introduction, Classification: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber-Reinforced Composites and nature-made composites, and application-**Reinforcements:** Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermo setts, Metal matrix and ceramic composites.- Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-II

Micromechanical Analysis of a Lamina

Introduction, Definitions: Stress, Strain, Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.

UNIT –III

Higro Thermal Stress in Lamina

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes, Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina.

UNIT-IV

Micromechanical Analysis of a Lamina

Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models, Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion.

UNIT-V

Micromechanical Analysis of Laminates

Introduction, Laminate Code, Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate, Hygrothermal Effects in a Laminate, Warpage of Laminates -Failure, Analysis, and Design of Laminates: Introduction, Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite.

Text Books:

1. Engineering Mechanics of Composite Materials, Isaac and M Daniel, Oxford University Press.
2. Mechanics of composite materials, Robert M. Jones, 2nd Edition, CRC Press.

Reference Books:

1. Analysis and performance of fibre Composites, B. D. Agarwal and L. J. Broutman, Inter science, New York.
2. Mechanics of Composite Materials, Autar K. Kaw, 2nd Edition, CR Publisher.
3. Mechanics of Composite Materials, Autar K. Kaw, Taylor & Francis Group.

FRACTURE MECHANICS
(ELECTIVE –III)

II Semester **L P C**
Course Code: 172SE2E09 **4 0 3**

Course Objectives:

- COB 1: To impart knowledge on computing the stress intensity factor, strain energy release rate, and the stress and strain fields around a crack tip for linear and non linear materials.
- COB 2: To make the students to Know experimental methods to determine the fracture toughness.
- COB 3: To enable the students to know the concepts of Mixed mode crack propagation.
- COB 4: To make the students to know structures using fracture mechanics approaches.
- COB 5: To enable the students to apply the design principles.

Course Outcomes:
At the end of the Course, Student will be able to:

- CO 1: Explain fundamentals of fracture mechanics, yield criteria & flow-rules.
- CO 2: Describe the experimental methods to determine the fracture toughness.
- CO 3: Apply principles of fracture mechanics.
- CO 4: Solve real problems related to plastic fracture mechanics.
- CO 5: Design structures using fracture mechanics approaches.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO11 (K 4)
CO1 (K2)	-	1	-	-	-	-	-	-	-	-	-
CO2 (K3)	2	3	2	-	-	-	-	-	-	-	-
CO3 (K4)	1	2	1	-	-	-	-	-	-	-	-
CO4 (K3)	1	3	1	-	-	-	-	-	-	-	-
CO5 (K4)	2	3	2	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K4)	PSO 2 (K6)	PSO 3 (K3)
CO1 (K2)	1	1	-
CO2 (K3)	2	-	-
CO3 (K4)	3	-	-
CO4 (K3)	2	-	-
CO5 (K4)	3	-	-

UNIT-I
Introduction
Fundamentals of elastic and plastic behavior of materials- stresses in a plate with a hole – Stress Concentration factor-modes of failure- Brittle fracture and ductile fracture- history of fracture mechanics-Griffiths criteria for crack propagation cracks- Energy release rate, GI GII and GIII - Critical energy release rate GIc , GIIc and GIIIc – surface energy - R curves – compliance.

UNIT-II

Principles of Linear Elastic Fracture Mechanics

SOM vs Fracture Mechanics -stressed based Criteria for fracture- Stress Intensity Factors- KI K II and K III – Critical stress Intensity Factors, KIc KIIc and KIIc – crack tip plastic zone – Erwin's plastic zone correction-Critical crack length-Load carrying capacity of a cracked component- Design of components based on fracture mechanics.

UNIT –III

Mixed Mode Crack Propagation

Maximum tangential stress criterion – crack propagation angle-Material characterization by Crack Tip Opening Displacements (CTOD)- Crack Mouth Opening Displacement(CMOD)- Critical crack tip opening displacement (CTODc) –critical Crack Mouth Opening Displacement (CMODc).

UNIT-IV

Fatigue Crack Propagation

Fatigue load parameters Fatigue crack growth curve –Threshold stress intensity factor-Paris law- Retardation effects.

UNIT-V

Applications of Fracture Mechanics

Applications of fracture Mechanics to concrete- reasons –strain softening behaviour – Bazant's size effect law.

Text Books:

1. Elementary engineering fracture mechanics, David Broek, First edition Noordhoff International Publishing.
2. Elements of Fracture Mechanics, Prasanth Kumar, 1st Edition, wiley Eastern Publications.

Reference Books:

1. Fracture Mechanics: Fundamentals and applications, T.L. Andrason, PhD, CRC Press.
2. Fracture Mechanics of Concrete: Applications of fracture mechanics to concrete, Surendra P. Shah, Stuart E. Swartz, Chengsheng Ouyang, John Wiley&Son publications, 1st Edition.
3. Elementary engineering fracture mechanics, D.Broek, Martinous Nijhoff Publishers, 3rd Edition.

Web Links:

1. http://nptel.ac.in/courses/112106065
2. https://www.youtube.com/watch?v=c0ki054GGrE
3. https://en.wikipedia.org/wiki/Fracture_mechanics

INDUSTRIAL STRUCTURES
(ELECTIVE –IV)

II Semester	**L**	**P**	**C**
Course Code: 172SE2E10	4	0	3

Course Objectives:

- COB 1: To make students to learn principles of design of industrial building.
- COB 2: To enable students to design different components of industrial structures and to detail the structures.
- COB 3: To impart knowledge on evaluating the performance of the pre engineered buildings.
- COB 4: To illustrate the concept of power plant structures- bunkers and silos-chimney and cooling towers.
- COB 5: To train the students to distinguish the power transmission structures, transmission line towers and tower foundations.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Illustrate the planning and functional requirements of industrial building.
- CO 2: Analyze the components of industrial building.
- CO 3: Design different folded plates of industrial structures and detailing.
- CO 4: Distinguish the principles of power plant structures- bunkers and silos-chimney and cooling towers.
- CO 5: Summarize the power transmission structures, transmission line towers and tower foundations.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO11 (K4)
CO1 (K3)	1	2	1	3	-	-	-	-	-	-	-
CO2 (K4)	2	3	2	3	-	-	-	-	-	-	-
CO3 (K4)	2	3	2	3	-	-	-	-	-	-	-
CO4 (K4)	2	3	2	3	-	-	-	-	-	-	-
CO5 (K5)	3	3	3	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K4)	PSO 2 (K6)	PSO 3 (K3)
CO1 (K3)	2	-	-
CO2 (K4)	3	1	-
CO3 (K4)	3	1	-
CO4 (K4)	3	1	-
CO5 (K5)	3	2	-

UNIT-I

Planning and Functional Requirements

Classification of industries and industrial structures- planning for layout-requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

UNIT-II

Industrial Buildings

Roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations.

UNIT –III

Design of Folded Plates

Design considerations- analysis of folded plates- analysis of multibuy folded plates- design of diaphragm beam.

UNIT-IV

Power Plant Structures

Bunkers and silos- chimney and cooling towers-Nuclear containment structures.

UNIT-V

Power Transmission Structures

Transmission line towers- tower foundations- testing towers.

Text Books:

1. Advanced reinforced concrete design, N. Krishnam Raju, 3rd Edition, CBS Publications.
2. Design of Steel Structures, S K Duggal, 2nd Edition, Tata McGraw-Hill Education.

Reference Books:

1. Hand book on machine foundations, P. Srinivasulu and C.V. Vaidyanathan, 2nd Edition, Tata McGraw-Hill Education.
2. Tall Chimneys-Design and construction, S.N. Manohar, Tata McGraw-Hill Pub. Co.
3. Planning Industrial Structures, Clarence W Dunham , McGraw-Hill Book Co.

Web Links:

1. http://nptel.ac.in/courses/105106113/3
2. https://www.youtube.com/watch?v=QdHeTf-pH1k
3. https://www.khanacademy.org
4. http://industrialstructuresfram.com

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EARTH RETAINING STRUCTURES
(ELECTIVE –IV)

II Semester **L P C**
Course Code: 172SE2E12 **4 0 3**

Course Objectives:

COB 1: To make the students to know earth pressure theories.
COB 2: To enable the students to judge the stability of retaining walls.
COB 3: To train the students be knowledgeable of current US guidelines regarding the design of earth retaining structures.
COB 4: To enable the students to analyse sheet pile structures.
COB 5: To help the students design the most technically appropriate and cost-effective type of retaining wall.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Solve earth pressure on various earth retaining structures such as gravity retaining walls, sheet pile, bulkheads, bracing/struts and coffer dams.
CO 2: Evaluate the mechanical properties of geo synthetics used for soil reinforcement.
CO 3: Constructing of sheet pile with and without anchors.
CO 4: Select the most technically appropriate type of retaining wall for the application.
CO 5: Design a relevant earth retaining structure for given soil conditions.
CO 6: Summarize the current guidelines regarding the design of earth retaining structures.
CO 7: Develop retaining structures considering both external and internal stability aspects.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K1)	PO 2 (K4)	PO 3 (K5)	PO 4 (K4)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K4)	PO 9 (K1)	PO 10 (K2)	PO11 (K 4)
CO1 (K1)	3	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	3	3	3	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	2	-	-	-	-	-	-	-
CO4 (K5)	3	3	3	3	-	-	-	-	-	-	-
CO5 (K6)	3	3	3	3	-	-	-	-	-	-	-
CO6 (K2)	3	1	-	1	-	-	-	-	-	-	-
CO7 (K6)	3	3	3	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K4)	PSO 2 (K6)	PSO 3 (K3)
CO1 (K1)	-	-	1
CO2 (K5)	3	2	1
CO3 (K3)	1	-	3
CO4 (K5)	1	2	-
CO5 (K6)	-	-	-
CO6 (K2)	1	-	1
CO7 (K6)	-	3	-

UNIT-I

Earth Pressures

Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT-II

Retaining Walls

Different types - Type of Failures of Retaining Walls Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT –III

Sheet pile Structures

Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.

UNIT-IV

Soil Reinforcement

Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embankments on problematic soils.

UNIT-V

Braced Cuts and Cofferdams

Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects VA method and Cummins' methods.

Text Books:

1. Foundation Analysis and Design ,J. E. Bowels, Mc Graw Hill Companies.
2. Foundation engineering, B. M. Das, Cengage Learning.
3. Geotechnical engineering, Gulhati, K. Shashi and M. Datta, Mc.Graw Hill book company.

Reference Books:

1. Earth and Earth Rock Dams Engineering Problems of Design and Construction, J.L. Sherard, R.J. Wood ward, S.F. Gizienski, and W.A. Clevenger, John Wiley and Sons, New York.
2. Soil Mechanics in Engineering Practice, Terzaghi, K and Rolph, B. peck 2nd Edn, John Wiley & Co.
3. Analysis and Design of Foundations and Retaining Structures, Prakash, S, Saritha Prakashan, Mearut.

Web Links:

1. https://en.wikipedia.org/wiki/Earth-retaining-structures
2. http://earthretainingstructures.com
3. https://www.khanacademy.org
4. http://nptel.ac.in/courses/122104123

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Syllabus revision Index for the Academic Year 2018-2019 M.Tech Structural Engineering

S.No	Name of the course	Percentage of syllabus change
1	Mechanics of Composite Material	30
2	Fracture Mechanics'	20
3	Industrial Structures	20
4	Earth Retaining Structures	20

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mechanics Of Composite Materials	Mechanics Of Composite Materials
Course Code	172se2e08	172se2e08
Syllabus	UNIT-I Introduction to Composite Materials Introduction, Classification: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, FiberReinforced Composites and nature-made composites, and application Reinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermo setts, Metal matrix and ceramic composites.- Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion,RTM.	**UNIT-I** **Introduction to Composite Materials** **Introduction,** **Classification:** Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber- Reinforced Composites and nature-made composites, and application- **Reinforcements:** Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermo setts, Metal matrix and ceramic composites.- Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.
	UNIT-II Micromechanical Analysis of a Lamina Introduction, Definitions: Stress, Strain, Elastic Moduli, Strain Energy. Hooke's Law	**UNIT-II** **Micromechanical Analysis of a Lamina** **Introduction,**

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	for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.	**Definitions:** Stress, Strain, Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.
	UNIT –III Higro Thermal Stress in Lamina Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes, Maximum Strain Failure Theory ,Tsai– Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–StrainRelationshipsfor an AngleLamina.	**UNIT –III** **Higro Thermal Stress in Lamina** Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina **Analysis of Laminated Compsites** Governing equations for an isotropic and orthotropic plate - Angle-ply and cross ply laminates. Static, dynamic and stability analysis for simpler cases of composite plates - Inter laminar stresses
	UNIT-IV Micromechanical Analysis of a Lamina Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials	**UNIT-IV** **Failure and Fracture of Composite** Netting analysis - Failure criterion - Maximum stress,

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	Approach, Semi-Empirical Models, Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion.	maximum strain - fracture mechanics of composites - Sandwich construction.
	UNIT-V Micromechanical Analysis of Laminates Introduction, Laminate Code, Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate, Hygrothermal Effects in a Laminate, Warpage of Laminates -Failure, Analysis, and Design of Laminates: Introduction, Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite.	**UNIT-V** **Micromechanical Analysis of Laminates** Introduction, Laminate Code, Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate, Hygrothermal Effects in a Laminate, Warpage of Laminates -Failure, Analysis, and Design of Laminates: Introduction, Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite.

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Department of Civil Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	FRACTURE MECHANICS	FRACTURE MECHANICS
Course Code	**172SE2E09**	**172SE2E09**
Syllabus	UNIT-I Introduction Fundamentals of elastic and plastic behavior of materials-stresses in a plate with a hole – Stress Concentration factor-modes of failure-Brittle fracture and ductile fracture-history of fracture mechanics-Griffiths criteria for crack propagation cracksEnergy release rate, GI GII and GIII - Critical energy release rate GIc , GIIc and GIIIc – surface energy - R curves – compliance.	.**UNIT-I** **Introduction** Fundamentals of elastic and plastic behavior of materials-stresses in a plate with a hole – Stress Concentration factor-modes of failure-Brittle fracture and ductile fracture- history of fracture mechanics-Griffiths criteria for crack propagation cracks-Energy release rate, GI GII and GIII - Critical energy release rate GIc , GIIc and GIIIc – surface energy - R curves – compliance.
	UNIT-II Principles of Linear Elastic Fracture Mechanics SOM vs Fracture Mechanics -stressed based Criteria for fracture- Stress Intensity Factors- KI K II and K III – Critical stress Intensity Factors, KIc KIIc and KIIc – crack tip plastic zone – Erwin's plastic zone correction-Critical crack length-Load carrying capacity of a cracked component- Design of components based on fracture mechanics.	**UNIT-II** **Principles of Linear Elastic Fracture Mechanics** SOM vs Fracture Mechanics -stressed based Criteria for fracture- Stress Intensity Factors- KI K II and K III – Critical stress Intensity Factors, KIc KIIc and KIIc – cracktip plastic zone – Erwin's plastic zone correction-Critical crack length-Load carrying capacity of a cracked component- Design of components based on fracture mechanics.

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.	UNIT –III Mixed Mode Crack Propagation Maximum tangential stress criterion – crack propagation angle-Material characterization by Crack Tip Opening Displacements (CTOD)- Crack Mouth Opening Displacement(CMOD)- Critical crack tip opening displacement (CTODc) –critical Crack Mouth Opening Displacement (CMODc).	**UNIT –III** **Mixed Mode Crack Propagation** Maximum tangential stress criterion – crack propagation angle-Material characterization by Crack Tip Opening Displacements (CTOD)-Crack Mouth Opening Displacement(CMOD)-Critical crack tip opening displacement (CTODc) – critical Crack Mouth Opening Displacement (CMODc).
	UNIT-IV Fatigue Crack Propagation Fatigue load parameters Fatigue crack growth curve –Threshold stress intensity factor-Parislaw-Retardation effects.	**UNIT-IV** **Fatigue Crack Propagation** Fatigue load parameters Fatigue crack growth curve –Threshold stress intensityfactor-Paris law-Retardation effects.
	UNIT-V Applications of Fracture Mechanics Applications of fracture Mechanics to concrete- reasons –strain softening behaviour – Bazant's size effectlaw.	**UNIT-V** **Fracture of Steel** Fracture - Fracture under extreme conditions - Fatigue - Environment sensitive cracking.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	INDUSTRIAL STRUCTURES	INDUSTRIAL STRUCTURES
Course Code	**172SE2E10**	**172SE2E10**
Syllabus	UNIT-I Planning and Functional Requirements Classification of industries and industrial structures-planning for layoutrequirements regarding lighting ventilation and fire safety- protection against noise and vibrations.	**UNIT-I** **Planning and Functional Requirements** Classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety-protection against noise and vibrations.
	UNIT-II Industrial Buildings Roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs-machine foundations.	**UNIT-II** **Industrial Buildings** Roofs for industrial buildings (Steel) - design of gantry girder- design of corbelsand nibs-machine foundations.
	UNIT –III Design of Folded Plates Design considerations- analysis of folded plates- analysis of multibuy folded platesdesign of diaphragm beam.	**UNIT –III** **Design of Folded Plates** Design considerations-analysis of folded plates-analysis of multibuy folded plates-design of diaphragm beam.
	UNIT-IV Power Plant Structures Bunkers and silos- chimney and cooling towers-Nuclear containment structures.	**UNIT-IV** **Power Plant Structures** Bunkers and silos- chimney and cooling towers-Nuclear containment structures.

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	UNIT-V Power Transmission Structures Transmission line towers-tower foundations-testing towers.	**UNIT-V** **Auxiliary Structures** Intro to Wind load calculations - Design of steel and RCC Chimneys - Bunkers and silos - Flat and conical bottoms.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	EARTH RETAINING STRUCTURES	EARTH RETAINING STRUCTURES
Course Code	**172SE2E12**	**172SE2E12**
Syllabus	UNIT-I Earth Pressures Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.	**UNIT-I** **Earth Pressures** Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions. Concept of strain dependence of developed stresses, active, at rest and passive conditions, plastic equilibrium Hansen theoretical derivation and graphical construction with different geometric and boundary conditions.
	UNIT-II Retaining Walls Different types - Type of Failures of Retaining Walls Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.	**UNIT-II** **Retaining Walls** Different types - Type of Failures of Retaining Walls Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.
	UNIT –III Sheet pile Structures Types of Sheet piles – Cantilever sheet piles in sands and clays –	**UNIT –III** **Sheet pile Structures**

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	Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.	Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.
	UNIT-IV Soil Reinforcement Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embankments on problematic soils.	**UNIT-IV** **Soil Reinforcement** Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embankments on problematic soils. Stability of earth dams during different stages - during and at end of construction, steady seepage, sudden draw down, estimation of pore water pressure - use of stability charts.
	UNIT-V Braced Cuts and Cofferdams Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects VA method and Cummins' methods.	**UNIT-V** **Braced Cuts and Cofferdams** Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects VA method and Cummins' methods.

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Program Name : M.Tech. in Power Electronics and Drives

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172PD1T01	Electrical Machine Modeling & Analysis	0
2	I	172PD1T02	Analysis of Power Electronic Converters	0
3	I	172PD1T03	Power Electronic Control of DC Drives	0
4	I	172PD1T04	Flexible AC Transmission Systems	0
5	I	172PD1E01	Modern Control Theory	0
6	I	172PD1E02	Power Quality	0
7	I	172PD1E03	Optimization Techniques	0
8	I	172PD1E04	Energy Auditing, Conservation & Management	0
9	I	172PD1E05	Artificial Intelligence Techniques	0
10	I	172PD1E06	HVDC Transmission	0
11	I	172PD1L01	Simulation Lab	0
12	II	172PD2T05	Switched Mode Power Conversion	0
13	II	172PD2T06	Power Electronics Control of AC Drives	0
14	II	172PD2T07	Digital Controllers	0
15	II	172PD2T08	Custom Power Devices	0
16	II	172PD2E07	Renewable Energy Systems	0
17	II	172PD2E08	Reactive Power Compensation & Management	25
18	II	172PD2E09	Electrical Distribution System	20

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
19	II	172PD2E10	Smart Grid Technologies	20
20	II	172PD2E11	Special Machines	0
21	II	172PD2E12	Programmable Logic Controllers & Applications	20
22	II	172PD2L02	Power Converters & Drives Lab	0
23	III	172PD3C01	Comprehensive Viva-Voce	0
24	III	172PD3R01	Seminar – I	0
25	III	---	Project Work Part - I	0
26	IV	172PD4R02	Seminar – II	0
27	IV	172PD4P01	Project Work Part - II	0

Total number of courses in the academic year 2018-2019	= 27
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 4
Percentage of syllabus revision carried out in the academic year 2018-2019 = (4/27)*100	= 14.81%

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods/week		Credits
		Lecture (T)	Practice (P)	(C)
172PD1T01	Electrical Machine Modeling & Analysis	4	---	3
172PD1T02	Analysis of Power Electronic Converters	4	---	3
172PD1T03	Power Electronic Control of DC Drives	4	---	3
172PD1T04	Flexible AC Transmission Systems	4	---	3
Elective – I				
172PD1E01	Modern Control Theory	4	---	3
172PD1E02	Power Quality			
172PD1E03	Optimization Techniques			
Elective – II				
172PD1E04	Energy Auditing, Conservation & Management	4	---	3
172PD1E05	Artificial Intelligence Techniques			
172PD1E06	HVDC Transmission			
172PD1L01	Simulation Lab	---	3	2
TOTAL		**24**	**3**	**20**

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II **SEMESTER**

Course Code	Name of the Course	Periods/week Lecture (T)	Periods/week Practice (P)	Credits (C)
172PD2T05	Switched Mode Power Conversion	4	---	3
172PD2T06	Power Electronics Control of AC Drives	4	---	3
172PD2T07	Digital Controllers	4	---	3
172PD2T08	Custom Power Devices	4	---	3
Elective – III				
172PD2E07	Renewable Energy Systems	4	---	3
172PD2E08	Reactive Power Compensation & Management			
172PD2E09	Electrical Distribution System			
Elective – IV				
172PD2E10	Smart Grid Technologies			
172PD2E11	Special Machines	4	---	3
172PD2E12	Programmable Logic Controllers & Applications			
172PD2L02	Power Converters & Drives Lab	---	3	2
TOTAL		**24**	**3**	**20**

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172PD3C01	Comprehensive Viva-Voce	---	---	2
172PD3R01	Seminar – I	---	---	2
---	Project Work Part – I	---	---	16
	TOTAL	---	---	---

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172PD4R02	Seminar – II	---	---	2
172PD4P01	Project Work Part- - II	---	---	18
	TOTAL	---	---	20

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REACTIVE POWER COMPENSATION & MANAGEMENT

II Semester **L P C**

Course Code: 172PD2E08 **4 0 3**

Course Objectives:

COB 1: To make the student gain the basic objectives of reactive power compensation.

COB 2: To impart the types of compensation and their behavior.

COB 3: To help the students understand the mathematical modeling of reactive power compensating devices.

COB 4: To make the student understand the reactive power compensation has to be done at distribution side.

COB 5: To make the student identify the role of reactive power compensation at electric traction systems and Arc furnace.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Analyze the various load compensations.

CO 2: Develop the mathematical model of reactive power compensating devices.

CO 3: Discuss the various application of reactive power compensation in electrical traction & arc furnaces.

CO 4: Examine the various loss reduction techniques in Distribution side Reactive power Management

CO 5: Identify the effects of under voltage harmonics in rective power distribution

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1 (K4)	2	3	3	3	-	-	-	-	-	-	-
CO2 (K3)	1	2	3	-	-	-	-	-	-	-	-
CO3 (K6)	-	3	-	3	-	-	-	-	-	-	-
CO4 (K4)	2	-	3	3	-	-	-	-	-	-	-
CO5 (K3)	-	2	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K3)
CO1 (K4)	3	-	3
CO2 (K3)	3	-	-
CO3 (K6)	3	3	-
CO4 (K4)	-	3	-
CO5 (K3)	-	2	-

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UNIT-1:

Load Compensation:

Objectives and specifications - reactive power characteristics - inductive and capacitive approximate biasing - Load compensator as a voltage regulator - phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT-II:

Reactive power compensation in transmission system:

Steady state -Uncompensated line - types of compensation - Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods - passive shunt compensation - static compensations- series capacitor compensation -compensation using synchronous condensers - examples

UNIT -III:

Reactive power coordination:

Objective - Mathematical modeling - Operation planning - transmission benefits - Basic concepts of quality of power supply - disturbances- steady -state variations - effects of under voltages - frequency - Harmonics, radio frequency and electromagnetic interferences

UNIT -IV:

Distribution side Reactive power Management:

System losses -loss reduction methods - examples - Reactive power planning - objectives - Economics Planning capacitor placement - retrofitting of capacitor banks

User side reactive power management:

KVAR requirements for domestic appliances - Purpose of using capacitors - selection of capacitors - deciding factors - types of available capacitor, characteristics and Limitations

UNIT-V:

Reactive power management in electric traction systems and are furnaces:

Typical layout of traction systems - reactive power control requirements - distribution transformers- Electric arc furnaces - basic operations- furnaces transformer -filter requirements - remedial measures -power factor of an arc furnace.

Text Books:

1. Reactive power control in Electric power systems by T. J. E. Miller, John Wiley and sons, 1982
2. Reactive power Management by D. M. Tagare,Tata McGraw Hill,2004

Reference Books :

1. Reactive Power Management: Reactive Power Control for Greater Efficiency, Rafael Barreto, Createspace Independent Pub.
2. Reactive Power Control in AC Power Systems, Mahdavi Tabatabaei, Springer International Publishing

Weblinks:

1. http://www.electronics-tutorials.ws/accircuits/reactive-power.html
2. https://www.slideshare.net/NaveenKssvs/reactive-power-compensation-33009860
3. https://www.electrical4u.com/capacitor-bank-reactive-power-compensation/

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ELECTRICAL DISTRIBUTION SYSTEMS

II Semester **L P C**

Course Code: 172PD2E09 **4 0 3**

Course Objectives:

COB 1: To make the sudent learn the importance of economic distribution of electrical energy.

COB 2: To make the student analyze the distribution networks for V-drops, P_{Loss} calculations and reactive power.

COB 3: To make the student understand the co-ordination of protection devices.

COB 4: To impart the knowledge of capacitive compensation/voltage control.

COB 5: To make the student understand the principles of voltage control.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Analyze the distribution system.

CO 2: Design equipment for compensation of losses in the distribution system.

CO 3: Design protective systems and co-ordinate the devices.

CO 4: Analyze the capacitive compensation.

CO 5: Explian different voltage control methods.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1 (K4)	2	3	3	3	-	-	-	-	-	-	-
CO2 (K5)	3	2	-	3	2	-	-	-	-	-	-
CO3 (K4)	-	3	3	-	-	-	-	-	-	-	-
CO4 (K4)	2	-	3	3	1	-	-	-	-	-	-
CO5 (K5)	3	3	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K3)
CO1 (K4)	3	3	3
CO2 (K5)	3	-	3
CO3 (K4)	3	3	-
CO4 (K4)	-	3	3
CO5 (K5)	-	-	-

UNIT- I:

Load characteristics:

Residential, Commercial, Agricultural and Industrial and their characteristics.

UNIT -II:

Distribution Feeders and Substations :

Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution

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system. Location of Substations : Rating of a Distribution Substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations.

UNIT- III:

System analysis :

Voltage drop and power loss calculations : Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.

UNIT -IV :

Protective devices and coordination :

Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices : General coordination procedure.

UNIT - V :

Capacitive compensation for power factor control:

Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Text Books:

1. Electric Power Distribution System Engineering " by Turan Gonen, Mc. Graw-Hill Book Company,1986.
2. Electric Power Distribution-by A. S. Pabla, Tata McGraw-Hill Publishing Company, 4th edition, 1997.

Reference Books:

1. Electrical Distribution V. Kamaraju-McGraw Hill
2. Handbook of Electrical Power Distribution - Gorti Ramamurthy-Universities press

Web Links:

1. https://en.wikipedia.org/wiki/Portal:Mathematics
2. http://mathworld.wolfram.com
3. https://www.khanacademy.org
4. http://nptel.ac.in/courses/122104017

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SMART GRID TECHNOLOGIES

II Semester **L P C**

Course Code: 172PD2E10 **4 0 3**

Course Objectives:

COB 1: To impart the knowledge on the concept of smart grid and developments on smart grid.
COB 2: To make the student learn smart grid technologies and application of smart grid concept in hybrid electric vehicles etc.
COB 3: To help the student understand smart substations, feeder automation and application for monitoring and protection.
COB 4: To enable the student study micro grids and distributed energy systems.
COB 5: To help the students have the knowledge of power quality aspects in smart grid.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Analyze the smart grids and its policies and developments.
CO 2: Develop the basic concepts of smart grid technologies in hybrid electrical vehicles etc.
CO 3: Explain the smart substations, feeder automation, GIS etc.
CO 4: Illustrate micro grids and distributed generation systems.
CO 5: Investigate the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1 (K4)	2	-	-	-	3	-	-	-	-	-	-
CO2 (K3)	1	2	1	3	3	-	-	-	-	-	-
CO3 (K5)	3	-	3	-	-	-	-	-	-	-	-
CO4 (K2)	-	1	-	2	-	-	-	-	-	-	
CO5 (K4)	2	-	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K3)
CO1 (K4)	3	-	-
CO2 (K3)	3	2	-
CO3 (K5)	3	3	-
CO4 (K2)	-	-	2
CO5 (K4)	-	-	3

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UNIT- I:

Introduction to Smart Grid:

Evolution of Electric Grid, Concept of Smart Grid, Definitions,Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient &Self Healing Grid, Present development & International policies on Smart Grid. Case study of Smart Grid.

UNIT - II:

Smart Grid Technologies: Part 1:

Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT - III:

Smart Grid Technologies: Part 2:

Smart Substations, Substation Automation, FeederAutomation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit(PMU).

UNIT - IV:

Micro-grids and Distributed Energy Resources:

Concept of micro grid, need & applications of Micro grid, formation of micro grid, Issues of interconnection, protection & control of micro grid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, micro turbines, Captive power plants, Integration of renewable energy sources.

UNIT - V:

Power Quality Management in Smart Grid:

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Text Books:

1. Integration of Green and RenewableEnergy in Electric Power Systems, Ali Keyhani, Mohammad N. Marwali, Min Dai, Wiley.
2. The Smart Grid: Enabling Energy Efficiency and Demand Response, Clark W. Gellings,CRC Press.
3. Smart Grid: Technology and Applications, JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama ,Wiley.
4. Smart Grids, Jean Claude Sabonnadière, NouredineHadjsaïd, Wiley.

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Reference Books:

1. Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities, Peter S. Fox Penner, Island Press.
2. Microgrids and Active Distribution Networks, S. Chowdhury, S. P. Chowdhury, P. Crossley, Institution of Engineering and Technology.
3. Smart Grids (Power engineering), Stuart Borlase, CRC Press
4. Substation Automation (Power Electronics and Power Systems), Mladen Kezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert, Springer

Web Links:

1. https://en.wikipedia.org/wiki/Smart_grid
2. https://www.smartgrid.gov/the_smart_grid/smart_grid.html
3. https://www.powerstream.ca/innovation/smart-grid.html
4. https://smartgrid.ieee.org/about-ieee-smart-grid

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PROGAMMABLE LOGIC CONTROLLERS & APPLICATIONS

II Semester	**L**	**P**	**C**
Course Code: 172PD2E12	**4**	**0**	**3**

Course Objectives:

The objectives of the course are

- COB 1 : To help the students infer the knowledge on PLC.
- COB 2 : To make the students build the knowledge on programming of PLC
- COB 3 : To help the students learn different PLC registers and their description
- COB 4 : To make the students understand the knowledge on data handling functions of PLC.
- COB 5 : To enable the students handle analog signal and converting of A/D in PLC.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Explain the PLCs and their I/O modules.
- CO 2 : Develop control algorithms to PLC using ladder logic etc
- CO 3 : Describe effective utilization of PLC registers in different applications
- CO 4 : Illustrate data functions to control of two axis and their axis robots with PLC
- CO 5 : Design PID controller with PLC

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K2)	-	1	-	-	-	-	-	-	-	-	-
CO 2(K5)	-	-	2	-	-	-	-	-	-	-	-
CO 3(K3)	-	-	3	-	-	-	-	-	-	-	-
CO 4(K3)	-	-	3	-	-	-	-	-	-	-	-
CO 5(K5)	-	-	-	-	-	1	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K3)
CO1 (K2)	2	1	2
CO2 (K5)	3	3	3
CO3 (K3)	3	-	3
CO4 (K3)	-	2	-
CO5 (K5)	-	-	-

UNIT - I:
PLC Basics:

PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules

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UNIT - II:

PLC Programming:

Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT - III:

PLC Registers:

Characteristics of Registers, module addressing, holding registers, input registers, output registers. PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT - IV:

Data Handling functions:

SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC, Matrix functions

UNIT - V:

Analog PLC operation: Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions

Textboooks:

1. Programmable Logic Controllers - Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI
2. Programmable Logic Controllers - Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. - Pearson, 2004.

Referrence Books:

1. Introduction to Programmable Logic Controllers- Gary Dunning-Cengage Learning.
2. Programmable Logic Controllers -W. Bolton-Elsevier publisher.

Web links:

1. https://en.wikipedia.org/wiki/Programmable_logic_controller
2. https://www.engineersgarage.com/articles/plc-programmable-logic-controller
3. www.deltaelectronicsindia.com/products/IABU-Programmable-Logic-Controller.html

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Department of Electrical and Electronics Engineering

(Power Electronics and Drives)

Syllabus revision Index for 2018-2019

S. No	Name of the course	Percentage of syllabus change
1	Reactive Power Compensation & Management	25
2	Electrical Distribution System	20
3	Smart Grid Technologies	20
4	Programmable Logic Controllers & Applications	20

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Reactive Power Compensation & Management**	**Reactive Power Compensation & Management**
Course Code	**172PD2E08**	**172PD2E08**
Syllabus	**UNIT-1: Load Compensation:** Objectives and specifications - reactive power characteristics - inductive and capacitive approximate biasing - Load compensator as a voltage regulator - phase balancing and power factor correction of unsymmetrical loads- examples.	**UNIT-1: Load Compensation:** Objectives and specifications - reactive power characteristics - inductive and capacitive approximate biasing - Load compensator as a voltage regulator - phase balancing and power factor correction of unsymmetrical loads- examples.
	UNIT-II: Reactive power compensation in transmission system: Steady state -Uncompensated line - types of compensation - Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods - passive shunt compensation - static compensations- series capacitor compensation -compensation using synchronous condensers - examples	**UNIT-II: Reactive power compensation in transmission system:** Steady state -Uncompensated line - types of compensation - Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods - passive shunt compensation - static compensations- series capacitor compensation -compensation using synchronous condensers - examples
	UNIT -III: Reactive power coordination: Objective - Mathematical modeling - Operation planning - transmission benefits - Basic concepts of quality of power supply - disturbances- steady - state variations - effects of under voltages - frequency - Harmonics, radio frequency and electromagnetic interferences	**UNIT -III: Reactive power coordination:** Objective - Mathematical modeling - Operation planning - transmission benefits - Basic concepts of quality of power supply - disturbances- steady - state variations - effects of under voltages - frequency - Harmonics, radio frequency and electromagnetic interferences
	UNIT -IV: Distribution side Reactive power Management: System losses -loss reduction methods	**UNIT -IV: Demand Side Management:** Load patterns – basic methods load

	- examples - Reactive power planning - objectives - Economics Planning capacitor placement - retrofitting of capacitor banks User side reactive power management: KVAR requirements for domestic appliances - Purpose of using capacitors - selection of capacitors - deciding factors - types of available capacitor, characteristics and Limitations	shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels Distribution side Reactive power Management:: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks
	UNIT-V: **Reactive power management in electric traction systems and are furnaces:** Typical layout of traction systems - reactive power control requirements – distribution transformers- Electric arc furnaces - basic operations- furnaces transformer - filter requirements - remedial measures -power factor of an arc furnace	**UNIT-V: User Side Reactive Power Management:** KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations Reactive power management in electric traction systems and are furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer – filter requirements – remedial measures –power factor of an arc furnace

Course Coordinator

Head of the Department

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Electrical Distribution Systems**	**Electrical Distribution Systems**
Course Code	**172PD2E09**	**172PD2E09**
Syllabus	**UNIT- I: Load characteristics:** Residential, Commercial, Agricultural and Industrial and their characteristics.	**UNIT I: GENERAL CONCEPTS:** Introduction to distribution system, Distribution system planning, Factors effecting the distribution system planning, Load modeling and characteristics. Coincidence factor – Contribution factor – Loss factor – Relationship between the load factor and loss factor. Load growth, Classification of Loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.
	UNIT -II: Distribution Feeders and Substations : Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution system. Location of Substations : Rating of a Distribution Substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations.	**UNIT -II: Distribution Feeders and Substations :** Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution system. Location of Substations : Rating of a Distribution Substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations.
	UNIT- III: System Analysis : Voltage drop and power loss calculations : Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.	**UNIT- III: System Analysis :** Voltage drop and power loss calculations : Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.
	UNIT -IV : Protective devices and	**UNIT -IV : Protective devices and**

	coordination : Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices, General coordination procedure.	**coordination** : Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices, General coordination procedure.
	UNIT - V : Capacitive compensation for power factor control: Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.	**UNIT - V : Capacitive compensation for power factor control:** Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Course Coordinator

Head of the Department

Head of The Department
Dept. Of Electrical & Electronics Engineering
Aditya Engineering College (A9)

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Smart Grid Technologies**	**Smart Grid Technologies**
Course Code	**172PD2E10**	**172PD2E10**
Syllabus	**UNIT- I: Introduction to Smart Grid:** Evolution of Electric Grid, Concept of Smart Grid, Definitions,Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient &Self Healing Grid, Present development & International policies on Smart Grid. Case study of Smart Grid.	**UNIT I: Introduction to Smart Grid:** Basics of power systems, definition of smart grid, need for smart grid, smart grid domain, enablers of smart grid, smart grid priority areas, regulatory challenges, smart-grid activities in India.
	UNIT - II: Smart Grid Technologies: Part 1: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.	**UNIT - II: Smart Grid Technologies: Part 1:** Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.
	UNIT - III: Smart Grid Technologies: Part 2: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area	**UNIT - III: Smart Grid Technologies: Part 2:** Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area

	Measurement System(WAMS), Phase Measurement Unit(PMU).	Measurement System(WAMS), Phase Measurement Unit(PMU).
	UNIT - IV: Micro-grids and Distributed Energy Resources: Concept of micro grid, need & applications of Micro grid, formation of micro grid, Issues of interconnection, protection & control of micro grid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, micro turbines, Captive power plants, Integration of renewable energy sources.	**UNIT - IV: Micro-grids and Distributed Energy Resources:** Concept of micro grid, need & applications of Micro grid, formation of micro grid, Issues of interconnection, protection & control of micro grid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, micro turbines, Captive power plants, Integration of renewable energy sources.
	UNIT - V: Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).	**UNIT - V: Power Quality Management in Smart Grid:** Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

Course Coordinator

Head of the Department

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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Programmable Logic Controllers & Applications**	**Programmable Logic Controllers & Applications**
Course Code	**172PD2E12**	**172PD2E12**
	UNIT - I: PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules	**UNIT - I: PLC Basics:** PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams.
	UNIT - II: PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.	**UNIT - II: PLC Programming:** Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction.
Syllabus	**UNIT - III: PLC Registers:** Characteristics of Registers, module addressing, holding registers, input registers, output registers. PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.	**UNIT - III: PLC Registers:** Characteristics of Registers, module addressing, holding registers, input registers, output registers. PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions.
	UNIT - IV: Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and	**UNIT - IV: Data Handling functions:** SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications.

	their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC, Matrix functions	Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC.
	UNIT - V: Analog PLC operation: Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control., PID modules, PID tuning, PID functions	**UNIT - V: Analog PLC operation:** Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control.

Course Coordinator

Head of the Department

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Program Name : M.Tech. in Thermal Engineering

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172TE1T01	Optimization Techniques & Applications	0
2	I	172TE1T02	Advanced Thermodynamics	0
3	I	172TE1T03	Advanced Heat & Mass Transfer	0
4	I	172TE1T04	Advanced Fluid Mechanics	0
5	I	172TE1E01	Gas Dynamics	0
6	I	172TE1E02	Refrigeration & Cryogenics	0
7	I	172TE1E03	Renewable Energy Technologies	0
8	I	172TE1E04	Theory and Technologies of Fuel Cells	0
9	I	172TE1E05	Advanced IC Engines	0
10	I	172TE1E06	Solar Energy Technology	0
11	I	172TE1E07	Turbo Machines	0
12	I	172TE1E08	Alternative Fuels Technologies	0
13	I	172TE1L01	Thermal Engineering Lab	0
14	II	172TE2T05	Fuels, Combustion & Environment	0
15	II	172TE2T06	Energy Management	0
16	II	172TE2T08	Finite Element Method	0
17	II	172TE2T07	Computational Fluid Dynamics	0
18	II	172TE2E09	Materials Technology	0
19	II	172TE2E10	Convective Heat Transfer	0
20	II	172TE2E11	Thermal and Nuclear Power Plants	0
21	II	172TE2E12	Advanced Automobile Engineering	20
22	II	172TE2E13	Thermal Measurements and Process Controls	0
23	II	172TE2E14	Cryogenic Engineering	0
24	II	172TE2E15	Jet Propulsion and Rocketry	0
25	II	172TE2E16	Equipment Design for Thermal Systems	20
26	II	172TE2L02	Thermal Systems Design Lab	0
27	III	172TE3C01	Comprehensive Viva-Voce	0
28	III	172TE3R01	Seminar – I	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
29	III	----	Project Work Part - I	0
30	IV	172TE4C02	Seminar – II	0
31	IV	172TE4P01	Project Work Part - II	0
Total number of courses in the academic year 2018-2019				31
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				2
Percentage of syllabus revision carried out in the academic year 2018-2019 = (2/31)*100				= 6

3/2

Program Coordinator

Head of the Department

Head of the Department
Department of Mechanical Engineering
Aditya Engineering College (A)
SURAMPALEM-533 437

Department of Mechanical Engineering

Date: 14-11-2018

Minutes of the III meeting of BOS scheduled on 12-11-2018

The III meeting of the BOS (Board of Studies) of ME was held on 12-11-2018 at 10:00 AM in the Ajivika Conference Hall, Bill Gates Bhavan, AEC. Prof. A. Saravanan, chairperson presided over the meeting.

Agenda 3.1: Welcome address by Chairperson-BOS

Prof A.Saravanan, BOS chairperson invited the distinguished members of BOS to the III BOS Meeting.

Agenda 3.2: Ratification of minutes of the previous Board of Studies meeting

The members of BOS have ratified the points discussed in the previous Board of Studies meeting held on 30/11/2017.

Agenda 3.3: Discussion on proposed AR17 B.Tech(ME) Program- VI, VII & VIII semesters syllabus and ratification of the same

BOS members approved the syllabus of VI, VII & VIII Semester Syllabus and ratified the same.

After long discussion with the BOS members on the syllabus, the following suggestions are made:

VI Semester

- Suggested to keep a note in Refrigeration &Air conditioning for allowing psychometric charts in external examinations
- Suggested to keep Dynamometers in Metrology &Instrumentation and control systems in any elective of the curriculum.
- Suggested to include grippers in unit -II and proximity sensors in unit -IV of Robotics
- Suggested to include welding symbols in Design for Manufacturing
- Suggested to introduce types of testing and introduction to destructive testing in Non-Destructive Testing
- Suggested to replace Beam Machining in unit V of unconventional machining process by Radiant Energy Machining.

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- Suggested to verify size of the accumulators and intensifiers in unit-III of Industrial Hydraulics &Pneumatics.
- Suggested to include boring and internal threading operations in drilling on lathe experiment and delete gear cutting on slotter in augmented experiments
- Suggested to replace Composite slab by Composite material in second experiment of Heat Transfer Lab

VII Semester

- Suggested to remove Fluid flow problems, 2D Heat and Structural problems in Finite Element Methods.
- Suggested to replace heading of unit-II by Diesel Power Plants &Gas Power Plants.
- Suggested to remove Jet Propulsion in Gas dynamics and Jet Propulsion
- Suggested to remove induction motors in fault diagnostics, thermal images in thermography of condition monitoring
- Suggested to keep material handling in FMS in place of material transportation.
- Suggested to replace NC Lathe by CNC Lathe.

VIII Semester

- Suggested to remove Basic Design Methods of Heat Exchangers in Unit-I, shell and tube heat exchangers in Unit-II of Thermal Equipment Design
- The members of BOS discussed and ratified the list of new courses. The percentage of courses introduced in the academic year 2018-19 for B.Tech (ME) Program is 6.09%. The List of courses introduced is enclosed as Annexure-I.
- The members of BOS discussed and ratified the revision of syllabus. The percentage of courses revised in the academic year 2018-19 for B.Tech (ME) Program is 16.25% and for M.Tech (TE) Program is 6%. The List of courses revised is enclosed as Annexure-II.

Open Electives offered by Mechanical Engineering:

1. Computer Science Engineering and Information Technology
   I. Robotics
   II. Nano technology and its applications
   III. Operations Research

- Suggested to add robot programming in Unit-II and remove programming languages and software packages in Unit-V of Robotics.

2. Electronics and Communications Engineering
   I. Green Fuel Technologies
   II. Robotics
   III. Alternative Energy Sources

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- Suggested to add robot programming in Unit-II and remove programming languages and software packages in Unit-V of Robotics.

3. Civil Engineering
   I. Green Fuel Technologies
   II. Green Energy Systems

- No suggestions are made for above subjects.

4. Agricultural Engineering
   I. Computational Fluid Dynamics
   II. Industrial Engineering and Management
   III. Operation Research

IV. Production technology for Agricultural Machinery

- Suggested to remove equations governing Fluid Flow and heat transfer of Unit-II, Finite difference applications in Conduction and Convection of CFD.
- Suggested to remove Total Quality Management in Industrial Engineering and management
- Suggested to remove Mechatronics System in Unit-I and add some sub topics in PLCs in Unit –IV of Mechatronics
- Suggested to follow JNTU Syllabus of Production Technology for Agricultural Machinery

5. Petroleum Technology
   1. Alternate Energy Source for Automobiles
   2. Computational Fluid Dynamics

- Suggested to remove equations governing Fluid Flow and heat transfer of Unit-II, Finite difference applications in Conduction and Convection of CFD.

6. Electrical and Electronics Engineering:
   1. Robotics
   2. Optimization Techniques

- Suggested to add robot programming in Unit-II and remove programming languages and software packages in Unit-V of Robotics.

7. Mining Engineering
   1. Robotics
   2. Mechanical Engineering Lab

- Suggested to add robot programming in Unit-II and remove programming languages and software packages in Unit-V of Robotics which helps the student to get more placement opportunities.
- Suggested to remove Study of Boilers and Moment of Inertia of Fly Wheel Experiments in Mechanical Engineering Lab.

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Agenda 3.4: Discussion on the proposed AR19 B.Tech (ME) Program&AR19 M.Tech (TE) Program as per the guidelines of APSCHE&AICTE

- The BOS members approved the proposed AR19 B.Tech (ME) Program&AR19 M.Tech Program as per the guidelines of APSCHE&AICTE

Agenda 3.5: Discussion on MOOCS Courses in the curriculum and ratification of the same.

- BOS members ratified the courses MOOCS-I in V Semester and MOOCS-II in VI Semester in the curriculum.

Agenda 3.6: Discussion on AICTE Approved Model Curriculum on 2018-2019 Academic year and ratification of the same.

BOS members suggested to discuss the Model Curriculum of AICTE in the next schedule BOS meeting.

Agenda 3.7: Analysis of student's feedback &Action taken Report

BOS Chairperson expressed that the student feedback & action taken report process was initiated at end of each semester.

Agenda 3.8: Analysis of stakeholder's feedback on Curriculum

BOS Chairperson presented the analysis report of stakeholder's feedback on Curriculum. The BOS members noted the same and the action taken report is enclosed in Annexure III.

Agenda 3.9: Discussion on Analysis of results

The BOS chairperson presented odd semester pass percentage for the A.Y.2018-2019.The BOS members noted the same.

Agenda 3.10: Any other item with the approval of Chairman.

NIL

Agenda 3.11: Scheduling of next Board of Studies meeting.

The next BOS meeting is tentatively scheduled in the month of July 2019.

Agenda 3.12: Vote of Thanks

Prof A. Saravanan, BOS Chairperson presented the Vote of thanks.

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BOS Chairperson

Head of the Department
Department of Mechanical Engineering
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Department of Mechanical Engineering

Annexure-I

List of New Courses in the Academic Year 2018-19

S. No	Program	Semester	Course Code	Course Name
1	B. Tech (ME)	III	171HS3A10	Employability Skills – I
2	B. Tech (ME)	IV	171HS4A11	Employability Skills – II
3	B. Tech (ME)	V	R1631036	Theory of Machines Lab
4	B. Tech (ME)	VI	R163203A	Entrepreneurship
5	B. Tech (ME)	VI	R1632038	Computational Fluid Dynamics Lab

BOS Chairperson

Head of the Department
Department of Mechanical Engineering
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Annexure-II

List of Courses Revised in the Academic Year 2018-19

S. No	Program	Semester	Course Code	Course Name
1	B. Tech (ME)	III	171ES3T11	Mechanics of Solids
2	B. Tech (ME)	III	171ES3L05	Basic Electrical and Electronics Engineering Lab
3	B. Tech (ME)	III	171ES3L06	Mechanics of Solids and Metallurgy Lab
4	B. Tech (ME)	IV	171ME4T05	Design of Machine Members – I
5	B. Tech (ME)	IV	171ME4T06	Industrial Engineering and Management
6	B. Tech (ME)	IV	171ME4T07	Machine Drawing
7	B. Tech (ME)	IV	171ME4L01	Production Technology Lab
8	B. Tech (ME)	IV	171ES4L07	Fluid Mechanics &Hydraulic Machinery Lab
9	M. Tech (TE)	II	172TE2E12	Advanced Automobile Engineering
10	M. Tech (TE)	II	172TE2E16	Equipment Design for Thermal Systems

BOS Chairperson

Head of the Department
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Annexure III

Action Taken Report on Stakeholders Feedback in the Academic Year 2018-19

S. No.	Agenda Item No.	Stakeholders Recommended	Action Taken
1	3.13	Introduce employability skills as a part of curriculum so that students can be industry ready.	As suggested from the employer, employability skills has be implemented in the upcoming semesters.
2	3.8	Better to add GD & T related to Machine Drawing so that student may have knowledge on production symbols.	Introduced limits, fits, tolerances to Machine Drawing subject.
3	3.3	Better to introduce advanced material testing experiments so that student may have good knowledge on materials and its properties.	As per suggestions and discussions made with the professionals and dean academics, fatigue testing has be added to the material science lab.
4	3.3	It has be an added advantage if student had knowledge on advanced testing and materials.	As per the suggestions received, Non – Destructive Evaluation and Nano Technology has be introduced.
5	3.8	It is better to know how the operations are managed in the industries.	As per the suggestions received, Industry Engineering & Management has be introduced to the curriculum.
6	3.8	Please reduce the DMM syllabus.	As per suggestions and discussions made with dean academics, necessary action has be implemented.

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7	3.8	Should be aware of the latest drafting and engineering techniques.	According to the suggestions, and changes from time to time, Engineering drawing subject name can be revised.
8	3.3	Students must have knowledge on the fuels and its types.	According to the suggestions, experiment on the fuels has be added to the lab when discussion made with the experts and professors.
9	3.8	Better to introduce additional industry oriented courses to enhance the student skill.	As per the suggestions, value added courses has be introduced to have skill oriented training.
10	3.3	As more topics included in the design of machine members – 1, it is better to reduce the topics	As per the feedback received and discussions made, revision of the subject has be initiated.
11	3.7	Please remove dress code to the last semester students.	As per the suggestion received, necessary action has be implemented.
12	3.7	Better to provide additional training on subjects to beat the competitive exams.	As per suggestion received and discussions made with dean academics, GATE classes has be introduced.
13	3.8	Student participation is required for the project to be completed successfully.	As per suggestions, projects are encouraged for students and various industry visits will be planned.
14		Better to provide more electives.	As per the suggestions, more PE's and OE's will be introduced.
15		It is better to change the question paper pattern in the semester examination.	As suggested and discussion with experts, to overcome the deficiency new question paper will be formulated for the final semester examination.
16	3.7	Better to provide more technical sessions, webinars on advanced topics.	As suggested, industrial orientation sessions from industry experts and global engineers will be initiated.

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BOS Chairperson
Head of the Department
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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172TE1T01	Optimization Techniques & Applications	4	---	3
172TE1T02	Advanced Thermodynamics	4	---	3
172TE1T03	Advanced Heat & Mass Transfer	4	---	3
172TE1T04	Advanced Fluid Mechanics	4	---	3
Elective – I				
172TE1E01	Gas Dynamics			
172TE1E02	Refrigeration & Cryogenics		---	3
172TE1E03	Renewable Energy Technologies	4		
172TE1E04	Theory & Technologies of Fuel Cells			
Elective – II				
172TE1E05	Advanced IC Engines			
172TE1E06	Solar Energy Technology			
172TE1E07	Turbo Machines	4	---	3
172TE1E08	Alternative Fuels Technologies			
172TE1L01	Thermal Engineering Lab	---	3	2
		TOTAL		**20**

II SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172TE2T05	Fuels, Combustion & Environment	4	---	3
172TE2T06	Energy Management	4	---	3
172SE2T08	Finite Element Method	4	---	3
172TE2T07	Computational Fluid Dynamics	4	---	3
Elective – III				
172TE2E09	Materials Technology			
172TE2E10	Convective Heat Transfer	4	---	3
172TE2E11	Thermal and Nuclear Power Plants			
172TE2E12	Advanced Automobile Engineering			
Elective – IV				
172TE2E13	Thermal Measurements & Process Controls			
172TE2E14	Cryogenic Engineering			
172TE2E15	Jet Propulsion & Rocketry	4	--	3
172TE2E16	Equipment Design for Thermal Systems			
172TE2L02	Thermal Systems Design Lab	---	3	2
			TOTAL	**20**

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172TE3C01	Comprehensive Viva-Voce	---	---	2
172TE3R01	Seminar – I	---	---	2
---	Project Work Part – I	---	---	16
			TOTAL	**20**

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172TE4C02	Seminar – II	---	---	2
172TE4P01	Project Work Part- - II	---	---	18
			TOTAL	**20**

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ADVANCED AUTOMOBILE ENGINEERING
(Elective IV)

II Semester	L	P	C
Course Code: 172TE2E12	4	0	3

Course Objectives:

COB 1: To enable the students understand the concepts of transmission system.

COB 2: To impart the knowledge of various breaking systems used in automobiles.

COB 3: To make the students to explain the steering mechanisms and suspension systems.

COB 4: To create knowledge among students on wiring and lighting systems of automobile.

COB 5: To make the students compare hybrid and motor vehicles.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Compare the basics of various automobile lay-outs

CO 2: Distinguish various breaking systems used in automobiles.

CO 3: Classify various steering mechanisms and suspension systems.

CO 4: Analyze trouble shooting occurred in wiring circuits and lighting systems.

CO 5: Explain various components of hybrid vehicle.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K 3)	PO 2 (K4)	PO 3 (K 5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K 2)	PO11 (K3)
CO1 (K4)	3	3	2	-	-	-	-	-	-	-	3
CO2 (K4)	3	2	1	-	-	-	-	-	-	-	3
CO3 (K4)	3	2	1	-	-	-	-	-	-	-	-
CO4 (K3)	3	3	3	-	-	-	-	-	-	-	-
CO5 (K3)	3	3	3	-	3	-	-	-	-	-	3

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K6)
CO1 (K4)	3	-	-
CO2 (K4)	3	-	-
CO3 (K4)	3	-	-
CO4 (K3)	3	-	-
CO5 (K3)	3	3	-

UNIT I:

Transmission Systems:

Clutch, gearbox, propeller shaft, differential, axle and wheels

UNIT II:

Breaking Systems:

Mechanical, hydraulic & pneumatic breaking systems. Antilock breaking systems. Safety and Security

UNIT III:

Steering & Suspension Systems:

Mechanical and power steering. Mechanical, electronic and adaptive suspension systems

UNIT IV:

Electrical & Electronic Systems:

Wiring circuits, Trouble diagnosis & Trouble shooting, charging, starting and lighting system.

UNIT V:

Hybrid Vehicles & Motor Vehicle Act:

Components of hybrid vehicles, Motor vehicle act.

Text Books:

1. Automobile Engineering, Sudhir Kumar Saxena, University science press,3rd Edition
2. Automotive Mechanics, S. Srinivasan,Mc GrawHill,2nd Edition

Reference Books:

1. Automobile Engineering, Kirpal Singh, Vol.I & II, 6th Edition
2. Automobile Engineering, Hitner, 4th Edition.
3. Automotive Mechanics, Crouse, W.H & D.L. Anlin McGrawHill,10th Edition.

Web Links:

1. http://nptel.ac.in/courses/107106080/
2. http://nptel.ac.in/courses/107106080/2
3. http://nptel.ac.in/112999903
4. http://www.engineering108.com/Data/Engineering/Automobile/advance-vehicle echnology.pdf

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Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

EQUIPMENT DESIGN FOR THERMAL SYSTEMS
(Elective IV)

I Semester	L	P	C
Course Code: 172TE2E16	4	0	3

Course Objectives:

COB 1: To impart the knowledge of different kinds of heat exchangers.

COB 2: To equip the student with the design methods of heat exchangers.

COB 3: To impart the knowledge of heat exchanger.

COB 4: To impart the knowledge of condensation of single vapours.

COB 5: To nurture the students about vaporizers, evaporators and reboilers theory and applications.

COB 6: To induce the knowledge of direct contact heat exchangers.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the different types of heat éxchangers.

CO 2: Make use of the different design methods for heat exchangers.

CO 3: Analyze the double pipe heat exchanger.

CO 4: Calculate the condensation of single vapours.

CO 5: Estimate the heat transfer performance in vaporizers, evaporator.

CO 6: Evaluate the performance of direct contact heat exchangers.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K 2)	PO11 (K 3)
CO1 (K4)	-	3	2	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	3	-	-	-	-	-
CO3 (K4)	-	3	2	-	-	-	-	-	-	-	-
CO4 (K4)	-	3	2	-	-	-	-	-	-	-	-
CO5 (K4)	-	3	2	-	-	-	-	-	-	-	-
CO6 (K4)	-	3	2	-	-	-	-	-	-	-	-

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Mechanical Engineering
Aditya Engineering College
Surampalem

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K6)
CO1 (K4)	-	-	1
CO2 (K3)	3	3	-
CO3 (K4)	-	-	1
CO4 (K4)	-	-	1
CO5 (K4)	-	-	1
CO6 (K4)	-	-	1

UNIT-I:

Classification Of Heat Exchangers:

Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Casketed plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.

Basic Design Methods of Heat Exchanger:

Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, and Counter flow. Multipass, cross flow heat exchanger design calculations.

UNIT-II:

Double Pipe Heat Exchanger:

Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements. Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1-2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of performance of 1-2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2-4 exchangers.

UNIT –III:

Condensation of Single Vapors:

Calculation of horizontal condenser, Vertical condenser, De-Super heater condenser, Vertical condenser-sub-Cooler, Horizontal Condenser- Sub cooler, Vertical reflux type condenser. Condensation of steam.

UNIT-IV:

Vaporizers, Evaporators and Boilers:

Vaporizing processes, forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.

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UNIT-V:

Direct Contact Heat Exchanger:

Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.

Text Books:

1. Process Heat Transfer, D.Q.Kern, McGraw Hill Education, 1st Edition.
2. Fundamentals of Heat Exchanger Design, Ramesh K. Shah & Dusan P. Sekulic, Wiley Wiley India Pvt Ltd, 1st Edition.

Reference Books:

1.Heat Exchanger Design, A.P.Fraas and M.N.Ozisicj, Wiley India Pvt Ltd, 2nd Edition.
2.A Heat Transfer Textbook, John H. Lienhard IV & John H. Lienhard V, Phlogiston Press, 4th Eddition.
3.Cooling Towers, J.D.Gurney and I.A. Cotter, Elsevier Science Ltd, 1st Edition.

Web Links:

1. http://nptel.ac.in/courses/103103027/
2. https://www.slideshare.net/BasemEleaba/heat-exchanger-training-course-material
3. https://www.slideshare.net/acpammar/heat-exchangers-35430932
4. https://www.youtube.com/playlist?list=PLogCfdsrpUTMe1BLu_41xEsKG5rWQEea

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Mechanical Engineering
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Department of Mechanical Engineering

M.Tech-Thermal Engineering

Syllabus revision Index (2018-19)

S. No	Name of the course	Percentage of syllabus change
1	Advanced Automobile Engineering	20
2	Equipment design for Thermal Systems	20

Program Coordinator

Head of the Department

Head of the Department
Department of Mechanical Engineering
Aditya Engineering College (A)
SURAMPALEM-533 437

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Department of Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Advanced Automobile Engineering**	**Advanced Automobile Engineering**
Course Code	172TE2E12	172TE2E12
Syllabus	**UNIT I:** **Transmission Systems:** Clutch, gearbox, propeller shaft, differential, axle and wheels	**UNIT I:** **Transmission Systems:** Clutch, gearbox, propeller shaft, differential, axle and wheels
	UNIT II: **Breaking Systems:** Mechanical, hydraulic & pneumatic breaking systems. Antilock breaking systems. Safety and Security	**UNIT II:** **Breaking Systems:** Mechanical, hydraulic & pneumatic breaking systems. Antilock breaking systems. Safety and Security
	UNIT III: **Steering & Suspension Systems:** Mechanical and power steering. Mechanical, electronic and adaptive suspension systems	**UNIT III:** **Steering & Suspension Systems:** Mechanical and power steering. Mechanical, electronic and adaptive suspension systems
	UNIT IV: **Electrical & Electronic Systems:** Wiring circuits, Trouble diagnosis & Trouble shooting, charging, starting and lighting system.	**UNIT IV:** **Propeller shaft and Braking system Design and Calculation of CG of the vehicle** Propeller shaft; Design of Propeller shafts for a give torque rating; types of drive shafts; Mechanics of Hotchkiss drive and Torque tube drive; Numerical- Braking of vehicles; Brakes applied to the rear wheels & front wheels; Calculation of mean lining pressure and heat generation during braking; braking of vehicle in a curved path; Numerical- Importance of CG – Calculating CG location in Lateral, Side, and its height
	UNIT V: **Hybrid Vehicles & Motor Vehicle Act:** Components of hybrid vehicles, Motor vehicle act.	**UNIT V:** **Electrical & Electronic Systems:** Wiring circuits, Trouble diagnosis & Trouble shooting, charging, starting and lighting system. **Hybrid Vehicles & Motor Vehicle Act:** Components of hybrid vehicles, Motor vehicle act.

Course Coordinator

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Department of Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Equipment Design for Thermal Systems**	**Equipment Design for Thermal Systems**
Course Code	**172TE2E16**	**172TE2E16**
Syllabus	**UNIT-I:** **Classification of Heat Exchangers:** Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketed plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin. **Basic Design Methods of Heat Exchanger:** Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, Counter flow. Multipass, cross flow heat exchanger design calculations:	**UNIT-I:** **Classification of Heat Exchangers:** Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketed plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin. **Basic Design Methods of Heat Exchanger:** Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, Counter flow. Multipass, cross flow heat exchanger design calculations:
	UNIT-II: **Double Pipe Heat Exchanger:** Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements. Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1-2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of	**UNIT-II:** **Double Pipe Heat Exchanger:** Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements. Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1-2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of

	performance of 1-2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2-4 exchangers.	performance of 1-2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2-4 exchangers.
	UNIT-III **Condensation of Single Vapours**: Calculation of horizontal condenser, Vertical condenser, De-Super heater condenser, Vertical condenser-sub-Cooler, Horizontal Condenser- Sub cooler, Vertical reflux type condenser. Condensation of steam.	**UNIT-III** **Condensation of Single Vapours**: Calculation of horizontal condenser, Vertical condenser, De-Super heater condenser, Vertical condenser-sub-Cooler, Horizontal Condenser- Sub cooler, Vertical reflux type condenser. Condensation of steam.
	UNIT-IV: **Vaporizers, Evaporators And Reboilers**: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.	**UNIT-IV:** **Vaporizers, Evaporators And Reboilers**: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger. **Direct Contact Heat Exchanger**: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection Deign of cooling towers, Calculation of cooling tower performance.

	Unit-V: **Direct Contact Heat Exchanger**: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.	UNIT-V **Simulation and optimization of thermal systems:** Numerical modeling of thermal equipment-pumps, turbines and heat exchangers, simulation methods, optimization techniques- linear programming, geometric programming. Dynamic behavior of one-dimensional steady state thermal systems

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
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Program Name : M.Tech. in VLSI Design

Syllabus Revision for the Academic Year 2018-19

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172EM1T01	Digital System Design	0
2	I	172VD1T01	VLSI Technology & Design	0
3	I	172VD1T02	CMOS Analog IC Design	0
4	I	172VD1T03	CMOS Digital IC Design	0
5	I	172EM1E01	Cyber Security	20
6	I	172VD1E01	Digital Design using HDL	0
7	I	172CO1E02	Advanced Operating Systems	0
8	I	172EM1E03	Soft Computing Techniques	0
9	I	172VD1E02	CPLD / FPGA Architectures & Applications	20
10	I	172VD1E03	Hardware Software Co - Design	0
11	I	172EM1E07	Advanced Computer Architecture	0
12	I	172VD1L01	Front End VLSI Design - Lab	0
13	II	172VD2T04	CMOS Mixed Signal Circuit Design	0
14	II	172VD2T05	Embedded System Design	0
15	II	172VD2T06	Low Power VLSI Design	0
16	II	172VD2T07	Design For Testability	0
17	II	172VD2E04	CAD for VLSI	20
18	II	172EM2T06	DSP Processors & Architectures	0
19	II	172VD2E05	VLSI Signal Processing	0
20	II	172EM2E08	System on Chip Design	0
21	II	172VD2E06	Optimization Techniques in VLSI Design	0
22	II	172VD2E07	Semiconductor Memory Design and Testing	0
23	II	172VD2L02	Back end VLSI Design Laboratory	0
24	III	172VD3C01	Comprehensive Viva-Voce	0
25	III	172VD3R01	Seminar – I	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
26	III		Project Work Part – I	0
27	IV	172VD4R02	Seminar – II	0
28	IV	172VD4P01	Project Work Part - II	0

Total number of courses in the academic year 2018-19	28
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-19	3
Percentage of syllabus revision carried out in the academic year 2018-19 = (3/28)*100	10.7

Program Coordinator

Head of the Department

Head of the Department
Department of E.C.E.
Aditya Engineering College (A.)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINUTES OF THE III MEETING OF BOS SCHEDULED ON 10-11-2018

Date: 11-11-2018

The III meeting of the BOS of Electronics and Communication Engineering Department was held on 10-11-2018 at 09.30 AM.

The Members discussed the agenda items and made the following resolutions..

Agenda 3.1: Welcome address by Chairman

Prof. G. Sridevi, Chairman of BOS, invited all the distinguished members of BOS to the first BOS meeting..

Agenda 3.2: Ratification of minutes of the previous Board of Studies meeting

The BOS members have ratified the points discussed in the previous Board of Studies meeting held on 11-11-2017.

Agenda 3.3: Discussion on proposed course syllabus of each course in B.Tech V, VI, VII andVIIIsemesters.

The BOS members have discussed about course content in, VI, VII & VIII semesters of Electronics and Communication Engineering Department subjects, suggested some minor modifications and Ratified

- Suggested to change the title of the course "DSP Processors and Applications" as "DSP Processors and Architectures".
- Suggested to make the students to do programming experiments as assignments and the interfacing experiments to be performed in Lab sessions in MPMC lab in VI semester.
- Suggested to prepare evaluation process in internship program based on individual or group of students of VII semester.
- Suggested to plan two MOOCS courses for the students with the duration of at least 16 weeks (4+12 or 8+8 or 10+6) before the completion of VII semester.
- Suggested to allocate 4 hours to practical session and evaluate student performance on the basis of objective and subjective evaluation for the major project of VIII semester.
- The BOS members discussed the courses which improved the skill set of the students.
- The BOS members discussed the new courses which focus on new trend and technologies, the list of new courses during the academic year 2018-2019 enclosed as Annexure-I and revised courses in Annexure II and ratified the same.

Agenda 3.4: Discussion on proposed program structure AR19 B.Tech (ECE), AR19 M.Tech (VLSI Design) & AR19 M.Tech (ES) based on the AICTE model curriculum.

The BOS members have discussed the proposed course structure of AR19 B.Tech (ECE), AR19 M.Tech (VLSI Design) & AR19 M.Tech (ES) based on the AICTE model curriculum and the members Suggested to prepare a credit plan for the Humanity sciences courses, Basic Sciences Courses, Professional Core Courses, and Professional Elective Courses and Open elective Courses in line with AICTE model curriculum.

Agenda 3.5: Ratification of the proposed model question paper for sessional and external examinations of B.Tech (ECE), M.Tech (VLSI Design) and M.Tech (ES) programs.

BOS members have approved the model papers for the internal and external examinations for the pattern and ratified the same.

Agenda 3.6: Finalization of names of reputed institution for setting question paper and valuation of answer scripts.

BOS members accepted the list consisting of the names of reputed autonomous institution for setting question paper and valuation of answer scripts and ratified.

Agenda 3.7: Analysis of results.

The BOS Chairperson presented the odd and even semesters pass percentage for the A.Y.2017-2018. The BOS members noted the same.

Agenda 3.8: Analysis of Students feedback and action taken report.

Students feedback and actions taken report is presented by the BOSchairperson to the BOS members and BOS members approved the same.

Agenda 3.9: Analysis of Stakeholder's Feedback on Curriculum.

Analysis of Stakeholder's Feedback on Curriculum is presented by the BOS, chairperson to the BOS members and BOS members noted the sameand the Action Taken Report is enclosed as Annexure-III.

Agenda 3.10: Any other item/s with the approval of Chairperson.

- Suggested to reduce Employability skills credits from 4 to 2 and ratified.
- Suggested to replace Industrial oriented mini project in IV Year I Semester with Internship Program with a period of 2 to 3 weeks with 2 credits and ratified.

Agenda 3.11: Scheduling of next Board of Studies meeting.

The next BOS meeting is tentatively scheduled in the month of July 2019.

Agenda 3.12: Vote of Thanks

Prof. G. Sridevi, BOS Chairperson presented the Vote of thanks.

G. Sridevi 11/11/18

Chairperson, BOS

Head of the Department

Department of E.C.E.

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Department of Electronics and Communication Engineering

ANNEXURE-I

LIST OF NEW COURSES IN THE ACADEMIC YEAR 2018-2019

S. No	Program	Semester	Course Code	Course Name
1	B. Tech (ECE)	III	171HS3A10	Employability Skills - I
2	B. Tech (ECE)	IV	171HS4A11	Employability Skills – II
3	B. Tech (ECE)	VI	R163204B	Data Mining
4	B. Tech (ECE)	VI	R163204C	Industrial Robotics
5	B. Tech (ECE)	VI	R163204E	Power Electronics

G. Sridhar

BOS Chairperson

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

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Department of Electronics and Communications Engineering

ANNEXURE-II

LIST OF COURSES REVISED IN THE ACADEMIC YEAR 2018-2019

S. No	Program	Semester	Course Code	Course Name
1	B. Tech (ECE)	III	171HS3T04	Managerial Economics and Financial Analysis
2	B. Tech (ECE)	III	171EC3L01	Electronic Devices and Circuits Lab
3	B. Tech (ECE)	III	171ES3L08	Networks and Electrical Technology Lab
4	B. Tech (ECE)	IV	171EC4L03	Analog Communications Lab
5	B. Tech (ECE)	V	R1631042	Digital I C Applications
6	B. Tech (ECE)	V	R1631048	Digital I C Applications Lab
7	B. Tech (ECE)	VI	R1632047	VLSI Lab
8	M.Tech(ES)	I	172EM1E02	Sensors and actuators
9	M.Tech(ES)	I	172EM1E05	Device drivers
10	M.Tech(VLSID)	I	172EM1E01	Cyber security
11	M.Tech(VLSID)	I	172VD1E02	CPLD/FPGA architecture and applications
12	M.Tech(VLSID)	II	172VD2E04	CAD for VLSI

G. Sridevi

BOS Chairperson

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ANNEXURE III

S. No	Agenda Item No.	Stakeholders Recommended	Action Taken
1	3.14	IT industry is one of the rapidly growing industries. Accommodate more relevant courses in the curriculum so that the students can meet the industry requirements.	DATA MINING is included in open elective so that it can be opted by the students who are interested in choosing their career towards IT industry.
2	3.14	IC design industry is rapidly growing and provides vast opportunities. Students should be encouraged in this aspect.	A course is included in the curriculum facilitating an insight to the domain.
3	3.14	Encourage students to visit industries and corporate work places so that they can inculcate the industry requirements in them personally.	Will be discussed with the concerned body for providing space for such activities to be a part of curriculum only with proper approval.
4	3.14	Include courses which will help the students in getting through competitive exams and placements as well.	Employability skills I and II in the III and IV semesters respectively are introduced to facilitate this suggestion.
5	3.14	Suggestions made by alumni to include small-scale project works to inculcate technical skills in the students.	Suggestion will be taken to the concerned body and necessary action will be taken by the expertise with proper approval.
6	3.14	Suggested to invite core companies such as domain specific companies more in number for placements.	This will be discussed and necessary action will be taken by the expertise.
7	3.14	facilitate more industrial training sessions and engage the students with more live projects.	This will be incorporated in the revised syllabus in the upcoming regulation.
8	3.14	Make sure theory course and lab related to the theory appears in the	Exercise will be done on this suggestion and with proper

		same semester.	approval by the expertise, it will be looked into.
9	3.14	In the course Linear IC Applications unit III and unit V are really tough to be dealt by an average student. And also, the content is large. This may be changed in favour of an average student with expertise suggestion.	Will be discussed with the expertise and necessary changes will be made if needed.
10	3.13	Students are very much enthusiastic in practical and project-oriented courses. It will help the student community if courses related to these are included in the curriculum.	Students will come across INDUSTRIAL ROBOTICS and POWER ELECTRONICS in their VI semester to provide practical exposure in them.
11	3.13	Requested for more industrial visits to be incorporated in the curriculum.	Will be discussed with the expertise and necessary changes will be made if needed.
12	3.13	Suggestions are recommended by students to change the exam paper pattern.	Taking students feedback into account, and looking into the possibilities with the expertise suggestions, this will be discussed thoroughly.

G. Seidms

BOS Chairperson

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

PROGRAMME STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172EM1T01	Digital System Design	4	---	3
172VD1T01	VLSI Technology & Design	4	---	3
172VD1T02	CMOS Analog IC Design	4	---	3
172VD1T03	CMOS Digital IC Design	4	---	3
Elective – I				
172EM1E01	Cyber Security	4	---	3
172VD1E01	Digital Design using HDL			
172CO1E02	Advanced Operating Systems			
172EM1E03	Soft Computing Techniques			
Elective – II				
172VD1E02	CPLD / FPGA Architectures & Applications	4	---	3
172VD1E03	Hardware Software Co - Design			
172EM1E07	Advanced Computer Architecture			
172VD1L01	Front End VLSI Design - Lab	---	3	2
			TOTAL	20

II SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172VD2T04	CMOS Mixed Signal Circuit Design	4	---	3
172VD2T05	Embedded System Design	4	---	3
172VD2T06	Low Power VLSI Design	4	---	3
172VD2T07	Design For Testability	4	---	3
Elective – III				
172VD2E04	CAD for VLSI	4	---	3
172EM2T06	DSP Processors & Architectures			
172VD2E05	VLSI Signal Processing			
Elective – IV				
172EM2E08	System on Chip Design	4	---	3
172VD2E06	Optimization Techniques in VLSI Design			
172VD2E07	Semi Conductor Memory Design and Testing			
172VD2L02	Back End VLSI Design - Lab	---	3	2
			TOTAL	20

G. Sridhar
Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172VD3C01	Comprehensive Viva-Voce	---	---	2
172VD3R01	Seminar – I	---	---	2
---	Project Work Part – I	---	---	16
			TOTAL	20

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172VD4R02	Seminar - II	---	---	2
172VD4P01	Project Work Part - II	---	---	18
			TOTAL	20

G. Sridhar

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

CYBER SECURITY
(Elective-I)

I Semester	L	P	C
Course Code:172EM1E01	4	0	3

Course Objectives:

- COB 1: To make the students to understand the Network Security.
- COB 2: To enable the students to understand network-troubleshooting concepts.
- COB 3: To make the students to understand about risk management processes and practices.
- COB 4: To demonstrate the students about the threats and risks within context of the cyber security architecture.
- COB 5: To make the students familiar with the security tools and hardening techniques.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Discover the various security attacks and security services
- CO 2: Develop a model for Internetwork security
- CO 3: Analyze threats and risks within context of the cyber security architecture
- CO 4: Utilize cryptography algorithms, digital signatures, digital Certificates and Key Management
- CO 5: Interpret the IP Security and its implementation of architecture, SSL, TLS
- CO6: Make use of the intrusion detection system and Firewall

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K4)	2	3	2	3	3	3	-	-	3	3	3
CO 2(K3)	1	2	1	3	3	2	-	3	3	3	2
CO 3(K4)	-	3	2	-	-	3	-	-	3	3	3
CO 4(K3)	1	-	2	3	3	3	-	-	3	-	2
CO 5(K5)	3	3	3	3	3	3	-	3	3	3	3
CO 6(K3)	1	2	1	3	3	2	-	-	3	3	2

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K4)	3	-	-
CO 2(K3)	-	2	-
CO 3(K4)	3	-	-
CO 4(K3)	3	-	-
CO 5(K5)	3	-	2
CO 6(K3)	3	-	-

G. Seidhar
Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

UNIT-I

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT-III

Number Theory:

Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV

IP Security:

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)
Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

Intrusion Detection:

Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.

Text Books:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, 6th edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

G. Sridevi

Reference Books:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010.
2. Network Security: The Complete Reference, Mark Rhodes-Ousley, Roberta Bragg, Keith Strassberg.

Web Links:

1. http://www.sis.pitt.edu/jjoshi/IS2935/Fall04/
2. http://wiki.cas.mcmaster.ca/index.php/Conventional_Encryption_Algorithms
3. https://technet.microsoft.com/en-us/library/cc961976.aspx
4. https://technet.microsoft.com/en-us/library/cc179879.aspx

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Q. Sridhar

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

CPLD/FPGA ARCHITECTURES & APPLICATIONS
(Elective-II)

I Semester L P C

Course Code: 172EM2T08 4 0 3

Course Objectives:

COB 1: To impart the knowledge on programmable logic devices and differences among them.

COB 2: To demonstrate the FPGA Programming Technologies, programmable logic block architectures and their inter connects.

COB 3: To make the students to familiarize with the different SRAM programmable FPGAs and their programming technology.

COB 4: To enable the students to learn about different Anti-Fuse Programmed FPGAs and their programming technology.

COB 5: To enable the students to develop different digital circuits with ACT Architectures.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Identify different types of programmable logic devices.

CO 2: Compare the performance of different FPGAs and their programming Technologies.

CO 3: Analyze different SRAM programmable FPGA architectures.

CO 4: Analyze different Anti-Fuse Programmed FPGA architectures.

CO 5: Develop digital circuits with ACT architectures.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K3)	1	-	1	-	3	-	-	-	-	-	-
CO 2(K2)	-	-	-	2	2	-	-	-	-	-	-
CO 3(K4)	2	3	2	3	3	-	-	-	-	-	-
CO 4(K4)	2	3	2	3	3	-	-	-	-	-	-
CO 5(K3)	1	2	1	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K3)	-	-	-
CO 2(K2)	-	-	-
CO 3(K4)	2	2	-
CO 4(K4)	2	2	-
CO 5(K3)	1	1	3

G. Saidu

Head of the Department
Department of E.C.E.
Aditya Engineering College

UNIT-I

Introduction to Programmable Logic Devices:

Introduction, Simple Programmable Logic Devices - Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL,CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II

Field Programmable Gate Arrays:

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT–III

Programming FPGAs:

SRAM Programmable FPGAs, Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT-IV

ACT FPGA Architectures:

Anti-Fuse Programmed FPGAs, Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures

UNIT-V

Applications:

Design Applications, General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

Text Books:

1. Field Programmable Gate Array Technology, Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design, Charles H. Roth Jr, LizyKurian John, Cengage Learning.
3. Digital Systems Design with FPGAs and CPLDs, Ian Grout, Elsevier, Newnes.

Reference Books:

1. Digital Design Using Field Programmable Gate Arrays, Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.
2. Digital Systems Design with FPGAs and CPLDs, Ian Grout, Elsevier, Newnes.
3. FPGA based System Design, Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.
4. Field Programmable Gate Arrays, John V. Oldfield, Richard C. Dorf, Wiley India.

G. Seidns
Head of the Department
Department of E.C.E.

Web Links:

1. www.cs.umd.edu/class/sum2003/cmsc311/Notes/Comb/pla.html
2. www.eng.ucy.ac.cy/theocharides/Courses/ECE664/L5.pdf
3. www.soc.napier.ac.uk/~bill/pdf/ICD_C09.PDF
4. https://en.wikipedia.org/wiki/Complex_programmable_logic_device.

*****

G. Sridhar

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

CAD FOR VLSI
(Elective-III)

II Semester L P C

Course Code: 172VD2E04 4 0 3

Course Objectives:

COB 1: To enable the students to explain the Basic VLSI physical design flow.

COB 2: To enable the student to identify the various algorithms for partitioning, floor planning and Pin assignment.

COB 3: To make the student to be able to differentiate between global routing and detailed routing.

COB 4: To impart the knowledge on various algorithms for global and detailed routing.

COB 5: To train the students to explain the physical design automation of FPGAs and MCMs

COB6: To enable the student to understand the necessity of chip input and output circuits necessary to overcome problems of ESD

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the VLSI physical Design automation

CO 2: Apply Algorithms Required for partitioning, floor planning, pin assignment placement

CO 3: Explain global and detailed routing

CO 4: Demonstrate Physical design automation of FPGAs and MCMs.

CO 5: Analyze the Chip input and output circuits to protect against ESD

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1(k2)	-	1	-	-	-	-	-	3	-	-	-
CO2(k3)	1	2	-	-	-	-	-	3	3	-	-
CO3(k2)	-	1	-	-	-	-	-	3	3	-	-
CO4(k2)	-	1	-	-	-	-	-	3	3	-	-
CO5(k4)	2	3	-	-	-	-	-	3	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO1 (K2)	2	-	-
CO2 (K3)	3	2	-
CO3 (K2)	2	1	-
CO4 (K2)	2	-	-
CO5 (K4)	3	3	1

Head of the Department.
Department of E.C.E.
Aditya Engineering College (A9)

UNIT-I

VLSI Physical Design Automation:

VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles;

UNIT-II

Partitioning, Floor Planning, Pin Assignment and Placement:

Partitioning – Problem formulation, Classification of Partitioning algorithms, Kernighan-Lin Algorithm, Simulated Annealing, Floor Planning – Problem formulation, Classification of floor

planning algorithms, constraint based floor planning, Rectangular Dualization, Pin Assignment –problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, Placement – Problem formulation, Classification of placement algorithms, Partitioning based placement algorithms;

UNIT-III

Global Routing and Detailed Routing:

Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing – Problem formulation, Classification of routing algorithms, Single layer routing algorithms;

UNIT-IV

Physical Design Automation of FPGAs and MCMs:

FPGA Technologies, Physical Design cycle for FPGAs, Partitioning, Routing – Routing Algorithm for the Non-Segmented model, Routing Algorithms for the Segmented Model; Introduction to MCM Technologies, MCM Physical Design Cycle.

UNIT-V

Chip Input and Output Circuits:

ESD Protection, Input Circuits, Output Circuits and noise, On-chip clock Generation and Distribution, Latch-up and its prevention.

Text Books:

1. Algorithms for VLSI Physical Design Automation, Naveed Shervani, Springer International Edition,3rd Edition,2005.
2. CMOS Digital Integrated Circuits Analysis and Design, Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Edition,2011.

Reference Books:

1. VLSI Physical Design Automation-Theory and Practice , Sadiq M Sait, Habib Youssef, World Scientific.
2. Algorithms for VLSI Design Automation, S. H. Gerez, Wiley student Edition, JohnWiley and Sons (Asia) Pvt. Ltd,1999.
3. VLSI Physical Design Automation, SungKyu Lim, Springer International Edition.

G. Seidu

18-19

CYBER SECURITY
(Elective-I)

I Semester L P C

Course Code:172EM1E01 4 0 3

Course Objectives:

- COB 1: To make the students to understand the Network Security.
- COB 2: To enable the students to understand network-troubleshooting concepts.
- COB 3: To make the students to understand about risk management processes and practices.
- COB 4: To demonstrate the students about the threats and risks within context of the cyber security architecture.
- COB 5: To make the students familiar with the security tools and hardening techniques.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Discover the various security attacks and security services
- CO 2: Develop a model for Internetwork security
- CO 3: Analyze threats and risks within context of the cyber security architecture
- CO 4: Utilize cryptography algorithms, digital signatures, digital Certificates and Key Management
- CO 5: Interpret the IP Security and its implementation of architecture, SSL, TLS
- CO6: Make use of the intrusion detection system and Firewall

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K4)	2	3	2	3	3	3	-	-	3	3	3
CO 2(K3)	1	2	1	3	3	2	-	3	3	3	2
CO 3(K4)	-	3	2	-	-	3	-	-	3	3	3
CO 4(K3)	1	-	2	3	3	3	-	-	3	-	2
CO 5(K5)	3	3	3	3	3	3	-	3	3	3	3
CO 6(K3)	1	2	1	3	3	2	-	-	3	3	2

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K4)	3	-	-
CO 2(K3)	-	2	-
CO 3(K4)	3	-	-
CO 4(K3)	3	-	-
CO 5(K5)	3	-	2
CO 6(K3)	3	-	-

G. Sridhar

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

UNIT-I

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT-III

Number Theory:

Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV

IP Security:

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)
Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

Intrusion Detection:

Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.

Text Books:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, 6th edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

O. Seidros

Head of the Department
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Reference Books:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010.
2. Network Security: The Complete Reference, Mark Rhodes-Ousley, Roberta Bragg, Keith Strassberg.

Web Links:

1. http://www.sis.pitt.edu/jjoshi/IS2935/Fall04/
2. http://wiki.cas.mcmaster.ca/index.php/Conventional_Encryption_Algorithms
3. https://technet.microsoft.com/en-us/library/cc961976.aspx
4. https://technet.microsoft.com/en-us/library/cc179879.aspx

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G. Sridhar

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

CPLD/FPGA ARCHITECTURES & APPLICATIONS
(Elective-II)

I Semester	L	P	C
Course Code: 172EM2T08	4	0	3

Course Objectives:

- COB 1: To impart the knowledge on programmable logic devices and differences among them.
- COB 2: To demonstrate the FPGA Programming Technologies, programmable logic block architectures and their inter connects.
- COB 3: To make the students to familiarize with the different SRAM programmable FPGAs and their programming technology.
- COB 4: To enable the students to learn about different Anti-Fuse Programmed FPGAs and their programming technology.
- COB 5: To enable the students to develop different digital circuits with ACT Architectures.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Identify different types of programmable logic devices.
- CO 2: Compare the performance of different FPGAs and their programming Technologies.
- CO 3: Analyze different SRAM programmable FPGA architectures.
- CO 4: Analyze different Anti-Fuse Programmed FPGA architectures.
- CO 5: Develop digital circuits with ACT architectures.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K3)	1	-	1	-	3	-	-	-	-	-	-
CO 2(K2)	-	-	-	2	2	-	-	-	-	-	-
CO 3(K4)	2	3	2	3	3	-	-	-	-	-	-
CO 4(K4)	2	3	2	3	3	-	-	-	-	-	-
CO 5(K3)	1	2	1	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K3)	-	-	-
CO 2(K2)	-	-	-
CO 3(K4)	2	2	-
CO 4(K4)	2	2	-
CO 5(K3)	1	1	3

UNIT-I

Introduction to Programmable Logic Devices:

Introduction, Simple Programmable Logic Devices - Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL,CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II

Field Programmable Gate Arrays:

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT–III

Programming FPGAs:

SRAM Programmable FPGAs, Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT-IV

ACT FPGA Architectures:

Anti-Fuse Programmed FPGAs, Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures

UNIT-V

Applications:

Design Applications, General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

Text Books:

1. Field Programmable Gate Array Technology, Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design, Charles H. Roth Jr, LizyKurian John, Cengage Learning.
3. Digital Systems Design with FPGAs and CPLDs, Ian Grout, Elsevier, Newnes.

Reference Books:

1. Digital Design Using Field Programmable Gate Arrays, Pak K. Chan/Samiha Mourad, Pearson Low Price Edition.
2. Digital Systems Design with FPGAs and CPLDs, Ian Grout, Elsevier, Newnes.
3. FPGA based System Design, Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.
4. Field Programmable Gate Arrays, John V. Oldfield, Richard C. Dorf, Wiley India.

G. Sridevi

Web Links:

1. www.cs.umd.edu/class/sum2003/cmsc311/Notes/Comb/pla.html
2. www.eng.ucy.ac.cy/theocharides/Courses/ECE664/L5.pdf
3. www.soc.napier.ac.uk/~bill/pdf/ICD_C09.PDF
4. https://en.wikipedia.org/wiki/Complex_programmable_logic_device.

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G. Saidunt

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

CAD FOR VLSI
(Elective-III)

II Semester L P C

Course Code: 172VD2E04 4 0 3

Course Objectives:

COB 1: To enable the students to explain the Basic VLSI physical design flow.

COB 2: To enable the student to identify the various algorithms for partitioning, floor planning and Pin assignment.

COB 3: To make the student to be able to differentiate between global routing and detailed routing.

COB 4: To impart the knowledge on various algorithms for global and detailed routing.

COB 5: To train the students to explain the physical design automation of FPGAs and MCMs

COB6: To enable the student to understand the necessity of chip input and output circuits necessary to overcome problems of ESD

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the VLSI physical Design automation

CO 2: Apply Algorithms Required for partitioning, floor planning, pin assignment placement

CO 3: Explain global and detailed routing

CO 4: Demonstrate Physical design automation of FPGAs and MCMs.

CO 5: Analyze the Chip input and output circuits to protect against ESD

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1(k2)	-	1	-	-	-	-	-	3	-	-	-
CO2(k3)	1	2	-	-	-	-	-	3	3	-	-
CO3(k2)	-	1	-	-	-	-	-	3	3	-	-
CO4(k2)	-	1	-	-	-	-	-	3	3	-	-
CO5(k4)	2	3	-	-	-	-	-	3	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO1 (K2)	2	-	-
CO2 (K3)	3	2	-
CO3 (K2)	2	1	-
CO4 (K2)	2	-	-
CO5 (K4)	3	3	1

UNIT-I

VLSI Physical Design Automation:

VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles;

UNIT-II

Partitioning, Floor Planning, Pin Assignment and Placement:

Partitioning – Problem formulation, Classification of Partitioning algorithms, Kernighan-Lin Algorithm, Simulated Annealing, Floor Planning – Problem formulation, Classification of floor

planning algorithms, constraint based floor planning, Rectangular Dualization, Pin Assignment –problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, Placement – Problem formulation, Classification of placement algorithms, Partitioning based placement algorithms;

UNIT-III

Global Routing and Detailed Routing:

Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing – Problem formulation, Classification of routing algorithms, Single layer routing algorithms;

UNIT-IV

Physical Design Automation of FPGAs and MCMs:

FPGA Technologies, Physical Design cycle for FPGAs, Partitioning, Routing – Routing Algorithm for the Non-Segmented model, Routing Algorithms for the Segmented Model; Introduction to MCM Technologies, MCM Physical Design Cycle.

UNIT-V

Chip Input and Output Circuits:

ESD Protection, Input Circuits, Output Circuits and noise, On-chip clock Generation and Distribution, Latch-up and its prevention.

Text Books:

1. Algorithms for VLSI Physical Design Automation, Naveed Shervani, Springer International Edition,3rd Edition,2005.
2. CMOS Digital Integrated Circuits Analysis and Design, Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Edition,2011.

Reference Books:

1. VLSI Physical Design Automation-Theory and Practice , Sadiq M Sait, Habib Youssef, World Scientific.
2. Algorithms for VLSI Design Automation, S. H. Gerez, Wiley student Edition, JohnWiley and Sons (Asia) Pvt. Ltd,1999.
3. VLSI Physical Design Automation, SungKyu Lim, Springer International Edition.

Q. Seidros

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

Web Links:

1. www.facweb.iitkgp.ernet.in/~isg/CAD/SLIDES/01-intro.pdf
2. www.facweb.iitkgp.ernet.in/~isg/CAD/index.html
3. nptel.ac.in/courses/106106088/
4. nptel.ac.in/courses/106106089/

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G. Sridevi

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

ADITYA ENGINEERING COLLEGE
An Autonomous Institution
Approved by AICTE • Permanently Affiliated to JNTUK • Accredited by NAAC with 'A' Grade
Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956
Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Department of Electronics and communication Engineering

Syllabus revision Index (V.L.S.I.D.)

2018-19

S.No	Name of the course	Percentage of syllabus change
1	Cyber security	20
2	CPLD/FPGA architecture and applications	25
3	CAD for VLSI	20

Head of the department

Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

ADITYA ENGINEERING COLLEGE

An Autonomous Institution

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Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956

Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Department of Electronics and communication Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Cyber security	Cyber security
Course Code	172EM1E01	172EM1E01
syllabus	UNIT-I Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks	UNIT-I Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks
	UNIT-II Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC	UNIT-II **Classical Encryption Techniques :** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines , Steganography **Block Ciphers and the Data Encryption Standard:** Traditional Block Cipher Structure , The Data Encryption Standard, A DES Example, The Strength of DES
	UNIT-III Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital	UNIT-III Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital

	signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service	Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service
	UNIT-IV IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME	UNIT-IV IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME
	UNIT-V Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.	UNIT-V Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems. Introduction to Malware: What is Malware? Malware Family, History and Evolution of Malware, Malware Distribution Technique, How much damages malwares cause, How to defend Malware Infection

Signature of the course coordinator

Signature of the HOD

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	CPLD/FPGA architecture and applications	CPLD/FPGA architecture and applications
Course Code	172EM2T08	172EM2T08
Syllabus	UNIT-I Introduction to Programmable Logic Devices: Introduction, Simple Programmable Logic Devices - Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL,CPLD, CPLD Implementation of a Parallel Adder with Accumulation.	UNIT-I Introduction to Programmable Logic Devices: Introduction, Simple Programmable Logic Devices - Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL,CPLD, CPLD Implementation of a Parallel Adder with Accumulation.
	UNIT-II Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.	UNIT-II Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.
	UNIT–III Programming FPGAs: SRAM Programmable FPGAs, Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.	UNIT–III Programming FPGAs: SRAM Programmable FPGAs, Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

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	UNIT-IV ACT FPGA Architectures: Anti-Fuse Programmed FPGAs, Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures	UNIT-IV ACT FPGA Architectures: Anti-Fuse Programmed FPGAs, Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures
	UNIT-V Applications: Design Applications, General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.	UNIT-V Applications: Design Applications Designing with ACT! and ACT2 FPGAs, Designing with ACT FPGAs: A 1TL Perspective, Migrating PLD Designs to FPGAs, Synthesis Design Flow, Designing Counters with ACT Devices, Designing Adders and Accumulators with the ACT Architecture, State Machine Design, Using FPGAs for Digital PLLs.

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Department of Electronics and communication Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	CAD for VLSI	CAD for VLSI
Course Code	172VD2E04	172VD2E04
Syllabus	UNIT-I VLSI Physical Design Automation: VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles;	UNIT-I VLSI Physical Design Automation: VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles;
	UNIT-II Partitioning, Floor Planning, Pin Assignment and Placement: Partitioning – Problem formulation, Classification of Partitioning algorithms, Kernighan-Lin Algorithm, Simulated Annealing, Floor Planning – Problem formulation, Classification of floor planning algorithms, constraint based floor planning, Rectangular Dualization, Pin Assignment – problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, Placement – Problem formulation, Classification of placement algorithms, Partitioning based placement algorithms	UNIT-II Partitioning, Floor Planning, Pin Assignment and Placement: Partitioning – Problem formulation, Classification of Partitioning algorithms, Kernighan-Lin Algorithm, Simulated Annealing, Floor Planning – Problem formulation, Classification of floor planning algorithms, constraint based floor planning, Rectangular Dualization, Pin Assignment –problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, Placement – Problem formulation, Classification of placement algorithms, Partitioning based placement algorithms
	UNIT-III Global Routing and Detailed Routing: Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing – Problem formulation, Classification of routing algorithms, Single layer routing algorithms;	UNIT-III Global Routing and Detailed Routing: Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing – Problem formulation, Classification of routing algorithms, Single layer routing algorithms;

	UNIT-IV Physical Design Automation of FPGAs and MCMs: FPGA Technologies, Physical Design cycle for FPGAs, Partitioning, Routing – Routing Algorithm for the Non-Segmented model, Routing Algorithms for the Segmented Model; Introduction to MCM Technologies, MCM Physical Design Cycle.	UNIT-IV Clock and Power Routing Clock Routing, Clocking Schemes, Design Considerations for the Clocking System, Delay Calculation for Clock Trees, Clock Routing Algorithms, H-tree Based Algorithm, The MMM Algorithm, Geometric Matching based Algorithm, Weighted Center Algorithm, Exact Zero Skew Algorithm, DME Algorithm, Power and Ground Routing
	UNIT-V Chip Input and Output Circuits: ESD Protection, Input Circuits, Output Circuits and noise, On-chip clock Generation and Distribution, Latch-up and its prevention.	UNIT-V Physical Design Automation of FPGAs and MCMs: FPGA Technologies, Physical Design cycle for FPGAs, Partitioning, Routing – Routing Algorithm for the Non-Segmented model, Routing Algorithms for the Segmented Model; Introduction to MCM Technologies, MCM Physical Design Cycle.

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Program Name : M.Tech. in Embedded Systems

Syllabus Revision for the Academic Year 2018-19

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172EM1T01	Digital System Design	0
2	I	172EM1T02	Embedded System Design	0
3	I	172EM1T03	Real Time Operating Systems	0
4	I	172EM1T04	Embedded - C	0
5	I	172EM1E01	Cyber Security	0
6	I	172EM1E02	Sensors and Actuators	20
7	I	172CO1E02	Advanced Operating Systems	0
8	I	172EM1E03	Soft Computing Techniques	0
9	I	172EM1E04	Embedded Computing	0
10	I	172EM1E05	Device Drivers	20
11	I	172EM1E06	Network Security and cryptography	0
12	I	172EM1E07	Advanced Computer Architecture	0
13	I	172EM1L01	Embedded Systems Lab	0
14	II	172EM2T05	Hardware Software Co - Design	0
15	II	172EM2T06	DSP Processors &Architectures	0
16	II	172EM2T07	Embedded Networking	0
17	II	172EM2T08	CPLD / FPGA Architectures & Applications	0
18	II	172EM2E08	System on Chip Design	0
19	II	172VD2T04	CMOS Mixed Signal Circuit Design	0
20	II	172EM2E09	MEMS Design	0
21	II	172EM2E10	Internet Protocols	0
22	II	172VD2T07	Design For Testability	0
23	II	172EM2E11	Wireless LANs and PANs	0
24	II	172EM2E12	Multimedia & Signal Coding	0
25	II	172EM2L02	Embedded Real Time Systems Lab	0
26	III	172EM3C01	Comprehensive Viva-Voce	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
27	III	172EM3R01	Seminar - I	0
28	III		Project Work Part - I	0
29	IV	172EM4R02	Seminar - II	0
30	IV	172EM4P01	Project Work Part- - II	0

Total number of courses in the academic year 2018-19	30
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-19	2
Percentage of syllabus revision carried out in the academic year 2018-19 = (2/30)*100	6.60%

Program Coordinator

Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172EM1T01	Digital System Design	4	---	3
172EM1T02	Embedded System Design	4	---	3
172EM1T03	Real Time Operating Systems	4	---	3
172EM1T04	Embedded - C	4	---	3
Elective – I				
172EM1E01	Cyber Security	4	---	3
172EM1E02	Sensors and Actuators			
172CO1E02	Advanced Operating Systems			
172EM1E03	Soft Computing Techniques			
Elective – II				
172EM1E04	Embedded Computing	4	---	3
172EM1E05	Device Drivers			
172EM1E06	Network Security & Cryptography			
172EM1E07	Advanced Computer Architecture			
172EM1L01	Embedded Systems Lab	---	3	2
			TOTAL	20

II SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172EM2T05	Hardware Software Co - Design	4	---	3
172EM2T06	DSP Processors & Architectures	4	---	3
172EM2T07	Embedded Networking	4	---	3
172EM2T08	CPLD / FPGA Architectures & Applications	4	---	3
Elective – III				
172EM2E08	System on Chip Design	4	---	3
172VD2T04	CMOS Mixed Signal Circuit Design			
172EM2E09	MEMS Design			
172EM2E10	Internet Protocols			
Elective – IV				
172VD2T07	Design For Testability	4	---	3
172EM2E11	Wireless LANs and PANs			
172EM2E12	Multimedia & Signal Coding			
172EM2L02	Embedded Real Time Systems Lab	---	3	2
			TOTAL	20

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III Semester

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172EM3C01	Comprehensive Viva-Voce	---	---	2
172EM3R01	Seminar - I	---	---	2
---	Project Work Part - I	---	---	16
			TOTAL	20

IV Semester

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172EM4R02	Seminar - II	---	---	2
172EM4P01	Project Work Part- - II	---	---	18
			TOTAL	20

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SENSORS AND ACTUATORS
(Elective-I)

I Semester	L	P	C
Course Code: 172EM1E02	4	0	3

Course Objectives:

COB 1: To make students to understand basic laws and phenomena for operation of Sensors and Actuators.

COB 2: To impart the knowledge on analysis, design and development solutions for sensors and actuators.

COB 3: To enable the students to classify various thermal, radiation and smart sensors available.

COB 4: To impart the knowledge on various control values of actuators

COB 5: To make the students to understand implementation of various Actuators

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Classify various sensors/transducers based on their applications.

CO 2: Dissect various types of Resistive, Inductive and Capacitive Sensors.

CO 3: Analyze various approaches, procedures and results related to Thermal and Magnetic sensors.

CO 4: Examine the radiation sensors based on their characteristics.

CO 5: Apply Smart Sensors in the field of Communication, Automation and Manufacturing.

CO6: Perceive various control values and types of actuators.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K2)	-	-	-	2	2	1	-	-	-	-	-
CO 2(K4)	2	3	-	3	3	3	-	-	3	-	3
CO 3(K4)	2	3	2	3	3	1	-	-	3	-	3
CO 4(K4)	2	3	2	3	3	-	2	-	3	-	3
CO 5(K3)	1	3	1	3	3	2	-	-	3	-	2
CO 6(K5)	3	3	-	3	3	3	-	-	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K2)	2	-	-
CO 2(K4)	3	-	-
CO 3(K4)	3	-	1
CO 4(K4)	3	-	1
CO 5(K3)	3	2	-
CO 6(K5)	3	-	3

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List of Experiments:

1. LED Blinking.
2. ASCII to Decimal vice versa conversion.
3. Basic Arithmetic operations.
4. PWM (Motor application).
5. Serial Communication (USART).
6. ADC and DAC implementation.
7. JTAG Debugger.
8. Seven segment display interfacing.
9. LCD display interfacing.
10. 3x4 keyboard interfacing.
11. Encryption and decryption of serial communication of characters (data) from the system to PC RS232C COM port
12. CAN Controlled Traffic Lights

Lab Requirements:

Software:

1. Keil Micro-vision IDE or Eclipse IDE for C and C++ (YAGARTO Eclipse IDE)
2. LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

The development kits of 8051/PIC Micro controllers or any ARM processor.

Reference Books:

1. Embedded C, Michael J. Pont, Pearson Education, 2nd Edition, 2008.
2. Embedded C Programming: Techniques and Applications of C and PIC MCUS , Newnes; 1 edition (October 3, 2014).

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UNIT-I

Sensors / Transducers:

Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization, Mechanical and Electromechanical Sensors, Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges, Inductive Sensors, Sensitivity and Linearity of the Sensor, Types, Capacitive Sensors, Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.

UNIT-II

Thermal Sensors:

Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor, Dielectric Constant and Refractive Index thermo sensors, Helium Low Temperature Thermometer, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors.

Magnetic sensors:

Introduction, Sensors and the Principles Behind, Magneto, resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros, Synchro, resolvers, Eddy Current Sensors, Electromagnetic Flow meter, Switching Magnetic Sensors SQUID Sensors.

UNIT-III

Radiation Sensors:

Introduction, Basic Characteristics, Types of Photo sensistors/Photo detectors, X-ray and Nuclear Radiation Sensors, Fiber Optic Sensors. Electro analytical Sensors: Introduction, The Electrochemical Cell, The Cell Potential, Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

UNIT-IV

Smart Sensors:

Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation Sensors.

Applications:

Introduction, On, board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors,, Sensors for Manufacturing, Sensors for environmental Monitoring.

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UNIT-V

Actuators Pneumatic and Hydraulic Actuation Systems:

Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Process control valves, Rotary actuators Mechanical Actuation Systems, Types of motion, Kinematic chains, Cams, Gears, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid, state switches Solenoids, D.C. Motors, A.C. motors, Stepper motors.

Text Books:

1. Sensors and Transducers, D. Patranabis, PHI Learning Private Limited.
2. Mechatronics, W. Bolton, Pearson Education Limited.

Reference Books:

1. Sensors And Actruators, D. Patranabis, PHI, 2nd Edition, 2013.
2. Transducers and Instrumentation, D.V.S. Murty, PHI Learning Private Limited.

Web Links:

1. http://www.es.ele.tue.nl/education/SensorsActuators/
2. http://depts.washington.edu/mictech/optics/sensors/index.html
3. http://www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/More%20on%20 Transducers%20Sensors%20and%20Actuators.pdf
4. http://www.kau.edu.sa/Files/0003605/Files/92058_Sensors- Transducers%20and%20Actuators.pdf

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DEVICE DRIVERS
(Elective-II)

I Semester	L	P	C
Course Code: 172EM1E05	4	0	3

Course Objectives:

- COB 1: To prepare the students towards learning the architecture and systematic approach of Linux device driver model.
- COB 2: To motivate the students to develop several device drivers in Linux kernel.
- COB 3: To make the students to interface the driver with the Linux kernel.
- COB4: To impart the knowledge to characterize the drivers as Character drivers, Block drivers, Network drivers and Bus drivers.
- COB5: To facilitate the students to write any driver in the recent trends of driver development.

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Translate the Virtual Character device driver and block drivers using Linux.
- CO 2: Construct the substantial code from scratch till developing an application.
- CO 3: Interpret the device driver and debug the Linux kernel in the grub.
- CO 4: Analyze the Linux device driver and kernel subsystem.
- CO 5: Make use of the data for different drivers & subsystems in the Linux kernal.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1(K2)	-	-	-	2	-	-	-	3	-	-	-
CO2(K3)	1	2	1	3	-	2	-	-	-	3	2
CO3(K5)	-	-	3	-	-	-	2	-	-	-	-
CO4(K4)	2	-	2	-	3	-	1	-	-	-	3
CO5(K3)	1	2	1	3	-	2	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO1 (K2)	2	1	-
CO2 (K3)	3	2	-
CO3 (K5)	-	3	2
CO4 (K4)	3	3	1
CO5 (K3)	3	2	-

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UNIT-I

An Introduction to Device Drivers:

The Role of the Device Driver, Splitting the Kernel, Classes of Devices and Modules, Security Issues.

Building and Running Modules:

Setting Up Your Test System, The Hello World Module, Kernel Modules Versus Applications, Compiling and Loading, The Kernel Symbol Table, Preliminaries, Initialization and Shutdown, Module Parameters, Doing It in User Space.

Char Drivers:

The Design of scull, Major and Minor Numbers, Some Important Data Structures, Char Device Registration, open and release, scull's Memory Usage, read and write, Playing with the New Devices.

UNIT-II

Debugging Techniques:

Debugging Support in the Kernel, Debugging by Printing, Debugging by Querying, Debugging by Watching, Debugging System Faults, Debuggers and Related Tools.

Concurrency and Race Conditions:

Pitfalls in scull, Concurrency and Its Management, Semaphores and Mutexes, Completions, Spinlocks, Locking Traps, Alternatives to Locking.

Advanced Char Driver Operations:

ioctl, Blocking I/O, poll and select, Asynchronous Notification, Seeking a Device, Access Control on a Device File.

UNIT–III

Time, Delays, and Deferred Work:

Measuring Time Lapses, Knowing the Current Time, Delaying Execution, Kernel Timers, Tasklets, Workqueues.

Allocating Memory:

The Real Story of kmalloc, Lookaside Caches, get_free_page and Friends, vmalloc and Friends, Per-CPU Variables, Obtaining Large Buffers.

Communicating with Hardware:

I/O Ports and I/O Memory, Using I/O Ports, An I/O Port Example, Using I/O Memory.

Interrupt Handling:

Preparing the Parallel Port, Installing an Interrupt Handler, Implementing a Handler, Top and Bottom Halves, Interrupt Sharing, Interrupt-Driven I/O

UNIT-IV

The Linux Device Model:

Kobjects, Ksets and Subsystems, Low-Level Sysfs Operations, Hotplug Event Generation, Buses, Devices, and Drivers, Classes, Putting It All Together, Hotplug, Dealing with Firmware.

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Memory Mapping and DMA:
Memory Management in Linux, The mmap Device Operation, Performing Direct I/O, Direct Memory Access.

USB Drivers:
USB Device Basics, USB and Sysfs, USB Urbs, Writing a USB Driver, USB Transfers Without Urbs.

UNIT-V

Block Drivers:
Registration, The Block Device Operations, Request Processing.

Network Drivers:
How snull Is Designed, Connecting to the Kernel, The net device Structure in Detail, Opening and Closing, Packet Transmission, Packet Reception, The Interrupt Handler, Receive Interrupt Mitigation, Changes in Link State, The Socket Buffers, MAC Address Resolution, Custom ioctl Commands, Statistical Information, Multicast.

TTY Drivers:
A Small TTY Driver, tty_driver Function Pointers, TTY Line Settings, ioctls,,proc and sysfs Handling of TTY Devices, The tty_driver Structure in Detail, The tty_operations Structure in Detail, The tty_struct Structure in Detail

Text Books:

1. Linux Device Drivers, Third Edition by Jonathan Corbet, Alessandro Rubini, and Greg Kroah, Hartman, O'Reilly Publishers.
2. Easy Linux Device Driver, Second Edition: First Step Towards Device Driver Programmingby Mahesh S. Jadhav

Reference Books:

1. Essential Linux Device Drivers by Sreekrishnan Venkateswaran, Prentice Hall publishers.
2. Professional Linux® Kernel Architecture, Wolfgang Mauerer, Wiley Publishers.
3. Beginning Linux Programming, Richard Stones Neil Matthew, 4th Edition.
4. Essential Linux Device Drivers, Sreekrishnan Venkateswaram.

Web Links:

1. https://www.safaribooksonline.com/library/view/linux-device-drivers/.../ch01.html
2. opensourceforu.com/2014/10/an-introduction-to-device-drivers-in-the-linux-kernel/
3. opensourceforu.com/2010/12/writing-your-first-linux-driver/
4. freesoftwaremagazine.com/articles/drivers_linux/
5. www.tldp.org/LDP/tlk/dd/drivers.html

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Head of the Department
Department of E.C.E.
Aditya Engineering College (A9)

18-19

SENSORS AND ACTUATORS
(Elective-I)

I Semester	L	P	C
Course Code: 172EM1E02	4	0	3

Course Objectives:

- COB 1: To make students to understand basic laws and phenomena for operation of Sensors and Actuators.
- COB 2: To impart the knowledge on analysis, design and development solutions for sensors and actuators.
- COB 3: To enable the students to classify various thermal, radiation and smart sensors available.
- COB 4: To impart the knowledge on various control values of actuators
- COB 5: To make the students to understand implementation of various Actuators

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Classify various sensors/transducers based on their applications.
- CO 2: Dissect various types of Resistive, Inductive and Capacitive Sensors.
- CO 3: Analyze various approaches, procedures and results related to Thermal and Magnetic sensors.
- CO 4: Examine the radiation sensors based on their characteristics.
- CO 5: Apply Smart Sensors in the field of Communication, Automation and Manufacturing.
- CO6: Perceive various control values and types of actuators.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO 1(K2)	-	-	-	2	2	1	-	-	-	-	-
CO 2(K4)	2	3	-	3	3	3	-	-	3	-	3
CO 3(K4)	2	3	2	3	3	1	-	-	3	-	3
CO 4(K4)	2	3	2	3	3	-	2	-	3	-	3
CO 5(K3)	1	3	1	3	3	2	-	-	3	-	2
CO 6(K5)	3	3	-	3	3	3	-	-	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO 1(K2)	2	-	-
CO 2(K4)	3	-	-
CO 3(K4)	3	-	1
CO 4(K4)	3	-	1
CO 5(K3)	3	2	-
CO 6(K5)	3	-	3

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UNIT-I

Sensors / Transducers:

Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization, Mechanical and Electromechanical Sensors, Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges, Inductive Sensors, Sensitivity and Linearity of the Sensor, Types, Capacitive Sensors, Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.

UNIT-II

Thermal Sensors:

Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor, Dielectric Constant and Refractive Index thermo sensors, Helium Low Temperature Thermometer, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors.

Magnetic sensors:

Introduction, Sensors and the Principles Behind, Magneto, resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros, Synchro, resolvers, Eddy Current Sensors, Electromagnetic Flow meter, Switching Magnetic Sensors SQUID Sensors.

UNIT-III

Radiation Sensors:

Introduction, Basic Characteristics, Types of Photo sensistors/Photo detectors, X-ray and Nuclear Radiation Sensors, Fiber Optic Sensors. Electro analytical Sensors: Introduction, The Electrochemical Cell, The Cell Potential, Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

UNIT-IV

Smart Sensors:

Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation Sensors.

Applications:

Introduction, On, board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors,, Sensors for Manufacturing, Sensors for environmental Monitoring.

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UNIT-V

Actuators Pneumatic and Hydraulic Actuation Systems:

Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Process control valves, Rotary actuators Mechanical Actuation Systems, Types of motion, Kinematic chains, Cams, Gears, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid, state switches Solenoids, D.C. Motors, A.C. motors, Stepper motors.

Text Books:

1. Sensors and Transducers, D. Patranabis, PHI Learning Private Limited.
2. Mechatronics, W. Bolton, Pearson Education Limited.

Reference Books:

1. Sensors And Actruators, D. Patranabis, PHI, 2nd Edition, 2013.
2. Transducers and Instrumentation, D.V.S. Murty, PHI Learning Private Limited.

Web Links:

1. http://www.es.ele.tue.nl/education/SensorsActuators/
2. http://depts.washington.edu/mictech/optics/sensors/index.html
3. http://www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/More%20on%20 Transducers%20Sensors%20and%20Actuators.pdf
4. http://www.kau.edu.sa/Files/0003605/Files/92058_Sensors-Transducers%20and%20Actuators.pdf

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G. Seidrod

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DEVICE DRIVERS
(Elective-II)

I Semester L P C

Course Code: 172EM1E05 4 0 3

Course Objectives:

COB 1: To prepare the students towards learning the architecture and systematic approach of Linux device driver model.

COB 2: To motivate the students to develop several device drivers in Linux kernel.

COB 3: To make the students to interface the driver with the Linux kernel.

COB4: To impart the knowledge to characterize the drivers as Character drivers, Block drivers, Network drivers and Bus drivers.

COB5: To facilitate the students to write any driver in the recent trends of driver development.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Translate the Virtual Character device driver and block drivers using Linux.

CO 2: Construct the substantial code from scratch till developing an application.

CO 3: Interpret the device driver and debug the Linux kernel in the grub.

CO 4: Analyze the Linux device driver and kernel subsystem.

CO 5: Make use of the data for different drivers & subsystems in the Linux kernal.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1(K2)	-	-	-	2	-	-	-	3	-	-	-
CO2(K3)	1	2	1	3	-	2	-	-	-	3	2
CO3(K5)	-	-	3	-	-	-	2	-	-	-	-
CO4(K4)	2	-	2	-	3	-	1	-	-	-	3
CO5(K3)	1	2	1	3	-	2	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K4)	PSO 3 (K6)
CO1 (K2)	2	1	-
CO2 (K3)	3	2	-
CO3 (K5)	-	3	2
CO4 (K4)	3	3	1
CO5 (K3)	3	2	-

G. Quidross

UNIT-I

An Introduction to Device Drivers:

The Role of the Device Driver, Splitting the Kernel, Classes of Devices and Modules, Security Issues.

Building and Running Modules:

Setting Up Your Test System, The Hello World Module, Kernel Modules Versus Applications, Compiling and Loading, The Kernel Symbol Table, Preliminaries, Initialization and Shutdown, Module Parameters, Doing It in User Space.

Char Drivers:

The Design of scull, Major and Minor Numbers, Some Important Data Structures, Char Device Registration, open and release, scull's Memory Usage, read and write, Playing with the New Devices.

UNIT-II

Debugging Techniques:

Debugging Support in the Kernel, Debugging by Printing, Debugging by Querying, Debugging by Watching, Debugging System Faults, Debuggers and Related Tools.

Concurrency and Race Conditions:

Pitfalls in scull, Concurrency and Its Management, Semaphores and Mutexes, Completions, Spinlocks, Locking Traps, Alternatives to Locking.

Advanced Char Driver Operations:

ioctl, Blocking I/O, poll and select, Asynchronous Notification, Seeking a Device, Access Control on a Device File.

UNIT–III

Time, Delays, and Deferred Work:

Measuring Time Lapses, Knowing the Current Time, Delaying Execution, Kernel Timers, Tasklets, Workqueues.

Allocating Memory:

The Real Story of kmalloc, Lookaside Caches, get_free_page and Friends, vmalloc and Friends, Per-CPU Variables, Obtaining Large Buffers.

Communicating with Hardware:

I/O Ports and I/O Memory, Using I/O Ports, An I/O Port Example, Using I/O Memory.

Interrupt Handling:

Preparing the Parallel Port, Installing an Interrupt Handler, Implementing a Handler, Top and Bottom Halves, Interrupt Sharing, Interrupt-Driven I/O

UNIT-IV

The Linux Device Model:

Kobjects, Ksets and Subsystems, Low-Level Sysfs Operations, Hotplug Event Generation, Buses, Devices, and Drivers, Classes, Putting It All Together, Hotplug, Dealing with Firmware.

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Memory Mapping and DMA:
Memory Management in Linux, The mmap Device Operation, Performing Direct I/O, Direct Memory Access.

USB Drivers:
USB Device Basics, USB and Sysfs, USB Urbs, Writing a USB Driver, USB Transfers Without Urbs.

UNIT-V

Block Drivers:
Registration, The Block Device Operations, Request Processing.

Network Drivers:
How snull Is Designed, Connecting to the Kernel, The net device Structure in Detail, Opening and Closing, Packet Transmission, Packet Reception, The Interrupt Handler, Receive Interrupt Mitigation, Changes in Link State, The Socket Buffers, MAC Address Resolution, Custom ioctl Commands, Statistical Information, Multicast.

TTY Drivers:
A Small TTY Driver, tty_driver Function Pointers, TTY Line Settings, ioctls,,proc and sysfs Handling of TTY Devices, The tty_driver Structure in Detail, The tty_operations Structure in Detail, The tty_struct Structure in Detail

Text Books:

1. Linux Device Drivers, Third Edition by Jonathan Corbet, Alessandro Rubini, and Greg Kroah, Hartman, O'Reilly Publishers.
2. Easy Linux Device Driver, Second Edition: First Step Towards Device Driver Programmingby Mahesh S. Jadhav

Reference Books:

1. Essential Linux Device Drivers by Sreekrishnan Venkateswaran, Prentice Hall publishers.
2. Professional Linux® Kernel Architecture, Wolfgang Mauerer, Wiley Publishers.
3. Beginning Linux Programming, Richard Stones Neil Matthew, 4th Edition.
4. Essential Linux Device Drivers, Sreekrishnan Venkateswaram.

Web Links:

1. https://www.safaribooksonline.com/library/view/linux-device-drivers/.../ch01.html
2. opensourceforu.com/2014/10/an-introduction-to-device-drivers-in-the-linux-kernel/
3. opensourceforu.com/2010/12/writing-your-first-linux-driver/
4. freesoftwaremagazine.com/articles/drivers_linux/
5. www.tldp.org/LDP/tlk/dd/drivers.html

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G. Saidas

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Department of Electronics and communication Engineering

Syllabus revision Index (E.S.)

2018-19

S.No	Name of the course	Percentage of syllabus change
1	Sensorsandactuators	20
2	Devicedrivers	20

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Department of Electronics and communication Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Sensors and actuators	Sensors and actuators
Course Code	172EM1E02	172EM1E02
Syllabus	**UNIT-I:** **Sensors / Transducers:** Principles – Classification – Parameters – Characteristics - Environmental Parameters (EP) – Characterization. **Mechanical and Electromechanical Sensors:** Introduction – Resistive Potentiometer – Strain Gauge – Resistance Strain Gauge – Semiconductor Strain Gauges - Inductive Sensors: Sensitivity and Linearity of the Sensor –Types- Capacitive Sensors:– Electrostatic Transducer– Force/Stress Sensors Using Quartz Resonators – Ultrasonic Sensor	**UNIT-I** **Sensors / Transducers:** Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization, Mechanical and Electromechanical Sensors, Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges, Inductive Sensors, Sensitivity and Linearity of the Sensor, Types, Capacitive Sensors, Electrostatic Transducer,
	UNIT-II: **Thermal Sensors:** Introduction – Gas thermometric Sensors – Thermal Expansion Type Thermometric Sensors – Acoustic Temperature Sensor – Dielectric Constant and Refractive Index thermosensors – Helium Low Temperature Thermometer – Nuclear Thermometer – Magnetic Thermometer – Resistance Change Type Thermometric Sensors – Thermoemf Sensors– Junction Semiconductor Types– Thermal Radiation Sensors – Quartz Crystal	**UNIT-II** **Thermal Sensors:** Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor, Dielectric Constant and Refractive Index thermo sensors, Helium Low Temperature Thermometer, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, **Magnetic sensors:** Introduction, Sensors and the Principles Behind, Magneto, resistive Sensors,

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	Thermoelectric Sensors – NQR Thermometry – Spectroscopic Thermometry – Noise Thermometry – Heat Flux Sensors **Magnetic sensors:** Introduction – Sensors and the Principles Behind – Magneto-resistive Sensors – Anisotropic Magnetoresistive Sensing – Semiconductor Magnetoresistors– Hall Effect and Sensors – Inductance and Eddy Current Sensors– Angular/Rotary Movement Transducers – Synchros – Synchro-resolvers - Eddy Current Sensors – Electromagnetic Flowmeter – Switching Magnetic Sensors SQUID Sensors	Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Switching Magnetic Sensors SQUID Sensors.
	UNIT-III: **Radiation Sensors:** Introduction – Basic Characteristics – Types of Photosensistors/Photo detectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors. **Electro analytical Sensors:** Introduction – The Electrochemical Cell – The Cell Potential - Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials – Polarization – Concentration Polarization–- Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media	**UNIT-III** **Position, distance, direction and motion sensors:** position sensing, direction sensing, distance measurement- large scale, distance travelled, accelerometer systems, rotation measurement
	UNIT - IV: **Smart Sensors:** Introduction – Primary Sensors – Excitation – Amplification – Filters – Converters – Compensation– Information Coding/Processing - Data Communication – Standards for Smart Sensor Interface – The Automation **Sensors-Applications:** Introduction – On-board Automobile Sensors (Automotive Sensors)– Home Appliance Sensors – Aerospace	**UNIT-IV** **Smart Sensors:** Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation Sensors. **Applications:** Introduction, On, board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors,,

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	Sensors — Sensors for Manufacturing –Sensors for environmental Monitoring	Sensors for Manufacturing, Sensors for environmental Monitoring.
	UNIT-V: Actuators Pneumatic and Hydraulic Actuation Systems- Actuation systems – Pneumatic and hydraulic systems - Directional Control valves – Presure control valves – Cylinders - Servo and proportional control valves – Process control valves – Rotary actuators Mechanical Actuation Systems- Types of motion – Kinematic chains – Cams – Gears – Ratchet and pawl – Belt and chain drives – Bearings – Mechanical aspects of motor selection Electrical Actuation Systems-Electrical systems -Mechanical switches – Solid-state switches Solenoids – D.C. Motors – A.C. motors – Stepper motors	**UNIT-V** **Actuators** Pneumatic and Hydraulic Actuation Systems: Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Mechanical aspects of motor selection Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid, state switches Solenoids, D.C. Motors, A.C. motors, Stepper motors

Signature of the course coordinator

Signature of the HOD

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Department of Electronics and communication Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Device Drivers**	**Device Drivers**
Course Code	172EM2E10	172EM2E10
syllabus	**UNIT-I** **An Introduction to Device Drivers:** The Role of the Device Driver, Splitting the Kernel, Classes of Devices and Modules, Security Issues. **Building and Running Modules:** Setting Up Your Test System, The Hello World Module, Kernel Modules Versus Applications, Compiling and Loading, The Kernel Symbol Table, Preliminaries, Initialization and Shutdown, Module Parameters, Doing It in User Space. **Char Drivers:** The Design of scull, Major and Minor Numbers, Some Important Data Structures, Char Device Registration, open and release, scull's Memory Usage, read and write, Playing with the New Devices.	**UNIT-I** **An Introduction to Device Drivers:** The Role of the Device Driver, Splitting the Kernel, Classes of Devices and Modules, Security Issues. **Building and Running Modules:** Setting Up Your Test System, The Hello World Module, Kernel Modules Versus Applications, Compiling and Loading, The Kernel Symbol Table, Preliminaries, Initialization and Shutdown, Module Parameters, Doing It in User Space. **Char Drivers:** The Design of scull, Major and Minor Numbers, Some Important Data Structures, Char Device Registration, open and release.
	UNIT-II **Debugging Techniques:** Debugging Support in the Kernel, Debugging by Printing, Debugging by Querying, Debugging by Watching, Debugging System Faults, Debuggers and Related Tools. **Concurrency and Race Conditions:** Pitfalls in scull, Concurrency and Its Management, Semaphores and Mutexes, Completions, Spinlocks, Locking Traps, Alternatives to Locking. **Advanced Char Driver Operations:** ioctl, Blocking I/O, poll and select, Asynchronous Notification, Seeking a	**UNIT-II** **Debugging Techniques:** Debugging Support in the Kernel, Debugging by Printing, Debugging by Querying, Debugging by Watching, Debugging System Faults, Debuggers and Related Tools. **Concurrency and Race Conditions:** Pitfalls in scull, Concurrency and Its Management, Semaphores and Mutexes, Completions, Spinlocks, Locking Traps, Alternatives to Locking. **Advanced Char Driver Operations:** ioctl, Blocking I/O, poll and select, Asynchronous Notification, Seeking a Device, Access Control on a Device

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	Device, Access Control on a Device File.	File.
	UNIT–III **Time, Delays, and Deferred Work:** Measuring Time Lapses, Knowing the Current Time, Delaying Execution, Kernel Timers, Tasklets, Workqueues. **Allocating Memory:** The Real Story of kmalloc, Lookaside Caches, get_free_page and Friends, vmalloc and Friends, Per-CPU Variables, Obtaining Large Buffers. **Communicating with Hardware:** I/O Ports and I/O Memory, Using I/O Ports, An I/O Port Example, Using I/O Memory. **Interrupt Handling:** Preparing the Parallel Port, Installing an Interrupt Handler, Implementing a Handler, Top and Bottom Halves, Interrupt Sharing, Interrupt-Driven I/O	**UNIT–III** **Time, Delays, and Deferred Work:** Measuring Time Lapses, Knowing the Current Time, Delaying Execution, Kernel Timers, Tasklets, Workqueues. **Allocating Memory:** The Real Story of kmalloc, Lookaside Caches, get_free_page and Friends, vmalloc and Friends, Per-CPU Variables, Obtaining Large Buffers.
	UNIT-IV **The Linux Device Model:** Kobjects, Ksets and Subsystems, Low-Level Sysfs Operations, Hotplug Event Generation, Buses, Devices, and Drivers, Classes, Putting It All Together, Hotplug, Dealing with Firmware. **Memory Mapping and DMA:** Memory Management in Linux, The mmap Device Operation, Performing Direct I/O, Direct Memory Access. **USB Drivers:** USB Device Basics, USB and Sysfs, USB Urbs, Writing a USB Driver, USB Transfers Without Urbs.	**Unit-IV** **Communicating with Hardware:** I/O Ports and I/O Memory, Using I/O Ports, An I/O Port Example, Using I/O Memory. **Interrupt Handling:** Preparing the Parallel Port, Installing an Interrupt Handler, Implementing a Handler, Top and Bottom Halves, Interrupt Sharing, Interrupt-Driven I/O
	UNIT-V **Block Drivers:** Registration, The Block Device Operations, Request Processing. **Network Drivers:** How snull Is Designed, Connecting to the Kernel, The net device Structure in Detail, Opening and Closing, Packet Transmission, Packet Reception, The Interrupt Handler, Receive Interrupt Mitigation, Changes in Link State, The Socket Buffers, MAC Address	**UNIT-V** **The Linux Device Model:** Kobjects, Ksets and Subsystems, Low-Level Sysfs Operations, Hotplug Event Generation, Buses, Devices, and Drivers, Classes, Putting It All Together, Hotplug, Dealing with Firmware. **Memory Mapping and DMA:** Memory Management in Linux, The mmap Device Operation, Performing Direct I/O, Direct Memory Access.

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	Resolution, Custom ioctl Commands, Statistical Information, Multicast. **TTY Drivers:** A Small TTY Driver, tty_driver Function Pointers, TTY Line Settings, ioctls,,proc and sysfs Handling of TTY Devices, The tty_driver Structure in Detail, The tty_operations Structure in Detail, The tty_struct Structure in Detail	**USB Drivers:** USB Device Basics, USB and Sysfs, USB Urbs, Writing a USB Driver, USB Transfers Without Urbs.

Signature of the course coordinator

Signature of the HOD

Head of the Department
Department of E.C.E.
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Program Name : M.Tech. in Computer Science and Engineering

Syllabus Revision for the Academic Year 2018-2019				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	172CO1T01	Advanced Data Structures & Algorithm Analysis	0
2	I	172CO1T02	Database Management System	0
3	I	172CO1T03	Computer Organization & Architecture	0
4	I	172CO1T04	Mathematical Foundations of Computer Science	0
5	I	172CO1T05	Computer Networks	0
6	I	172CO1E01	Software Engineering	0
7	I	172CO1E02	Advanced Operating Systems	20
8	I	172CO1E03	Compiler Design	0
9	I	172CO1E04	Human Computer Interaction	0
10	I	172CO1L01	Advanced Data Structures & Database Management Systems Lab	0
11	II	172CO2T06	Cyber Security	0
12	II	172CO2T07	Data Ware Housing & Data Mining	0
13	II	172CO2T08	Big Data Analytics	0
14	II	172CO2T09	Advanced Unix Programming	0
15	II	172CO2E05	Machine Learning	0
16	II	172CO2E06	Digital Image Processing	20
17	II	172CO2E07	Mobile Computing	0
18	II	172CO2E08	Cloud Computing	0
19	II	172CO2E09	Internet of Things	0
20	II	172CO2E10	Bio Informatics	0
21	II	172CO2L02	Advanced Unix Programming and Hadoop & Bigdata Lab	0
22	III	172CO3C01	Comprehensive Viva-Voce	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
23	III	172CO3R01	Seminar - I	0
24	IV	172CO4R02	Seminar - II	0
25	IV	172C04P01	Project Work Part- - II	0

Total number of courses in the academic year 2018-2019	= 25
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 2
Percentage of syllabus revision carried out in the academic year 2018-2019 = (2/25)*100	= 8%

Program Coordinator

Head of the Department

Head of the Department
Department of CSE
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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture (L)	Practice (P)	
172CO1T01	Advanced Data Structures & Algorithm Analysis	4	---	3
172CO1T02	Database Management System	4	---	3
172CO1T03	Computer Organization & Architecture	4	---	3
172CO1T04	Mathematical Foundations Of Computer Science	4	---	3
172CO1T05	Computer Networks	4	---	3
Elective – I				
172CO1E01	Software Engineering	4	---	3
172CO1E02	Advanced Operating Systems			
172CO1E03	Compiler Design			
172CO1E04	Human Computer Interaction			
172CO1L01	Advanced Data Structures & Database Management Systems Lab	---	3	2
	TOTAL	24	3	20

II SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture (L)	Practice (P)	
172CO2T06	Cyber Security	4	---	3
172CO2T07	Data Ware Housing & Data Mining	4	---	3
172CO2T08	Big Data Analytics	4	---	3
172CO2T09	Advanced Unix Programming	4	---	3
Elective – II				
172CO2E05	Machine Learning	4	---	3
172CO2E06	Digital Image Processing			
172CO2E07	Mobile Computing			
Elective – III				
172CO2E08	Cloud Computing	4	---	3
172CO2E09	Internet of Things			
172CO2E10	Bio Informatics			
172CO2L02	Advaned Unix Programming and Hadoop & Bigdata Lab	---	3	2
	TOTAL	24	3	20

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III SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture (L)	Practice (P)	
172CO3C01	Comprehensive Viva-Voce	---	---	2
172CO3R01	Seminar - I	---	---	2
---	Project Work Part – I	---	---	16
			TOTAL	20

IV SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture (L)	Practice (P)	
172CO4R02	Seminar - II	---	---	2
172C04P01	Project Work Part- - II	---	---	18
Total :				20

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Department of Computer Science and Engineering

Syllabus revision Index 2018-2019

S.No	Name of the course	Percentage of syllabus change
1	Advanced Operating Systems	20%
2	Digital Image Processing	20%

Program Coordinator

Head of the Department

Head of the Department
Department of CSE
ADITYA ENGINEERING COLLEGE (A9

ADVANCED OPERATING SYSTEMS
(Elective---1)

I Semester
Course Code: 172CO1E02

L	P	C
4	0	3

Course Objectives:

COB 1: To make the students to learn the fundamentals of distributed systems and architecture details.
COB 2: To create awareness distributed deadlock handling mechanisms and agreement protocols
COB 3: To demonstrate load management and failure recovery in distributed environment.
COB 4: To enable the students to understand various security mechanisms adopted in advanced operating systems.
COB 5: To illustrate the concepts of Multiprocessor operating systems and distributed operating systems.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Demonstrate basics of advanced operating system.
CO 2: Categorize deadlock detection algorithms in distributed environment.
CO 3: Apply agreement protocols to solve agreement problems
CO 4: Choose best load balancing techniques and failure recovery methods.
CO 5: Make use of protection and security mechanisms in distributed systems.
CO 6: Interpret multiprocessor systems and database operating systems

Mapping of Course Outcomes with Program Outcomes

CO/ PO	PO1 (K5)	PO2 (K4)	PO3 (K5)	PO4 (K3)	PO5 (K3)	PO6 (K4)	PO7 (K6)	PO8 (K2)	PO9 (K2)	PO10 (K2)	PO11 (K4)
CO1(K2)	-	1	-	2	2	-	-	-	-	-	-
CO2(K4)	2	3	2	3	3	-	-	3	3	-	-
CO3(K3)	2	2	1	3	3	-	-	-	3	-	-
CO4(K3)	2	2	1	3	3	-	-	-	-	-	-
CO5(K3)	2	2	1	3	3	-	-	-	-	-	-
CO6(K2)	---	1	---	2	2	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K4)	PSO 2(K4)
CO1(K2)	1	1
CO2(K4)	3	3
CO3(K3)	2	2
CO4(K3)	2	2
CO5(K3)	2	2
CO6(K2)	1	1

UNIT-I:

Architectures of Distributed Systems

System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages -

global state - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms.

UNIT-II:

Distributed Deadlock Detection –Strategies and Protocols

Deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system mode, A classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues.

UNIT –III:

Distributed Shared Memory-Concepts

Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery.

UNIT-IV:

Protection and Security –Preliminaries

Access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems.

UNIT-V:

Multiprocessor Operating Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

Text Books:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001.
2. Andrew S. Tanenbaum, "Distributed operating system", Pearson education, 2003.

Reference Books:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003.
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.

Web Links:

1. http://www.cs.iit.edu/~sun/cs550.html
2. https://in.udacity.com/course/advanced-operating-systems--ud189
3. http://nptel.ac.in/courses/106108101/
4. http://www.cs.iit.edu/~iraicu/teaching/CS550-S11/index.html
5. https://courses.soe.ucsc.edu/courses/cmps221/

Head of the Department
Department of CSE
ADITYA ENGINEERING COLLEGE (A)

DIGITAL IMAGE PROCESSING
(Elective – II)

I Year- II Semester L P C
Course Code: 172CO2E06 4 0 3

Course Objectives

COB 1: To teach the basic concepts of computer graphics.
COB 2: To impart the knowledge of different line and circle generation algorithms.
COB 3: To make the students to learn the fundamentals of digital image processing.
COB 4: To impart the knowledge of fundamental image processing and image analysis techniques.
COB 5: To create awareness to design and implement algorithms that perform basic image processing.
COB 6: To enable the students to understand various applications of image processing in industry, medicine and defense.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Demonstrate the applications of computer graphics.
CO 2: Apply line and circle generation algorithms to create complex graphical structures.
CO 3: Illustrate the basic properties of digital images.
CO 4: Apply morphological image processing operations to process an image.
CO 5: Interpret an image using different segmentation techniques.
CO 6: Make use of different types of compression techniques in image data compression.

Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1 (K2)	-	1	-	2	2	1	-	-	3	3	-
CO2 (K3)	1	2	1	3	3	2	-	-	3	3	-
CO3 (K2)	-	1	-	2	2	1	-	-	3	3	-
CO4 (K3)	1	2	1	3	3	2	-	-	3	3	-
CO5 (K3)	1	2	1	3	3	2	-	-	3	3	-
CO6 (K3)	1	2	1	3	3	2	-	-	3	3	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K4)	PSO 2 (K4)
CO1 (K2)	1	1
CO2 (K3)	2	2
CO3 (K2)	1	1
CO4 (K3)	2	2
CO5 (K3)	2	2
CO6 (K3)	2	2

UNIT I:
Introduction:
Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems.
DDA line algorithms:
Bresenhams line and circle derivations and algorithms.

UNIT II:

2-D Transformations:

Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates,

Composite Transformations-

Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen-Sutherland clipping algorithm.

UNIT III:

Digital Image Properties:

Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy.

Color Images:

Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

UNIT IV:

Mathematical Morphology:

Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation.

UNIT V:

SEGMENTATION:

Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation.

Image Data Compression:

Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:

1. Computer Graphics C Version, Donald Hearn, M Pauline Baker , Pearson (Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclov Hlavoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V)

Reference Books:

1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed.
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Si

Web Links:

1. http://nptel.ac.in/courses/117105079/
2. http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur
3. https://www.cs.nmt.edu/~ip/lectures.html
4. https://www.robotix.in/tutorial/imageprocessing/basicIp/
5. http://nptel.ac.in/courses/117105135/

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Department of Computer Science and Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Advanced Operating Systems	Advanced Operating Systems
Course Code	172CO1E02	172CO1E02
Syllabus	**UNIT-I:** Architectures of Distributed Systems System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages global state - termination detection.	**UNIT-I:** Architectures of Distributed Systems System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages global state - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms.
	UNIT-II: Distributed Deadlock Detection – Strategies and Protocols Deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system mode, A classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms.	**UNIT-II:** Distributed Deadlock Detection – Strategies and Protocols Deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system mode, A classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture -

		mechanism for building distributed file systems - design issues.
	UNIT-III: **Distributed Shared Memory**-Concepts Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues.	**UNIT-III:** **Distributed Shared Memory**-Concepts Algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery.
	UNIT-IV: **Protection and Security** –Preliminaries Access matrix model and its implementations. Safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography	**UNIT-IV:** **Protection and Security** –Preliminaries Access matrix model and its implementations. Safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems
	UNIT-V: **Multiprocessor Operating** Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems -	**UNIT-V:** **Multiprocessor Operating** Systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching -

	caching - hypercube architecture..	hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads-process synchronization and scheduling.

Signature of the Course Coordinator

Signature of the HOD

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Department of Computer Science and Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Digital Image Processing	Digital Image Processing
Course Code	172CO2E06	172CO2E06
Syllabus	**UNIT-I:** **Introduction:** Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems.	**UNIT-I:** **Introduction:** Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems. **DDA line algorithms:** Bresenhams line and circle derivations and algorithms.
	UNIT-II: **2-D Transformations:** Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.	**UNIT-II:** **2-D Transformations:** Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm.
	UNIT-III: **Digital Image Properties:** Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy. **Color Images:** Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel,	**UNIT-III:** **Digital Image Properties:** Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy. **Color Images:** Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection.

	Fri-chen, Canny Edge detection.	
	UNIT-IV: **Mathematical Morphology:** Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion.	**UNIT-IV:** **Mathematical Morphology:** Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation.
	UNIT-V: **SEGMENTATION:** Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation. **Image Data Compression:** Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits.	**UNIT-V:** **SEGMENTATION:** Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation. **Image Data Compression:** Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Signature of the course coordinator

Signature of the HOD

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Program Name : M.Tech. in Software Engineering

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172SO1T01	Software Requirements And Estimation	0
2	I	172SO1T02	Software Metrics And Reuse	0
3	I	172SO1T03	Software Project And Process Management	40
4	I	172SO1T04	Big Data Analytics	0
5	I	172SO1E01	Web Technologies	0
6	I	172SO1E02	Middleware Technologies	0
7	I	172SO1E03	Mobile Computing	0
8	I	172SO1E04	E-Commerce	0
9	I	172SO1E05	Scripting Languages	0
10	II	172SO1E06	ERP & Supply Chain Management	0
11	I	172SO1L01	Web Technologies & Big Data Analytics Lab	0
12	II	172SO2T05	Software Architecture And Design Patterns	0
13	II	172SO2T06	Software Quality Assurance And Testing	0
14	II	172CO2T06	Cyber Security	0
15	II	172SO2T07	Service Oriented Architectures	0
16	II	172SO2E07	Secure Software Engineering	0
17	II	172SO2E08	Systems Engineering	0
18	II	172SO2E09	Soft Computing	0
19	II	172SO2E10	User Interface Design	0
20	II	172CO2E08	Cloud Computing	0
21	II	172CO2E09	Internet Of Things	0
22	II	172SO2L02	Software Testing & Design Patterns Lab	0
23	III	171SO3C01	Comprehensive Viva-Voce	0
24	III	171SO3R01	Seminar - I	0
25	III	---	Project Work Part - I	0
26	IV	171SO4R02	Seminar - II	0
Total number of courses in the academic year 2018-2019				**= 26**
Number of courses having revision in syllabus content >/= 20% in the academic				**1**
Percentage of syllabus revision carried out in the academic year 2018-2019 = (				**= 3.84%**

ram Coordinator

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SO1T01	Software Requirements And Estimation	4	---	3
172SO1T02	Software Metrics And Reuse	4	---	3
172SO1T03	Software Project And Process Management	4	---	3
172SO1T04	Big Data Analytics	4	---	3
Elective – I				
172SO1E01	Web Technologies	4	---	3
172SO1E02	Middleware Technologies			
172SO1E03	Mobile Computing			
Elective – II				
172SO1E04	E-Commerce	4	---	3
172SO1E05	Scripting Languages			
172SO1E06	ERP & Supply Chain Management			
172SO1L01	Web Technologies & Big Data Analytics Lab		3	2
TOTAL		24	3	20

II SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172SO2T05	Software Architecture And Design Patterns	4	---	3
172SO2T06	Software Quality Assurance And Testing	4	---	3
172CO2T06	Cyber Security	4	---	3
172SO2T07	Service Oriented Architectures	4	---	3
Elective – III				
172SO2E07	Secure Software Engineering	4	---	3
172SO2E08	Systems Engineering			
172SO2E09	Soft Computing			
Elective – IV				
172SO2E10	User Interface Design	4	---	3
172CO2E08	Cloud Computing			
172CO2E09	Internet Of Things			
172SO2L02	Software Testing & Design Patterns Lab			
172SO2L02	Software Testing & Design Patterns Lab	---	3	2
TOTAL		24	3	20

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
171SO3C01	Comprehensive Viva-Voce	---	---	2
171SO3R01	Seminar - I	---	---	2
---	Project Work Part - I	---	---	16
	TOTAL	---	---	20

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
171SO4R02	Seminar - II	---	---	2
171SO4P01	Project Work Part- - II	---	---	18
	TOTAL	---	---	20

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SOFTWARE PROJECT AND PROCESS MANAGEMENT

I Semester L P C

Course Code: 172SO1T03 4 0 3

Course Objectives:

- COB 1: To characterize roles and responsibilities by Project Management process group.
- COB 2: To impart the knowledge of Software Economics.
- COB 3: To enable the students to interpret the Software life cycle phases and process.
- COB 4: To enable the students to work in groups to analyze a project and implement a solution.
- COB 5: To enable the students to relate quality management and process improvement in the context of software development projects.

Course Outcomes:

At the end of this course the student will be able to:

- CO1: Identify issues and challenges in the Software project Management.
- CO2: Demonstrate the structured view of the overall process of software development.
- CO3: Apply the metrics required for reducing the failure probability effectively in project management.
- CO4: Infer the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.
- CO5: Interpret the seven core metrics for managing the project.
- CO6: Identify life cycle phases and process artifacts in the project development.

Mapping of course outcomes with program outcomes:

CO / PO	PO 1 (K5)	PO 2 (K4)	PO 3 (K5)	PO 4 (K3)	PO 5 (K3)	PO 6 (K4)	PO 7 (K6)	PO 8 (K2)	PO 9 (K2)	PO 10 (K2)	PO 11 (K4)
CO1 (K3)	1	2	1	-	-	2	-	-	-	-	-
CO2 (K2)	-	-	-	-	-	1	-	-	-	-	-
CO3 (K3)	1	2	1	3	-	-	-	-	-	-	-
CO4 (K2)	-	1	-	2	2	-	-	-	-	-	-
CO5 (K5)	3	-	-	-	-	-	-	-	-	-	-
CO6 (K3)	1	-	-	-	-	-	-	-	-	-	-

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Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K3)
CO1 (K3)	3	-	3
CO2 (K2)	-	-	-
CO3 (K3)	3	3	3
CO4 (K2)	2	2	2
CO5 (K5)	3	3	3
CO6 (K3)	3	-	-

UNIT-I:

Software Process Maturity:

Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models Capability Maturity Model (CMM), CMMi, PCMM, PSP, TSP.

UNIT-II:

Software Project Management:

Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

UNIT-III:

Life-Cycle Phases and Process artifacts Engineering and Production stages:

Inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures. Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.

UNIT-IV:

Process Planning and Project Organizations:

Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning, line-of- business organizations, project organizations, evolution of organizations, process automation.

UNIT-V:

Project Control and process instrumentation:

The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation. CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions

Text Books:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education, 1st Edition, 1999.
2. Software Project Management, Walker Royce, Pearson Education, 1st Edition, 1998.

Reference Books:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 1st Edition, 2000.

2. Process Improvement essentials, James R. Persse, O'Reilly, 1st Edition, 2006.

Web Links:

1. https://www.coursera.org/specializations/project-management
2. http://www.selectbs.com/process-maturity/what-is-the-capability-maturity-model
3. https://www.sei.cmu.edu/reports/93tr024.pdf
4. http://ww3.ifpug.com/

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Department of M.Tech (Software Engineering)

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Project and Process Management	Software Project and Process Management
Course Code	162SO1T03	172SO1T03
Syllabus	**UNIT-I:** Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.	**UNIT-I:** Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective. Machine Instruction and Programs: Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions.Case Study: ARM, Motorola and Intel Instruction sets.
	UNIT-II: Machine Instruction and Programs: Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions	**UNIT-II:** Arithmetic : Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers. Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro programd Control -Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructionswith Next –Address
	UNIT-III: Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations	**UNIT-III:** The Memory System: Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage
	UNIT-IV: INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices,	**UNIT-IV:** Input/Output Organization: Accessing I/O Devices, Interrupts -

	Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)	Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –Programd I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).
	UNIT-V: The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, ReadOnly Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING Secondary Storage: Magnetic Hard Disks, Optical Disks,	**UNIT-V:** Pipelining : Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.

Signature of the Course Coordinator

Signature of the HOD

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Program Name : M.Tech. in Petroleum Engineering

Syllabus Revision for the Academic Year 2018-2019

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	172PE1T01	Advanced Numerical Methods and Applied Statistics	0
2	I	172PE1T05	PE Stream: Offshore Drilling	0
3	I	172PE1T06	Non-PE Stream: Fundamentals of Petroleum Geology and Reservoir Engineering	0
4	I	172PE1T07	Reservoir stimulation	0
5	I	172PE1T08	Non-PE Stream: Petroleum Drilling and Production Engineering	0
6	I	172PE1T02	Transportation of Oil and Gas	0
7	I	172PE1T03	Advanced EOR Techniques for field developments	0
8	I	172PE1T04	Project Management	0
9	I	172PE1L01	Advanced Numerical Methods and Applied Statistics (MATLAB Based) Lab	0
10	II	172PE2T09	Advanced Natural Gas Engineering	0
11	II	172PE2T10	Artificial Lift Techniques	0
12	II	172PE2T11	Operational Aspects of Well Testing	0
13	II	172PE2T12	Integrated Reservoir Management	0
14	II	172PE2E01	Practical Reservoir Modeling and Simulation	0
15	II	172PE2E02	Optimization of Oil and Gas Production	0
16	II	172PE2E03	Flow Assurance	20
17	II	172PE2E04	Process Safety and Environmental Aspects in Petroleum Industry	0
18	II	172PE2E05	Deep Water Technologies	0
19	II	172PE2E06	Characterization of Petroleum Oils	20
20	II	172PE2L02	Reservoir Simulation Lab	0
21	III	172PE3C01	Comprehensive Viva-Voce	0
22	III	172PE3R01	Seminar - I	0
23	III	172PE3R02	Project Work Part- - I	0
24	IV	172PE4R02	Seminar - II	0
25	IV	172PE4R01	Project Work Part- - II	0

Total number of courses in the academic year 2018-2019	= 25
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019	= 2
Percentage of syllabus revision carried out in the academic year 2018-2019 = (2/25)*100	= 8.69%

Program Coordinator

Head of the Department

Head of the Department
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18-19

PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture (L)	Practice (P)	
172PE1T01	Advanced Numerical Methods & Applied Statistics	4	---	3
172PE1T02	Transportation of Oil & Gas	4	---	3
172PE1T03	Advanced EOR Techniques	4	---	3
172PE1T04	Project Management	4	---	3
172PE1T05	**PE Stream:** Offshore Drilling	4	---	3
172PE1T06	**Non-PE Stream:** Fundamentals of Petroleum Geology & Reservoir Engineering			
172PE1T07	**PE Stream:** Reservoir Stimulation	4	---	3
172PE1T08	**Non-PE Stream:** Petroleum Drilling & Production Engineering			
172PE1L01	Advanced Numerical Methods & Applied Statistics (MATLAB Based) Lab	---	3	2
---	Industrial Visits (Minimum 3 Industries)	---	---	---
	TOTAL			**20**

II SEMESTER

Course Code	Name of the Course	Periods/Week		Credits (C)
		Lecture(L)	Practice(P)	
172PE2T09	Advanced Natural Gas Engineering	4	---	3
172PE2T10	Artificial Lift Techniques	4	---	3
172PE2T11	Operational Aspects of Well Testing	4	---	3
172PE2T12	Integrated Reservoir Management	4	---	3
Elective – I				
172PE2E01	Practical Reservoir Modeling & Simulation	4	---	3
172PE2E02	Optimization of Oil & Gas Production			
172PE2E03	Flow Assurance			
Elective – II				
172PE2E04	Process Safety & Environmental Aspects in Petroleum Industry	4	---	3
172PE2E05	Deep Water Technologies			
172PE2E06	Characterization of Petroleum Oils			
172PE2L02	Reservoir Simulation Lab	---	3	2
---	Summer Training (4-6 weeks)	---	---	---
	TOTAL			**20**

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III SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172PE3C01	Comprehensive Viva-Voce	---	---	2
172PE3R01	Seminar - I	---	---	2
---	Project Work Part - I	---	---	16
TOTAL				20

IV SEMESTER

Course Code	Name of the Course	Periods /Week		Credits (C)
		Lecture (L)	Practice (P)	
172PE4R02	Seminar - II	---	---	2
172PE4R01	Project Work Part- - II	---	---	18
TOTAL				20

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FLOW ASSURANCE

II Semester	L	P	C
Course Code: 172PE2E03	3	0	3

Course Objectives:

COB 1: To impart basic knowledge on flow assurance concepts

COB 2: To impart students having knowledge on non-Newtonian fluid, friction, transient flow and transient flow

COB 3: To teach the knowledge on flow regimes in oil and gas pipelines

COB 4: To impart the knowledge on hydraulics and phase flow in oil and gas pipelines

COB 5: To impart students knowledge about wax management, wax remediation, hydrate remediation

Course Outcomes:

At the end of the course, student will be able to:

CO 1: Solve flow assurance calculations and size the piping & distribution system

CO2: Explain the concepts of non-Newtonian fluid & friction, transient flow, transient flow and heat transfer fundamentals

CO3: Apply the concepts of emulsion, phase behavior, hydrocarbon flow, single, two, three & four phase regimes during design

CO 4: Apply three phase gas-liquid-solid flow

CO5: Explain the concepts of wax management, asphaltenes, hydrate remediation interpret phase behavior and hydrocarbon flow

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K 3)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)
CO1 (K3)	2	1	-	-	-	-	-	-	-	-	-
CO2 (K2)	3	2	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	-	-	-	-	-
CO4 (K3)	2	1	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K2)	PSO 3 (K4)
CO1 (K3)	2	-	-
CO2 (K2)	3	-	-
CO3 (K3)	3	-	-
CO4 (K3)	-	1	-
CO5 (K2)	-	-	1

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UNIT-I:
Introduction to flow assurance; Pipe friction; Friction in Non-circular pipes; Friction loss in components.

UNIT-II:
Non-Newtonian Fluid & Friction; Transient flow; Transient flow; Simplified liquid flow solution; Heat Transfer Fundamentals; U-Value; Steady State / Transient Heat Transfer; Thermal management strategy and Insulation; Simulation Results & Program Testing

UNIT –III:
Composition & properties of Hydrocarbons; Emulsion, Phase Behavior, Hydrocarbon Flow; Single, two, three & four phase regimes; conservation equations; 2 & 3 fluid models; friction, deposition & entrainment, solving two-phase three fluid equations; gas & Liquid slug including boiling & condensation.

UNIT-IV:
Hydraulics
Two Phase Liquid-Liquid Flow; Two Phase Liquid-Gas Flow, Two Phase Liquid-Solid Flow; Three Phase Gas-Liquid-Liquid Flow; Three phase Gas-Liquid-Solid Flow

UNIT-V:
Natural Gas; The Water Molecule; Hydrates; Water and Natural Gas; Heavy Water.
Hydrate Types and Formers: Type I Hydrates; Type II Hydrates; Type H Hydrates; Size of the Guest Molecule; N-Butane; Other Hydrocarbons; Cyclopropane; 2-Butane; Hydrogen and Helium; Chemical Properties of potential Guests; Liquid Hydrate Formers

Text Books:

1. "Pipe Flow-1 Single Phase Flow Assurance" – Over Bratland (e-Book)
2. "Pipe Flow-2 Multi Phase Flow Assurance" – Over Bratland (e-Book)
1. "Subsea Engineering Handbook" – Yong Bai &Qiang Bai – Gulf Professional Publishing

References Books:

1. "Natural Gas Hydrates in Flow Assurance" – Dendy Sloan et.al – GPP
2. Natural Gas Hydrates, Experimental Techniques and their applications, Yuguang Ye, Changling Liu, Springer Berlin Heidelberg.

Web Links:

1. https://en.wikipedia.org/wiki/Flow_assurance
2. https://en.wikipedia.org/wiki/Non-Newtonian_fluid
3. http://www.oilfieldwiki.com/wiki
4. https://en.wikipedia.org/wiki/Hydraulics

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CHARACTERIZATION OF PETROLEUM OILS

II Semester L P C

Course Code: 172PE2E06 3 0 3

Course Objectives:

COB 1: To impart the basic knowledge of characterization and properties of pure hydrocarbons

COB 2: To equip the student on characterization of petroleum fractions

COB 3: To make the student understanding of characterization of reservoir fluids and crude oil

COB 4: To impart the knowledge of PVT Relations and equations of state

COB 5: To impart the knowledge of thermodynamic relations for property estimation

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Apply characterization of hydrocarbons, prediction of molecular wt. and acentric factor

CO2: Apply experimental data on basic properties of petroleum fractions, prediction, conversion of distillation data and development of predictive methods

CO3: Illustrate specifications of reservoir fluids and crude oils, calculation of properties of crude oils and reservoir fluids

CO 4: Explain phase rule, PVT relations, generalized correlation for PVT properties of Liquids-Rackett equation and RI based equations of state

CO5: Apply thermodynamic properties of mixtures and methods for calculation of properties of real mixtures

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K 3)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)
CO1 (K3)	2	1	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	-	-	-	-	-	-	-	-	-
CO3 (K2)	3	2	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	-	-	-	-	-	-
CO5 (K3)	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K2)	PSO 3 (K4)
CO1 (K3)	2	-	-
CO2 (K3)	3	-	-
CO3 (K2)	3	-	-
CO4 (K2)	-	1	-
CO5 (K3)	-	-	1

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UNIT-I:

Characterization and properties of pure hydrocarbons:

Definition of pure components; characterization of hydrocarbons; prediction of molecular wt. / boiling point / specific Gravity; Prediction of Critical Properties and Acentric Factor; Prediction of Density/CH ratio/RI/Freezing Point; Prediction of KV @ 38 & 99 C; analysis & comparison of various characterization methods.

UNIT-II:

Characterization of petroleum fractions: Experimental data on basic properties of petroleum fractions; prediction and conversion of distillation data; prediction of properties of petroleum fractions; general procedures for properties of mixtures; prediction of composition of petroleum fractions; prediction of other properties; quality of petroleum products; minimum laboratory data; analysis of laboratory data and development of predictive methods.

UNIT –III:

Characterization of Reservoir fluids and Crude Oil:

Specifications of reservoir fluids and crude oils; generalized correlations for pseudo-critical properties of natural gases and gas condensate systems; Characterization and properties of single carbon number groups; characterization approaches for C_7^+ fractions; psuedoization and lumping approaches; continuous mixture Characterization approach; calculation of properties of crude oils and reservoir fluids

UNIT-IV:

PVT Relations and equations of state:

Basic definitions and Phase Rule; PVT Relations; Intermolecular forces; Equations of State; Cubic Equations of State, Non-cubic Equations of state; Corresponding state correlations; Generalized correlation for PVT properties of Liquids – Rackett Equation; RI based Equations of State.

UNIT-V:

Chemicals from gas reforming: Methanol- Acetic acid- Ammonia and urea.
Chemicals from ethylene: Ethylene oxide-Monoethylene glycol-Ethyl benzene-Styrene.
Polymers: LDPE, HDPE & LLDPE and Polypropylene – PVC - Polystyrene.

Text Books:

1. "Characterization and Properties of Petroleum Fractions"; M R Riazi; ASTM International
2. Handbook of Petroleum Analysis, Chemical Analysis: A Series of Monographs on Analytical Chemistry and Its Applications, James G. Speight, John Wiley & Sons

References Books:

1. "API Technical Data Book – Petroleum Refining; API – Sixth Edition
2. Thermal Methods in Petroleum Analysis, Kopsch, Heinz, John Wiley & Sons

Web Links:

1. https://www.astm.org
2. http://www3.aiche.org
3. https://virtualmaterials.com
4. http://www.thermopedia.com/content/1067/
5. http://www.iaea.org

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Department of Petroleum Technology

Syllabus revision Index for 2018-2019

S.No	Name of the course	Percentage of syllabus change
1	Flow Assurance	20
2	Characterization Of Petroleum Oils	20

Signature of the course coordinator

Signature of the HOD

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Flow Assurance	Flow Assurance
Course Code	172PE2E03	172PE2E03
Syllabus	UNIT-V: Natural Gas; The Water Molecule; Hydrates; Water and Natural Gas; Heavy Water. Hydrate Types and Formers: Type I Hydrates; Type II Hydrates; Type H Hydrates; Size of the Guest Molecule; N-Butane; Other Hydrocarbons; Cyclopropane; 2-Butane; Hydrogen and Helium; Chemical Properties of potential Guests; Liquid Hydrate Formers	UNIT-V: Hydrates, Wax &Asphaltenes: Physics & Phase Behavior; Hydrate Prevention; Hydrate Remediation; Hydrate Control Design Philosophies; Recovery of Thermodynamic Hydrate Inhibitors. Wax; Wax Management; Wax remediation; Asphaltenes; Asphaltene control design philosophies

Signature of the course coordinator

Signature of the HOD

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Department of Petroleum Technology

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Characterization Of Petroleum Oils	Characterization Of Petroleum Oils
Course Code	172PE2E06	172PE2E06
Syllabus	UNIT-V: Chemicals from gas reforming: Methanol- Acetic acid- Ammonia and urea. Chemicals from ethylene: Ethylene oxide-Monoethylene glycol-Ethyl benzene-Styrene. Polymers: LDPE, HDPE & LLDPE and Polypropylene – PVC - Polystyrene.	UNIT-V: Thermodynamic Relations for Property Estimation: Definitions and fundamental thermodynamic relations; Generalized correlations for calculation of thermodynamic properties; Properties of Ideal gases; Thermodynamic properties of mixtures; Phase equilibria of pure components; Phase equilibria of mixtures; general methods for calculation of properties of real mixtures; Use of velocity of sound for prediction of fluid properties.

Signature of the course coordinator

Signature of the HOD

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Department of Master of Computer Applications

Date: 20/11/2018

Minutes of the 3rd Meeting of BOS Scheduled on 17/11/2018

The III meeting of the BOS of Master of Computer Applications Department was held on

17-11-2018,at 09.30 AM.

The Members discussed the agenda items and made the following resolutions.

Agenda 3.1: Welcome address by Chair Person-BOS.

Prof.D Beulah, BOS Chairperson invited the distinguished members of BOS to the III BOS Meeting.

Agenda 3.2: Ratification of minutes of the previous Board of Studies meeting

The BOS members have ratified the points discussed in the previous Board of Studies meeting held on 25/11/2017.

Agenda 3.3: Discussion on proposed AR17 MCA Program – V &VI semester syllabus and ratification of the same.

The members of BOS ratified the AR17 V &VI Semesters MCA syllabus after incorporating the following changes:

- Suggested to use more courses which are industry ready as electives.
- Suggested to incorporate IoT as a lab course also.
- Suggested to use open source tools for Labs wherever they are possible.

The members of BOS ratified the Percentage of new courses introduced in the academic year 2018-2019 for MCA is 14%. The list of new courses is enclosed as Annexure-I.

The members of BOS ratified the professional core electives and open electives offered during the academic year 2018-2019.

Agenda 3.4: Analysis of Students Feedback & Action Taken Report

The Chairperson presented that the average feedback of the faculty for odd and even semesters for the A.Y.2019-20, members of BOS noted the students feedback and action taken report and appreciated the staff members for the same.

Agenda 3.5: Analysis of Stakeholder's Feedback on Curriculum

The BOS Chairperson presented the analysis of Feedback on Curriculum which is taken from the various Stakeholders. The BOS members noted the same and advised to incorporate the suggestions as per the feasibility. The Action Taken Report is enclosed as Annexure-II.

Agenda 3.6: Analysis of Results

Members of BOS noted the result analysis presented by the Chairperson for the A.Y.2017-18 and ratified the same.

Agenda 3.7: Any other item/s

- Suggested to follow the competitive exams pattern partially in preparation Suggested to include latest editions of text books for the Courses.
- Suggested to include labs for the courses like Cloud Computing, IOT, Neural Networks and Machine Learning.
- Suggested to Remove why, what and from the syllabus.
- Advised to teach beyond the course content by discussing need and applications of topics in industry.
- Suggested to increase the number of courses which focusing on employability and soft skills to gain more opportunities for the students.
- Suggested to fix no of hours for subject to teach as 48 to 54 hrs and for electives 44-48 hrs.

Agenda 3.8: Scheduling of the next BOS meeting.

The next BOS meeting is tentatively scheduled in the month of April/May 2019.

Agenda 3.9: Vote of Thanks

The Chairperson presented the Vote of Thanks.

Beulah

BOS Chairperson

Head of the Department
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Department of Master of Computer Applications

Annexure-I

List of New Courses in the Academic Year 2018-2019

S. No	Program	Semester	Course Code	Course Name
1	MCA	IV	173MC4E03	Cloud Computing
2	MCA	IV	173MC4E05	Artificial Intelligence
3	MCA	IV	173MC4L10	Advanced Java & Web
4	MCA	V	MC1651	Big Data Analytics
5	MCA	V	MC1653	Python Programming
6	MCA	V	MC165A	Big Data Analytics Lab
7	MCA	V	MC165C	Python Programming Lab

BOS Chairperson

Head of the Department
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Department of Master of Computer Applications

Annexure-II

Action Taken Report on Stakeholders Feedback in the Academic Year 2018-2019

S. No	Agenda Item No.	Stakeholders Recommended	Action Taken
1	3.3	Prepare syllabus for Database Management Systems, Mobile Computing, Artificial Intelligence etc., as per Industry Standards	As per the suggestion given by the employer and alumni syllabus was revised and prepared as per industry standards.
2	3.3	Improve the Communication skill of students	As per the suggestion Seminar course is introduced to develop the presentation and communication skills of the student.
3	3.7	Suggestion to conduct group activities for the students	Group discussions are being conducted to impart teamwork among students
4	3.7	Impart practical knowledge among students, make them work on more and more projects.	As per the suggestions given by the alumni, the special technical training classes are conducted after 3:30 PM. Every student should complete one Mini project.
5	3.7	Training session are needed for students to become more employable	Career guidance and placement programs are included in the course
6	3.4	Suggested to include competitive based examinations for aptitude and technical skill development	Conducted training sessions and tests to assess the student performance
7	3.4	Improvement required in the communication skills.	Training and placement classes (Communication classes) are started to improve communication of the students.
8	3.4	Personality development training	Training and placement classes (Personality

			development classes) are started.
9	3.4	Students are to be involved in developing the projects that are benefiting the society	Encouraged to do the projects that are beneficial to the society
10	3..3	Syllabus should design practical based approach. And more weight ages should be given to project.	Providing advanced technology training to students, it helps to develop mini and main project.
11	3.3	Interactive based learning with visual presentation is needed	Classes are handled by video conferencing and smart classroom
12	3.3	Recent technology-based courses are needed	As per suggestions included Cloud computing, Block chain Technologies and IOT

Beulah

BOS Chairperson

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Program Name : Master of Computer Applications

Syllabus Revision for the Academic Year 2018-2019

S.NO.	Semester	Course Code	Course Name	% of content revised for the existing year
1	1	173MC1T01	C PROGRAMMING AND DATA STRUCTURES	0
2	1	173MC1T02	COMPUTER ORGANIZATION	0
3	1	173MC1T03	DISCRETE MATHEMATICAL STRUCTURES AND GRAPH THEORY	0
4	1	173MC1T04	STATISTICAL PROGRAMMING WITH R	0
5	1	173MC1T05	ACCOUNTING AND FINANCIAL MANAGEMENT	0
6	1	173MC1L01	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB	0
7	1	173MC1L02	C PROGRAMMING LAB	0
8	1	173MC1L03	STATISTICAL PROGRAMMING WITH R LAB	0
9	2	173MC1T06	OOPS THROUGH JAVA	0
10	2	173MC1T07	OPERATING SYSTEMS	0
11	2	173MC1T08	SOFTWARE ENGINEERING	0
12	2	173MC1T09	OPTIMIZATION TECHNIQUES	0
13	2	173MC1T10	COMPUTER GRAPHICS	0
14	2	173MC1L04	OOPS THROUGH JAVA LAB	0
15	2	173MC1L05	DATA STRUCTURES LAB	0
16	2	173MC1L06	OPERATING SYSTEM & COMPUTER GRAPHICS LAB	0
17	3	173MC1T11	DATA BASE MANAGEMENT SYSTEMS	0
18	3	173MC1T12	COMPUTER NETWORKS	0
19	3	173MC1T13	UNIX PROGRAMMING	0
20	3	173MC1T14	MANAGEMENT INFORMATION SYSTEM	0
21	3	173MC1T15	DESIGN AND ANALYSIS OF ALGORITHMS	0
22	3	173MC1L07	DATA BASE MANAGEMENT SYSTEMS LAB	0
23	3	173MC1L08	UNIX PROGRAMMING LAB	0
24	3	173MC1L09	COMPUTER NETWORKS LAB	0
25	4	173MC1T16	OBJECT ORIENTED ANALYSIS AND DESIGN	0

26	4	173MC1T17	ADVANCED JAVA & WEB TECHNOLOGIES	0
27	4	173MC1T18	DATA WAREHOUSING AND MINING	0
28	4	173MC4E01	MOBILE COMPUTING	0
29	4	173MC4E02	HUMAN COMPUTER INTERACTION	0
30	4	173MC4E03	CLOUD COMPUTING	0
31	4	173MC4E04	SOFTWARE PROJECT MANAGEMENT	0
32	4	173MC4E05	ARTIFICIAL INTELLIGENCE	0
33	4	173MC4E06	EMBEDDED SYSTEMS	0
34	4	173MC1L10	ADVANCED JAVA & WEB TECHNOLOGIES LAB	0
35	4	173MC1L11	DATA WAREHOUSING AND MINING LAB	0
36	4	173MC1L12	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	0
37	5	MC1651	BIG DATA ANALYTICS	100
38	5	MC1652	NETWORK PROGRAMMING	0
39	5	MC1653	PYTHON PROGRAMMING	100
40	5	MCA16.5.4.1	CYBER SECURITY	100
41	5	MCA16.5.4.2	COMPUTER FORENSICS	0
42	5	MCA16.5.4.3	E-COMMERCE	0
43	5	MCA16.5.5.1	INTERNET OF THINGS	100
44	5	MCA16.5.5.2	MULTIMEDIA APPLICATION DEVELOPMENT	0
45	5	MCA16.5.5.3	SOFTWARE TESTING METHODOLOGIES	100
46	5	MC165A	BIG DATA ANALYTICS LAB	100
47	5	MC165B	NETWORK PROGRAMMING LAB	0
48	5	MC165C	PYTHON PROGRAMMING LAB	100
49	6	MC165D	PROJECT SEMINAR	0
50	6	173MCPO1	DISSERTATION/ THESIS	0
Total number of courses in the academic year 2018-2019				= 50
Number of courses having revision in syllabus content >/= 20% in the academic year 2018-2019				= 7
Percentage of syllabus revision carried out in the academic year 2018-				= 14.00%

T. Satya
Program Coordinator

Head of the Department
Head of the Department
Department of MCA
Aditya Engineering College

PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC1T01	C Programming & Data Structures	3	1	---	3
173MC1T02	Computer Organization	3	1	---	3
173MC1T03	Discrete Mathematical Structures & Graph Theory	3	1	---	3
173MC1T04	Statistics With R Programming	3	1	---	3
173MC1T05	Accounting & Financial Management	3	1	---	3
173MC1L01	English Language Communication Skills Lab	---	---	3	2
173MC1L02	C Programming Lab	---	---	3	2
173MC1L03	Statistics With R Programming Lab	---	---	3	2
	TOTAL	**15**	**5**	**9**	**21**

II SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC2T06	OOPS Through Java	3	1	---	3
173MC2T07	Operating Systems	3	1	---	3
173MC2T08	Software Engineering	3	1	---	3
173MC2T09	Optimization Techniques	3	1	---	3
173MC2T10	Computer Graphics	3	1	---	3
173MC2L04	OOPS Through Java Lab	---	---	3	2
173MC2L05	Data Structures Lab	---	---	3	2
173MC2L06	Operating System & Computer Graphics Lab	---	---	3	2
	TOTAL	**15**	**5**	**9**	**21**

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III SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC3T11	Database Management Systems	3	1	---	3
173MC3T12	Computer Networks	3	1	---	3
173MC3T13	Unix Programming	3	1	---	3
173MC3T14	Management Information System	3	1	---	3
173MC3T15	Design & Analysis of Algorithms	3	1	---	3
173MC3L07	Database Management Systems Lab	---	---	3	2
173MC3L08	Unix Programming Lab	---	---	3	2
173MC3L09	Computer Networks Lab	---	---	3	2
	TOTAL	15	5	9	21

IV SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC4T16	Object Oriented Analysis & Design	3	1	---	3
173MC4T17	Advanced Java & Web Technologies	3	1	---	3
173MC4T18	Data Warehousing & Mining	3	1	---	3
Elective – I					
173MC4E01	Mobile Computing	3	1	---	3
173MC4E02	Human Computer Interaction				
173MC4E03	Cloud Computing				
Elective – II					
173MC4E04	Software Project Management	3	1	---	3
173MC4E05	Artificial Intelligence				
173MC4E06	Embedded Systems				
173MC4L10	Advanced Java & Web Technologies Lab	---	---	3	2
173MC4L11	Data Warehousing & Mining Lab	---	---	3	2
173MC4L12	Object Oriented Analysis & Design Lab	---	---	3	2
	TOTAL	15	5	9	21

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V Semester

S. No.	SUBJECT	T	P
1	BIG DATA ANALYTICS	4	-
2	NETWORK PROGRAMMING	4	-
3	PYTHON PROGRAMMING	4	-
4	ELECTIVE-III MCA16.5.4.1CYBER SECURITY MCA16.5.4.2 COMPUTER FORENSICS MCA16.5.4.3 E-COMMERCE	4	-
5	ELECTIVE-IV MCA16.5.5.1 INTERNET OF THINGS MCA16.5.5.2 MULTIMEDIA APPLICATION DEVELOPMENT MCA16.5.5.3SOFTWARE TESTING METHODOLOGIES	4	-
6	BIG DATA ANALYTICS LAB	-	3
7	NETWORK PROGRAMMING LAB	-	3
8	PYTHON PROGRAMMING LAB		3

VI Semester

S. No.	SUBJECT
1	PROJECT SEMINAR
2	DISSERTATION/ THESIS EXCELLENT / GOOD / SATISFACTORY/ NOT SATISFACTORY

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ADITYA ENGINEERING COLLEGE

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Aditya Nagar, ADB Road, Surampalem - 533437, Near Kakinada, E.G.Dt., Ph:99498 76662

Department of Master of computer Applications

Syllabus revision Index -2018-19

S.No	Name of the course	Percentage of syllabus change
1.	No Change in syllabus	

Beulah

Signature of the HOD

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