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 Civil Engineering

Syllabus Revision for the Academic Year 2020-2021				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	201HS1T01	Communicative English	10
2	I	201BS1T01	Differential equations and Linear algebra	0
3	I	201BS1T02	Engineering Physics	0
4	I	201ES1T01	Building Materials & Construction	0
5	I	201ES1T05	Engineering Graphics	55
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L01	Engineering Physics Lab	0
8	I	201ES1L01	Engineering Workshop	0
9	I	201MC1T01	Environmental Science	0
10	II	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	II	201BS2T08	Chemistry of Materials	0
12	II	201ES2T06	Engineering Mechanics	0
13	II	201ES2T08	Programming for Problem Solving Using C	0
14	II	201ES2T12	Surveying	0
15	II	201ES2L05	Surveying field Work	0
16	II	201BS2L05	Engineering Chemistry Lab	0
17	II	201ES2L10	Programming for Problem Solving Using C	0
18	II	201MC2L01	Professional Communications skills Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T11	Integral transforms and applications of Partial Differential Equations	40
21	III	191ES3T10	Internet of things (IOT)	100
22	III	191HS3T02	Managerial economics and Financial analysis	0
23	III	191CE3T01	Strength of materials – I	0

24	III	191CE3T02	Fluid mechanics	0
25	III	191CE3T03	Surveying	0
26	III	191CE3L01	Surveying lab	0
27	III	191CE3T04	Computer aided civil engineering drawing	100
28	III	191CE3L02	Strength of materials lab	0
29	III	191MC3A03	Employability Skills – I	0
30	III	191MC3A04	Essence of Indian Traditional Knowledge	100
31	IV	191BS4T16	Numerical methods & Statistical Techniques (CE, ME, Ag. E)	50
32	IV	191HS4T03	Management science	0
33	IV	191CE4T05	Structural analysis	17
34	IV	191CE4T06	Construction materials and concrete technology	17
35	IV	191CE4T07	Strength of materials – II	0
36	IV	191CE4T08	Hydraulics and hydraulic machinery	0
37	IV	191CE4L03	Fluid mechanics & hydraulic Machinery lab	0
38	IV	191CE4L04	Construction materials and concrete technology lab	0
39	IV	191MC4A05	Employability Skills – II	0
40	IV	191MC4A06	Biology for Engineers	100
41	V	171HS5T05	Management Science	0
42	V	171CE5T10	Design and Drawing of Reinforced Concrete Structures	0
43	V	171CE5T11	Transportation Engineering	0
44	V	171CE5T12	Structural Analysis - II	0
45	V	171CE5T13	Water Resource Engineering - I	0
46	V	171CE5E01	(PE I)Construction Technology and Management	0
47	V	171CE5E02	Urban Hydrology	0
48	V	171CE5E03	Traffic Engineering	0
49	V	171HS5T06	Employability Skills - III	0
50	V	171CE5L04	Engineering Geology Lab	0
51	V	171CE5L05	Transportation Engineering Lab	0
52	V	171CE5S01	MOOCs – I	0
53	V	171CE5P03	Surveying Camp	0
54	VI	171CE6T14	Design and Drawing of Steel Structures	0

55	VI	171CE6T15	Geotechnical Engineering - I	0
56	VI	171CE6T16	Water Resource Engineering - II	0
57	VI	171CE6T17	Prestressed Concrete	0
58	VI	171CE6E04	PE II Ground Water Development	0
59	VI	171CE6E05	Pavement Analysis and Design	0
60	VI	171CE6E06	Repair and Rehabilitation of Structures	0
61	VI	171CE6E07	PE III Ground Improvement Techniques	0
62	VI	171CE6E08	Finite Element Methods	0
63	VI	171CE6E09	Earthquake Resistant Design	0
64	VI	171HS6T07	Employability Skills - IV	0
65	VI	171CE6L06	Geotechnical Engineering Lab	0
66	VI	171CE6L07	Irrigation Design and Drawing	0
67	VI	171CE6S02	MOOCs - II	0
68	VII	171CE7T18	Geotechnical Engineering - II	0
69	VII	171CE7T19	Environmental Engineering	0
70	VII	171CE7T20	Remote Sensing and GIS Applications	0
71	VII	171CE7T21	Estimation, Specifications and Contracts	0
72	VII	171CE7E10	PE IV Advanced Structural Engineering	0
73	VII	171CE7E11	Watershed Management	100
74	VII	171CE7E12	Design of Tall Buildings	100
75	VII	171CE7E13	PE V Bridge Engineering	0
76	VII	171CE7E14	Environmental Impact Assessment and Management	0
77	VII	171CE7E15	Water Resources Systems Planning	0
78	VII	171CE7L08	Environmental Engineering Lab	0
79	VII	171CE7L09	GIS And Computer Aided Design (CAD) Lab	0
80	VII	171CE7P01	Industry Oriented (Internship) Minor Project	0
81	VIII	171CE8E16	PE VI Urban Transportation Planning Engineering	0
82	VIII	171CE8E17	Soil Dynamics and Foundations	0
83	VIII	171CE8E18	Solid And Hazardous Waste Management	0
84	VIII	171CE8E19	Air Pollution and Control	0
85	VIII	171CE8O01	OE Electronic Instrumentation	0

86	VIII	171CE8O02	Database Management Systems	0
87	VIII	171CE8O03	Alternative Energy Sources	0
88	VIII	171CE8O04	Waste Water Management	0
89	VIII	171CE8O05	Fundamentals of Liquefied Natural Gas	0
90	VIII	171CE8O06	Green Fuel Technologies	0
91	VIII	171CE8O07	Green Engineering Systems	100
92	VIII	171CE8P02	**Major Project**	0

Total number of courses in the academic year 2020-2021	= 92
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021	= 10
Percentage of syllabus revision carried out in the academic year 2020-2021 = (10/92)*100	= 10.86 %

Program Coordinator

Head of the Department

Head of the Department
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2020-21
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PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T02	Engineering Physics	BSC	Theory	3	0	0	3	3
201ES1T01	Building Materials & Construction	ESC	Theory	3	0	0	3	3
201ES1T05	Engineering Graphics	ESC	Theory	1	0	4	5	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L01	Engineering Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L01	Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	**15**	**0**	**13**	**28**	**19.5**

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T08	Chemistry of Materials	BSC	Theory	3	0	0	3	3
201ES2T06	Engineering Mechanics	ESC	Theory	3	0	0	3	3
201ES2T08	Programming for Problem Solving Using C	ESC	Theory	3	0	0	3	3
201ES2T12	Surveying	ESC	Theory	3	0	0	3	3
201ES2L05	Surveying field Work	ESC	Lab	0	0	3	3	1.5
201BS2L05	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES2L10	Programming for Problem Solving Using C Lab	ESC	Lab	0	0	3	3	1.5
201MC2L01	Professional Communications skills Lab	MC	Lab	0	0	3	3	0
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	**17**	**0**	**12**	**29**	**19.5**

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III SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS3T11	Integral transforms and applications of Partial Differential Equations	BSC	3	0	0	3	3
191ES3T10	Internet of things (IOT)	ESC	3	0	0	3	3
191HS3T02	Managerial economics and Financial analysis	HSMC	3	0	0	3	3
191CE3T01	Strength of materials – I	PCC	3	0	0	3	3
191CE3T02	Fluid mechanics	PCC	2	0	0	2	2
191CE3T03	Surveying	PCC	3	0	0	3	3
191CE3L01	Surveying lab	PCC	0	0	3	3	1.5
191CE3T04	Computer aided civil engineering drawing	PCC	1	0	2	3	2
191CE3L02	Strength of materials lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**10**	**30**	**22**

IV SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS4T16	Numerical methods & Statistical Techniques (CE, ME, Ag. E)	BSC	3	0	0	3	3
191HS4T03	Management science	HSMC	3	0	0	3	3
191CE4T05	Structural analysis	PCC	2	1	0	3	3
191CE4T06	Construction materials and concrete technology	PCC	3	0	0	3	3
191CE4T07	Strength of materials – II	PCC	2	1	0	3	3
191CE4T08	Hydraulics and hydraulic machinery	PCC	3	0	0	3	3
191CE4L03	Fluid mechanics & hydraulic Machinery lab	PCC	0	0	3	3	1.5
191CE4L04	Construction materials and concrete technology lab	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	**18**	**2**	**8**	**28**	**21**

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V SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171HS5T05	Management Science	HSS	3	1	0	4	3
171CE5T10	Design and Drawing of Reinforced Concrete Structures	PC	3	1	0	4	3
171CE5T11	Transportation Engineering	PC	3	1	0	4	3
171CE5T12	Structural Analysis - II	PC	3	1	0	4	3
171CE5T13	Water Resource Engineering - I	PC	3	1	0	4	3
---	**Professional Elective – I**	PE	3	1	0	4	3
171HS5T06	Employability Skills - III	HSS	2	0	0	2	1
171CE5L04	Engineering Geology Lab	PC	0	0	3	3	2
171CE5L05	Transportation Engineering Lab	PC	0	0	3	3	2
171CE5S01	MOOCs – I	SS	0	0	0	0	0
171CE5P03	Surveying Camp	PC	0	0	0	0	0
		TOTAL	**18**	**6**	**8**	**32**	**23**

VI SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CE6T14	Design and Drawing of Steel Structures	PC	3	1	0	4	3
1CE6T15	Geotechnical Engineering - I	PC	3	1	0	4	3
171CE6T16	Water Resource Engineering - II	PC	3	1	0	4	3
171CE6T17	Prestressed Concrete	PC	3	1	0	4	3
---	**Professional Elective - II**	PE	3	1	0	4	3
---	**Professional Elective - III**	PE	3	1	0	4	3
171HS6T07	Employability Skills - IV	HSS	2	0	0	2	1
171CE6L06	Geotechnical Engineering Lab	PC	0	0	3	3	2
171CE6L07	Irrigation Design and Drawing	PC	0	0	3	3	2
171CE6S02	MOOCs - II	SS	0	0	0	0	0
		TOTAL	**18**	**6**	**8**	**32**	**23**

MOOCs – Massive Open Online Courses

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VII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CE7T18	Geotechnical Engineering - II	PC	3	1	0	4	3
171CE7T19	Environmental Engineering	PC	3	1	0	4	3
171CE7T20	Remote Sensing and GIS Applications	PC	3	1	0	4	3
171CE7T21	Estimation, Specificationsand Contracts	PC	3	1	0	4	3
---	**Professional Elective – IV**	PE	3	1	0	4	3
---	**Professional Elective – V**	PE	3	1	0	4	3
171CE7L08	Environmental Engineering Lab	PC	0	0	3	3	2
171CE7L09	GIS And Computer Aided Design (CAD) Lab	PC	0	0	3	3	2
171CE7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	1
		TOTAL	**18**	**6**	**6**	**30**	**23**

VIII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	**Professional Elective – VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171CE8P02	**Major Project**	PR	0	0	0	0	14
		TOTAL	**6**	**2**	**0**	**8**	**20**

Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171CE5E01	Construction Technology and Management
2	171CE5E02	Urban Hydrology
3	171CE5E03	Traffic Engineering

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171CE6E04	Ground Water Development
2	171CE6E05	Pavement Analysis and Design
3	171CE6E06	Repair and Rehabilitation of Structures

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171CE6E07	Ground Improvement Techniques
2	171CE6E08	Finite Element Methods
3	171CE6E09	Earthquake Resistant Design

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171CE7E10	Advanced Structural Engineering
2	171CE7E11	Watershed Management
3	171CE7E12	Design of Tall Buildings

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171CE7E13	Bridge Engineering
2	171CE7E14	Environmental Impact Assessment and Management
3	171CE7E15	Water Resources Systems Planning

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171CE8E16	Urban Transportation Planning Engineering
2	171CE8E17	Soil Dynamics and Foundations
3	171CE8E18	Solid And Hazardous Waste Management
4	171CE8E19	Air Pollution and Control

Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171CE8O01	Electronic Instrumentation
2	171CE8O02	Database Management Systems
3	171CE8O03	Alternative Energy Sources
4	171CE8O04	Waste Water Management
5	171CE8O05	Fundamentals of Liquefied Natural Gas
6	171CE8O06	Green Fuel Technologies
7	171CE8O07	Green Engineering Systems

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INTEGRAL TRANSFORMS AND APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

(Common to CE, ME,Ag. E)

III Semester
Course Code: 191BS3T11

L	T	P	C
3	0	0	3

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

CO 1: Compute the Fourier series of a function.
CO 2: Compute the Fourier transformof a function.
CO 3: Compute Laplace transform of a function.
CO 4: Apply Laplace transform to solve initial value problems.
CO 5: Solve one dimensional heat equation, wave equation and two-dimensionalLaplace equation

Mapping of course outcomes with program outcomes:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	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/PSO	PSO1	PSO2	PSO3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

UNIT-I:
Fourier series:
Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

UNIT-II:
Fourier Transforms:
Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

UNIT-III:
Laplace Transforms:
Laplace transforms of standard functions, First Shifting theorem, change of scale, Multiplication with t, Division by t, transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, evaluating improper integrals by using Laplace Transform.

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UNIT-IV:

Inverse Laplace Transforms:

Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, Solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise: Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems)

UNIT-V:

Application of PDE:

Classification of Higher order P.D.E - Method of separation of Variables- Solution of One-dimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Textbooks:

1. Advanced Engineering Mathematics, R.K. Jain, S.R.K. Iyengar, 4th Edition, Alpha Science Publications
2. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley-
3. Higher Engineering Mathematics,B.S. Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced engineering mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er., S. Chand Co. Pvt. Ltd,Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://nptel.ac.in/courses/111105123/
2. https://nptel.ac.in/courses/111105093/
3. https://www.khanacademy.org

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NUMERICAL METHODS & STATISTICAL TECHNIQUES

(Common to CE, ME & Ag.E)

IV Semester
Course Code: 191BS4T16

L	T	P	C
3	0	0	3

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

CO 1: Apply numerical methods to solve equations and interpolation of polynomials.
CO 2: Apply numerical methods to solve initial value problems and problems involving integration.
CO 3: Apply discrete and continuous probability distributions.
CO 4: Compute the components of a classical hypothesis test.
CO 5: Apply the statistical inferential methods based on small and large sampling tests.

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/PSO	PSO1	PSO2	PSO3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

UNIT-I:

Solution of Algebraic and Transcendental Equations:
Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton - Raphson method.

Interpolation:
Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Central difference, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.

UNIT-II:

Numerical Integration and solution of Ordinary Differential Equations:
Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).

UNIT-III:

Probability and Distributions:
Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

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UNIT - IV

Sampling Theory:

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, χ^2 and F-distributions – Point and Interval estimations – Maximum error of estimate.

UNIT- V

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 and two means (Large and Small samples) – Tests on proportions.

Text Books:

1. Advanced Engineering Mathematics, R. K. Jain, S. R. K. Iyengar, 4th Edition, Alpha Science Publications
2. Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
3. Higher Engineering Mathematics, B. S. Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and engineering Computations, New age International Publication (P) Ltd.
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand& Sons Publications, 2012.
3. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er., S. Chand Co. Pvt. Ltd, Delhi.
4. Sheldon, M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

Web Links:

1. https://nptel.ac.in/courses/111/107/111107105/
2. https://nptel.ac.in/courses/111/105/111105041/
3. https://nptel.ac.in/courses/111/105/111105090/
4. https://www.khanacademy.org

ENGINEEING GRAPHICS

(Common to CE, ME, Min.E, PT & Ag.E)

	L	T	P	C
I Semester **Course Code:** 201ES1105	1	0	4	3

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

CO1: Sketch the polygons, conics and scales by using the principles of drawing
CO2: Draw Orthographic projections of points and lines..
CO3: Draw Orthographic projections of planes in various positions
CO4: Draw Orthographic projections of solids in various positions.
CO5: Construct isometric scale and isometric projections

Mapping of Course Outcomes with Program Outcomes:

	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	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	1	-	-
CO3	1	-	-
CO4	1	-	-
CO5	1	-	-

Unit - I

Introduction to Engineering Drawing:Lettering, Dimensioning, Types of lines.
Conic Sections:Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.
Scales:Plain Scale, Diagonal Scale and Vernier Scales.

Unit – II

Orthographic Projections:Introduction to orthographic projections, Projections of Points, Projections of Lines.

Unit – III

Projections of Planes:Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.

Unit – IV

Projections of Solids:Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

Unit – V

Isometric Projections:Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

Text Books:

1. Engineering Drawing by N.D.Bhatt, Charotar Publishers
2. Engineering Drawing by K.L.Narayana and P. Kannaiah. Scitech Publishers.

Reference Books:

1. Engineering Drawing by K. Venugopal, New Age Publications
2. Engineering Drawing by M. B. shah & B.C. Rana., Pearson's Publishers.
3. Engineering Drawing by B. Agrawal & C.M. Agrawal, Tata Mcgraw Hill Publishers

Web Links:

1. http://nptel.ac.in/courses/112103019
2. http://freevideolectures.com/Course/3420/Engineering-Drawing
3. http://engineeringdrawing.org
4. http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html

Head of the Department
Dept. of Civil Engineering
ADITYA ENGINEERING COLLEGE (A9)

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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 Civil Engineering

Syllabus revision Index for the Academic Year 2020-2021 B.Tech Civil Engineering

S.No	Name of the course	Percentage of syllabus change
1	Engineering Graphics	55
2	Integral transforms and applications of Partial Differential Equations	40
3	Numerical methods & Statistical Techniques (CE, ME, Ag. E)	50

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Department of Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Engineering Graphics &Design**	**Engineering Graphics**
Course Code	**191ES2T02**	**201ES1T05**
Syllabus	**UNIT-I:** **Introduction to Engineering graphics:** Principles of Engineering Graphics and their significance- conventions in drawing- lettering – BIS Conventions- - Conic sections - Cycloid, epicycloids and hypocycloid-Involutes	**UNIT-I:** **Introduction to Engineering Drawing:** Lettering, Dimensioning, Types of lines. **Conic Sections:** Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods. **Scales:** Plain Scale, Diagonal Scale and Vernier Scales.
	UNIT-II: **Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.	**UNIT-II:** **Orthographic Projections:** Introduction to orthographic projections, Projections of Points, Projections of Lines.
	UNIT-III: **Projections of solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.	**UNIT-III:** **Projections of Planes:** Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.
	UNIT-IV: **Introduction to Computer Aided Drafting:** Basic drawing and editing commands-Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections	**UNIT-IV:** **Projections of Solids:** Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

	UNIT-V: **Isometric Projections:** Principles of isometric projection-Isometric scale; Isometric views: lines, planes, figures, simple and compound solids	**UNIT-V:.** **Isometric Projections:** Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

K. N. [illegible]
Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

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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	Mathematics-II	Integral Transforms and Applications of Partial differential equations
Course Code	171BS2T02	191BS3T12
Syllabus	UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation: Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method.Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Relation between operators - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	UNIT-I: Fourier series: Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations- Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	UNIT-III: Laplace Transforms: Laplace transforms of standard functions, First Shifting theorem, change of scale, Multiplication with t, Division by t, transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, evaluating improper integrals by using Laplace Transform.
	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.	UNIT-IV: Inverse Laplace Transforms: Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, Solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise:

		Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems
	UNIT V: Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.	UNIT-V: Application of PDE: Classification of Higher order P.D.E - Method of separation of Variables- Solution of Onedimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Signature of the course coordinator

Signature of the HOD

Head of the Department

Department of H & BS

Aditya Engineering College (A9)

Department of Humanities & Basic Sciences

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Probability & Statistics	Numerical Methods and Statistical Techniques
Course Code	171BS3T10	191BS4T16
Syllabus	UNIT-I: Random variables and Distributions: Random variables- Discrete and Continuous Random variable- Distribution functionExpectation,Variance,Moment Generating function –Discrete Distrinbutions- Binomial, Poisson Continuous Distributions -Normal distribution.	UNIT-I: Solution of Algebraic and Transcendental Equations: Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton - Raphson method. Interpolation: Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Central difference, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.
	UNIT-II: Sampling Theory: Introduction - Population and samples- Sampling distribution of means (σknownand σunknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.	UNIT-II: Numerical Integration and solution of Ordinary Differential Equations: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order)..
	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.	UNIT-III: Probability and Distributions: Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions
	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	UNIT - IV Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance χ(definition only) – Central limit theorem (without proof) – Introduction to t, 2 and

	(without proofs).	Fdistributions – Point and Interval estimations – Maximum error of estimate.
	UNIT-V: Statistical Quality Control Methods: Introduction - Methods for preparing control charts Problems using x-bar, p, R charts and attribute charts.	UNIT- V 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 and two means (Large and Small samples) – Tests on proportions.

Signature of the course coordinator

Signature of the HOD

Head of the Department
Department of H & BS
Aditya Engineering College (A.

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

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1 .	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential equations and Linear algebra	0
3	I	201BS1T03	Applied Physics	0
4	I	201ES1T02	Programming for Problem Solving using C	0
5	I	201ES1I01	Engineering Graphics and Design	40
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L02	Applied Physics Lab	0
8	I	201ES1L02	Programming for Problem Solving using C Lab	0
9	I	201MC1T01	Environmental Science	0
10	II	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	II	201BS2T06	Transform Techniques	0
12	II	201ES2T07	Data Structures through C	15
13	II	201ES2T09	Basic Electrical Circuits	5
14	II	201ES2T13	Basic Civil and Mechanical Engineering	0
15	II	201ES2L06	Data Structures through C Lab	100
16	II	201ES2L09	Electrical Engineering Workshop	5
17	II	201ES2L11	Basic Civil and Mechanical Engineering Lab	5
18	II	201MC2L01	Professional Communications Skills Lab	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T12	Transform Techniques	60
21	III	191EE3T02	Analog Electronic Circuits	0
22	III	191ES3T11	Python programming	100
23	III	191EE3T03	Electrical Circuit Analysis-II	0
24	III	191EE3T04	Electrical Machines-I	0
25	III	191EE3T05	Electromagnetic Fields	0
26	III	191EE3L01	Electrical Circuits Lab	15
27	III	191ES3L15	Python programming Lab	100
28	III	191MC3A03	Employability Skills-I	50
29	III	191MC3A04	Essence of Indian Traditional Knowledge	100
30	IV	191BS4T17	Numerical methods & Complex Variables	100
31	IV	191EE4T06	Digital Circuits & Logic Design	0
32	IV	191EE4T07	Electrical Machines-II	0
33	IV	191EE4T08	Control Systems	0
34	IV	191EE4T09	Power Systems-I	0
35	IV	191ES4T15	Internet of Things	0
36	IV	191EE4L02	Electrical Machines –I Lab	0
37	IV	191EE4L03	Analog Electronic Circuits Lab	0
38	IV	191MC4A05	Employability Skills –II	80
39	IV	191MC4A06	Biology for Engineers	100
40	V	171EE5T10	Power Systems – II	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
41	V	171EE5T11	Power Electronics	0
42	V	171EE5T12	Pulse and Digital Circuits	0
43	V	171EE5T13	Signals and Systems	0
44	V	171EE5E01	Renewable Energy Sources	0
45	V	171EE5E02	Modeling and Analysis of Electrical Machines	0
46	V	171EE5E03	Electrical Safety	0
47	V	171HS5T08	Intellectual Property Rights and Patents	0
48	V	171HS5T06	Employability Skills - III	0
49	V	171EE5L04	Electrical Measurements Lab	0
50	V	171EE5L05	Electrical Machines - II Lab	0
51	V	171EE5L06	Control Systems Lab	0
52	V	171EE5S01	MOOCs - I	0
53	VI	171EE6T14	Power Electronic Controllers andDrives	0
54	VI	171EE6T15	Power System Analysis	0
55	VI	171EE6T16	Micro Processor and Micro Controllers	0
56	VI	171EE6T17	Data Structures	0
57	VI	171EE6E04	Computer Architecture	0
58	VI	171EE6E05	Electrical Distribution Systems	0
59	VI	171EE6E06	Distributed Generation and Microgrid	0
60	VI	171EE6E07	Advanced Control Systems	0
61	VI	171EE6E08	PLC and Applications	0
62	VI	171EE6E09	Instrumentation	0
63	VI	171EE6E10	OOPs through JAVA	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
64	VI	171HS6T07	Employability Skills - IV	0
65	VI	171EE6L07	Data Structures Lab	0
66	VI	171EE6L08	Power Electronics Lab	0
67	VI	171EE6S02	MOOCs - II	0
68	VII	171EE7T18	Utilization of Electrical Energy	5
69	VII	171EE7T19	Linear and Digital IC Applications	10
70	VII	171EE7T20	Power System Operation and Control	15
71	VII	171EE7T21	Switch Gear and Protection	10
72	VII	171EE7E11	Optimization Techniques	10
73	VII	171EE7E12	Digital Signal Processing	100
74	VII	171EE7E13	Special Electrical Machines	5
75	VII	171EE7E14	High Voltage Engineering	0
76	VII	171EE7E15	Electric Power Quality	5
77	VII	171EE7E16	EHVAC Transmission	100
78	VII	171EE7L09	Power Systems Simulation Lab	15
79	VII	171EE7L10	Micro Processor and Micro Controllers Lab	0
80	VII	171EE7P01	Industry Oriented (Internship) Minor Project	0
81	VIII	171EE8E17	HVDC Transmission	10
82	VIII	171EE8E18	Flexible AC Transmission Systems	10
83	VIII	171EE8E19	Power System Reforms	10
84	VIII	171EE8E20	Digital Control Systems	15
85	VIII	171EE8O01	Energy Audit, Conservation and Management	100
86	VIII	171EE8O02	VLSI Design	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
87	VIII	171EE8O03	Unix and Shell Programming	0
88	VIII	171EE8O04	Neural Networks And Fuzzy Logic	0
89	VIII	171EE8O05	Robotics	0
90	VIII	171EE8O06	Vehicular Electric Power Systems	100
91	VIII	171EE8O07	Internet of Things	100
92	VIII	171EE8O08	Cyber Security	100
93	VIII	171EE8P02	Major Project	0
Total number of courses in the academic year 2020-2021				= 93
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				= 16
Percentage of syllabus revision carried out in the academic year 2020-2021 = (16/93)*100				= 17.20%

Program Coordinator

Head of the Department

Head of The Department
Dept: Of Electrical & Electronics Engineering
Aditya Engineering College (A9)

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Title	Course Type	Total Number of Contact Hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T03	Applied Physics	BSC	Theory	3	0	0	3	3
201ES1T02	Programming forProblem Solving using C	ESC	Theory	3	0	0	3	3
201ES1I01	Engineering Graphics and Design	ESC	Integrated	2	0	2	4	3
201HS1L01	Communicative English Lab	HSC	Lab	0	0	3	3	1.5
201BS1L02	Applied Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L02	Programming for Problem Solving using C Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	**16**	**0**	**11**	**27**	**19.5**

II SEMESTER

Course Code	Course Title	Course Title	Course Type	Total Number of Contact Hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T06	Transform Techniques	BSC	Theory	3	0	0	3	3
201ES2T07	Data Structures through C	ESC	Theory	3	0	0	3	3
201ES2T09	Basic Electrical Circuits	ESC	Theory	3	0	0	3	3
201ES2T13	Basic Civil and Mechanical Engineering	ESC	Theory	3	0	0	3	3
201ES2L06	Data Structures through C Lab	ESC	Lab	0	0	3	3	1.5
201ES2L09	Electrical Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201ES2L11	Basic Civil and Mechanical Engineering Lab	ESC	Lab	0	0	3	3	1.5
201MC2L01	Professional Communications Skills Lab	MC	Lab	0	0	3	3	0
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	**17**	**0**	**12**	**29**	**19.5**

Head of The Department
Dept: Of Electrical & Electronics Engineering
Aditya Engineering College (A9)

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	
191BS3T12	Transform Techniques	BSC	3	0	0	3	3
191EE3T02	Analog Electronic Circuits	PCC	3	0	0	3	3
191ES3T11	Python programming	ESC	3	0	0	3	3
191EE3T03	Electrical Circuit Analysis-II	PCC	3	0	0	3	3
191EE3T04	Electrical Machines-I	PCC	3	0	0	3	3
191EE3T05	Electromagnetic Fields	PCC	3	0	0	3	3
191EE3L01	Electrical Circuits Lab	PCC	0	0	3	3	1.5
191ES3L15	Python programming Lab	ESC	0	0	2	2	1
191MC3A03	Employability Skills-I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**7**	**27**	**20.5**

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	
191BS4T17	Numerical methods & Complex Variables	BSC	3	0	0	3	3
191EE4T06	Digital Circuits & Logic Design	PCC	3	0	0	3	3
191EE4T07	Electrical Machines-II	PCC	3	0	0	3	3
191EE4T08	Control Systems	PCC	3	0	0	3	3
191EE4T09	Power Systems-I	PCC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191EE4L02	Electrical Machines –I Lab	PCC	0	0	3	3	1.5
191EE4L03	Analog Electronic Circuits Lab	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills –II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**8**	**28**	**21**

Head of The Department
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V SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171EE5T10	Power Systems – II	PC	3	1	0	4	3
171EE5T11	Power Electronics	PC	3	1	0	4	3
171EE5T12	Pulse and Digital Circuits	PC	3	1	0	4	3
171EE5T13	Signals and Systems	PC	3	1	0	4	3
---	**Professional Elective - I**	PE	3	1	0	4	3
171HS5T08	Intellectual Property Rights and Patents	HSS	2	0	0	2	1
171HS5T06	Employability Skills - III	HSS	0	0	2	2	1
171EE5L04	Electrical Measurements Lab	PC	0	0	3	3	2
171EE5L05	Electrical Machines - II Lab	PC	0	0	3	3	2
171EE5L06	Control Systems Lab	PC	0	0	3	3	2
171EE5S01	MOOCs - I	SS	0	0	0	0	0
		TOTAL	**17**	**5**	**11**	**33**	**23**

VI SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171EE6T14	Power Electronic Controllers and Drives	PC	3	1	0	4	3
171EE6T15	Power System Analysis	PC	3	1	0	4	3
171EE6T16	Micro Processor and Micro Controllers	PC	3	1	0	4	3
171EE6T17	Data Structures	PC	3	1	0	4	3
---	**Professional Elective - II**	PE	3	1	0	4	3
---	**Professional Elective - III**	PE	3	1	0	4	3
171HS6T07	Employability Skills - IV	HSS	0	0	2	2	1
171EE6L07	Data Structures Lab	PC	0	0	3	3	2
171EE6L08	Power Electronics Lab	PC	0	0	3	3	2
171EE6S02	MOOCs - II	SS	0	0	0	0	0
		TOTAL	**18**	**6**	**8**	**32**	**23**

MOOCs – Massive Open Online Courses

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Dept: Of Electrical & Electronics Engineering
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VII SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171EE7T18	Utilization of Electrical Energy	PC	3	1	0	4	3
171EE7T19	Linear and Digital IC Applications	PC	3	1	0	4	3
171EE7T20	Power System Operation and Control	PC	3	1	0	4	3
171EE7T21	Switch Gear and Protection	PC	3	1	0	4	3
---	**Professional Elective - IV**	PE	3	1	0	4	3
---	**Professional Elective - V**	PE	3	1	0	4	3
171EE7L09	Power Systems Simulation Lab	PC	0	0	3	3	2
171EE7L10	Micro Processor and Micro Controllers Lab	PC	0	0	3	3	2
171EE7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	1
		TOTAL	**18**	**6**	**6**	**30**	**23**

VIII SEMESTER

Course Code	Name of the Course	Category	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	**Professional Elective - VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171EE8P02	**Major Project**	PR	0	0	0	0	14
		TOTAL	**6**	**2**	**0**	**8**	**20**

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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Professional Elective - I (V Semester)

S.No	Course Code	Name of the Course
1	171EE5E01	Renewable Energy Sources
2	171EE5E02	Modeling and Analysis of Electrical Machines
3	171EE5E03	Electrical Safety

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171EE6E04	Computer Architecture
2	171EE6E05	Electrical Distribution Systems
3	171EE6E06	Distributed Generation and Microgrid

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171EE6E07	Advanced Control Systems
2	171EE6E08	PLC and Applications
3	171EE6E09	Instrumentation
4	171EE6E10	OOPs through JAVA

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171EE7E11	Optimization Techniques
2	171EE7E12	Digital Signal Processing
3	171EE7E13	Special Electrical Machines

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171EE7E14	High Voltage Engineering
2	171EE7E15	Electric Power Quality
3	171EE7E16	EHVAC Transmission

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171EE8E17	HVDC Transmission
2	171EE8E18	Flexible AC Transmission Systems
3	171EE8E19	Power System Reforms
4	171EE8E20	Digital Control Systems

Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171EE8O01	Energy Audit, Conservation and Management
2	171EE8O02	VLSI Design
3	171EE8O03	Unix and Shell Programming
4	171EE8O04	Neural Networks And Fuzzy Logic
5	171EE8O05	Robotics
6	171EE8O06	Vehicular Electric Power Systems
7	171EE8O07	Internet of Things
8	171EE8O08	Cyber Security

ENGINEERING GRAPHICS AND DESIGN
(Common to EEE & ECE)

I Semester
Course Code: 201ES1I01

L	T	P	C
2	0	2	3

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

- CO1: Make use of fundamentals of Engineering Drawing to sketch basic curves, conic sections, cycloid and involute.
- CO2: Apply the principles of orthographic projections for points, lines and planes.
- CO3: Apply the principles of orthographic projections for solids.
- CO4: Explain the basic functions of drawing software.
- CO5: Apply the software for the orthographic projection of the machine parts.

Mapping of Course Outcomes with Program Outcomes:

	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	-	1
CO2	2	-	-	-	-	-	-	-	-	3	-	1
CO3	2	-	-	-	-	-	-	-	-	3	-	1
CO4	2	-	-	-	2	-	-	-	-	3	-	1
CO5	2	-	-	-	2	-	-	-	-	3	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

Unit - I
Introduction to Engineering Graphics-Principles of Engineering graphics and their significance – Conventions in drawing – Lettering- BIS conventions – Conic Sections by Eccentricity method.

Unit – II
Cycloid -Involute of Circle-Introduction to Orthographic projections- Projection of points.

Unit – III
Projections of Straight Lines -Introduction -Projections of lines inclined to one plane and both the reference planes.

Unit – IV
Projections of planes -Introduction – Projections of perpendicular planes and oblique planes.

Unit – V
Projections of Solids – Introduction – Projections of Prisms and Pyramids inclined to one reference plane.

LIST OF EXPERIMENTS
Exp1
Initiating the Graphics Package; Setting the paper size, setting the limits, units, Using Drawing Aids (functional keys) and control keys.

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Exp2
Selecting commands & Working with drawing.

Exp3
Viewing drawing and Working with coordinates.

Exp4
Draw 2d models using Different colors & font command.

Exp5
Creating simple entities by using draw commands.

Exp6
Manipulating Objects (Modifying Tool Bar).

Exp7
Getting drawing information& working with annotating drawing and practice.

Exp8
Dimensioning drawing and practice.

Exp9
2D Drawing practice.

Exp10
Orthographic Projections.

Exp11
Working with Layouts.

AugExp1
Apply the concept of layers and draw the 2D components.

AugExp2
Apply the concept of blocks and draw the 2D components.

AugExp3
Apply the concepts of Sections in drawing.

AugExp4
Drawing of various engineering components used in industry.

Text Books:

1. N.D.Bhatt, Engineering Drawing, 53rd Edition, Charotar Publishers, 2016.
2. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3rd Edition, Scitech Publishers, Chennai, 2012.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Web Links:

1. https://www.wiziq.com/tutorials/engineering-drawing
2. www.me.umn.edu/courses
3. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online,red woods.edu

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TRANSFORM TECHNIQUES

III Semester | **L T P C**
Course Code: 191BS3T12 | **3 0 0 3**

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

CO 1: Compute Laplace transform of a function.
CO 2: Apply Laplace transform to solve Initial Value Problems.
CO 3: Compute Fourier series of a function.
CO 4: Compute Fourier transform of a function
CO 5: Apply Z- transforms to solve difference equations.

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

UNIT-I:
Laplace Transforms:
Laplace transforms of standard functions, First Shifting theorem, Change of scale, Multiplication with t, Division by t, Transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, Evaluating improper integrals by using Laplace Transform.

UNIT-II:
Inverse Laplace Transforms:
Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise: Computing Laplace transform of f(t) using symbolic toolbox, Solving initial value problems)

UNIT-III:
Fourier series:
Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

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UNIT-IV:

Fourier Transforms:

Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

UNIT-V:

Z-Transforms:

Introduction to power series, Definition of Z-transform, Properties, damping rule, shifting rule, Initial and final value theorem, Inverse Z-transform, Convolution theorem (without proof), Solution of Difference equation by using z-transforms.

Text Books:

1. Advanced Engineering Mathematics, R.K. Jain, S.R.K. Iyengar, 4th Edition, Alpha Science Publications.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley-India.
3. Higher Engineering Mathematics, B.S. Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced engineering mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er.,S. Chand Co. Pvt. Ltd, Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://nptel.ac.in/courses/111105123/
2. http://mathworld.wolfram.com
3. https://www.khanacademy.org

EMPLOYABILITY SKILLS-I

(Common to all branches)

III Semester **L T P C**
Course Code: 191MC3A03 **0 0 2 0**

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

CO1: Solve problems of Series & Analogy for Numbers and Letters
CO2: Solve problems on Coding & Decoding and Divisibility rules
CO3: Solve problems on LCM & HCF and Simple Equations
CO4: Demonstrate Attitude, self-confidence and decision making in different situations
CO5: Develop out of box and lateral thinking, better goal setting and time management

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I:
Aptitude: Number series.
Soft Skills: Attitude, SWOT analysis, self-confidence, self esteem.

UNIT-II:
Aptitude: Number Analogy.
Soft Skills: Decision Making, Situation Reaction Test.

UNIT-III:
Aptitude: Letter series, Letter Analogy, Coding & Decoding.
Soft Skills: Verbal Aptitude-I, synonyms, Antonyms, Spotting of errors.

UNIT-IV:
Aptitude: Divisibility Rules, L.C.M&H.C.F.
Soft Skills: Creativity, Out of box thinking, lateral thinking.

UNIT-V:
Aptitude: Simple Equations.
Soft Skills: Goal setting, Smart goals, Time Management.

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Text Books:

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND.
2. Quantitative Aptitude - Dr. R.S. Aggarwal, S CHAND.
3. Quick Learning Objective General English – Dr. R.S. Aggarwal, S CHAND.

Reference Books:

1. General Intelligence and Test of Reasoning- S CHAND.
2. Logical Reasoning –Arun Sharma, Mc Graw Hill Publications.
3. Quantitative Aptitude - Abhijit Guha Mc Graw Hill Publications.
4. Quantitative Aptitude–Arun Sharma, Mc Graw Hill Publications.
5. A New Approach to Objective English -R.S. Dhillon DGP Publications.

Web Links:

1. www.indiabix.com
2. www.bankersadda.com

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EMPLOYABILITY SKILLS-II

(Common to all branches)

IV Semester **L T P C**
Course Code: 191MC4A05 **0 0 2 0**

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

CO1: Examine the symbols, notations and Venn -diagrams.
CO2: Solve different types of number systems problems.
CO3: Solve ratio & proportion, ages and averages by using simple logic.
CO4: Apply negotiation skills and leadership skills in a team
CO5: Apply listening skills and verbal skills of communication in a team

-Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Aptitude: Symbols &Notations, Direction test.
Soft Skills: Team work, leadership skills.

UNIT-II

Aptitude: Venn Diagrams, Blood Relations.
Soft Skills: Negotiation skills, persuasion& Negotiation, stages of Negotiation.

UNIT-III

Aptitude: Problems on Numbers.
Soft Skills: Listening skills, types of listening, Active listening.

UNIT-IV

Aptitude: Ratio &proportion.
Soft Skills: Verbal Aptitude -II, Idioms & phrases.

UNIT-V

Aptitude: Average and Ages.
Soft Skills: Verbal Aptitude -III, sentence Anagram, Reading Comprehension.

Text Books:

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal , S CHAND.
2. Quantitative Aptitude - Dr. R.S. Aggarwal , S CHAND.
3. Quick Learning Objective General English – Dr. R.S. Aggarwal , S CHAND.

Reference Books:

1. General Intelligence and Test of Reasoning- S CHAND.
2. Logical Reasoning –Arun Sharma, Mc Graw Hill Publications.
3. Quantitative Aptitude - Abhijit Guha Mc Graw Hill Publications.
4. Quantitative Aptitude–Arun Sharma, Mc Graw Hill Publications.
5. A New Approach to Objective English -R.S. Dhillon DGP Publications.

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Syllabus revision Index for 2020-2021

S. No	Name of the course	Percentage of syllabus change
1	Engineering Graphics and Design	40
2	Transform Techniques	60
3	Employability Skills-I	50
4	Employability Skills –II	80

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Engineering Drawing**	**Engineering Graphics and Design**
Course Code	**171ES2T03**	**201ES1I01**
Syllabus	**UNIT-I Introduction to Engineering Drawing:** Lettering, Dimensioning, Types of lines. **Geometrical Constructions:** Construction of regular polygons by general method and inscribing circle method. Special methods for pentagon and hexagon. **Conic Sections:** Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods. **Scales:** Plain Scale, Diagonal Scale and Vernier Scales.	**Unit – I: Introduction to Engineering Graphics**-Principles of Engineering graphics and their significance – Conventions in drawing – Lettering-BIS conventions – Conic Sections by Eccentricity method.
	UNIT-II: Orthographic Projections: Introduction to orthographic projections, Projections of Points, Projections of Lines	**Unit – II: Cycloid** -Involute of Circle-Introduction to Orthographic projections- Projection of points.
	UNIT-III: Projections of Planes: Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.	**Unit – III: Projections of Straight Lines** -Introduction -Projections of lines inclined to one plane and both the reference planes.
	UNIT-IV: Projections of Solids: Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes.	**Unit – IV: Projections of planes** -Introduction – Projections of perpendicular planes and oblique planes.
	UNIT-V: Isometric Projections Isometric Scale, Isometric Projections, Conversion of Isometric views into Orthographic projections.	**Unit – V: Projections of Solids** – Introduction – Projections of Prisms and Pyramids inclined to one reference plane.

		List Of Experiments Exp1: Initiating the Graphics Package; Setting the paper size, setting the limits, units, Using Drawing Aids (functional keys) and control keys. Exp 2: Selecting commands & Working with drawing. Exp 3: Viewing drawing and Working with coordinates. Exp 4: Draw 2d models using different colors & font command. Exp 5: Creating simple entities by using draw commands. Exp 6: Manipulating Objects. Exp 7: Getting drawing information & working with annotating drawing and practice. Exp 8: Dimensioning drawing and practice. Exp 9: 2D drawing practice. Exp 10: Orthographic Projections. Exp 11: Working with Layouts. Exp 12: Engineering Graphics abd Design. Aug Exp 1: Apply the concepts of layers and draw the 2D components. Aug Exp 2: Apply the concepts of blocks and draw the 2D components. Aug Exp 3: Apply the concepts of Sections in drawing. Aug Exp 4: Drawing of various engineering components used in industry.

K.L.Kishore

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mathematics - II	Transform Techniques
Course Code	171BS2T02	191BS3T12
Syllabus	**UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation:** Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method. Errors in polynomial interpolation – Finite differences- Forward Differences-Backward differences – Central differences – Relation between operators - Differences of a polynomial- Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	**UNIT-I: Laplace Transforms:** Laplace transforms of standard functions, First Shifting theorem, change of scale, Multiplication with t, Division by t, transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, evaluating improper integrals by using Laplace Transform.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	**UNIT-II: Inverse Laplace Transforms:** Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise: Computing Laplace transform of f(t) using symbolic toolbox, Solving initial value problems)
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	**UNIT-III: Fourier series:** Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.	**UNIT-IV: Fourier Transforms:** Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT V: Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables-Solution of One-dimensional Wave equation, Heat equation and two-dimensional Laplace equation.	**UNIT-V: Z-Transforms:** Introduction to power series, Definition of Z-transform, Properties, damping rule, shifting rule, Initial and final value theorem, Inverse Z-transform, Convolution theorem (without proof), Solution of Difference equation by using z-transforms

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Employability Skills-I	Employability Skills-I
Course Code	171HS3A10	191MC3A03
Syllabus	**UNIT – I Aptitude:** Number series **Soft Skills**: Importance-Changing industry needs –English, Functional Grammar- Significance, Articles- Usage of A, An, The- Definition – Rules, examples- Prepositions – Definition – Importance, types – usage rules	**UNIT-I: Aptitude:** Number series. **Soft Skills:** Attitude, SWOT analysis, self-confidence, self-esteem.
	UNIT – II: Aptitude: Number Analogy. **Soft Skills:** Tenses, Voice- Importance, -Definitions-usage-rules-types-structures-signal words – examples	**UNIT-II: Aptitude:** Number Analogy. **Soft Skills**: Decision Making, Situation Reaction Test.
	UNIT – III: Aptitude: Letter series, Letter Analogy **Soft Skills:** Speech Definition – importance- conversion rules – usage-structures -examples	**UNIT-III: Aptitude:** Letter series, Letter Analogy, Coding & Decoding. **Soft Skills:** Verbal Aptitude-I, synonyms, Antonyms, Spotting of errors.
	UNIT – IV: Aptitude: Coding &Decoding. **Soft Skills**: Creative product speaking, Auxiliaries A. Primary B. Secondary	**UNIT-IV: Aptitude:** Divisibility Rules, L.C.M&H.C.F. **Soft Skills:** Creativity, Out of box thinking, lateral thinking.
	UNIT – V: Aptitude: Direction Test **Soft Skills:**. Sentences – simplex, complex, compound, sentence improvement	**UNIT-V: Aptitude:** Simple Equations. **Soft Skills**: Goal setting, Smart goals, Time Management.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Employability Skills – II**	**Employability Skills –II**
Course Code	**171HS4A11**	**191MC4A05**
Syllabus	**UNIT – I:** **Aptitude**: Symbols & Notations **Soft Skills:** Subject-Verb- Agreement, Personality Development	**UNIT-I:** **Aptitude:** Symbols &Notations, Direction test. **Soft Skill:** Team work, leadership skills.
	UNIT – II: **Aptitude:** Venn Diagrams, Blood Relations **Soft Skills:** Adjectives, Degree of Comparisons	**UNIT-II:** **Aptitude:** Venn Diagrams, Blood Relations. **Soft Skills:** Negotiation skills, persuasion& Negotiation, stages of Negotiation.
	UNIT – III: **Aptitude:** Puzzle test, Time and Date (Group Reasoning) **Soft Skills**: Art of Communication, Words Often Confused	**UNIT-III:** **Aptitude:** Problems on Numbers. **Soft Skills:** Listening skills, types of listening, Active listening.
	UNIT – IV: **Aptitude:** Cubes & Dice **Soft Skills**: Word Analogy, Effective Listening	**UNIT-IV:** **Aptitude:** Ratio &proportion. **Soft Skills:** Verbal Aptitude -II, Idioms & phrases.
	UNIT – V: **Aptitude:** Seating Arrangements **Soft Skills**: Paragraph Writing, non-verbal communication	**UNIT-V:** **Aptitude:** Average and Ages. **Soft Skills:** Verbal Aptitude -III, sentence Anagram, Reading Comprehension.

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Program Name : B.Tech. in Mechanical Engineering

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential Equations and Linear Algebra	0
3	I	201BS1T02	Engineering Physics	0
4	I	201ES1T03	Essential Electrical and Electronics Engineering	0
5	I	201ES1T05	Engineering Graphics	45
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L01	Engineering Physics Lab	0
8	I	201ES1L03	Essential Electrical and Electronics Engineering Lab	0
9	I	201MC1T01	Environment Science	0
10	II	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	II	201BS2T08	Chemistry of Materials	0
12	II	201ES2T06	Engineering Mechanics	0
13	II	201ES2T08	Programming for Problem Solving using C	0
14	II	201ES2L07	Engineering Workshop	0
15	II	201ES2L12	Computer Aided Drafting Lab	100
16	II	201HS2L02	Professional Communications Skills Lab	0
17	II	201BS2L05	Engineering Chemistry Lab	0
18	II	201ES2L10	Programming for Problem Solving using C Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T11	Integral Transforms and Applications of Partial Differential Equations	40
21	III	191ME3T01	Fluid Mechanics & Hydraulic Machinery	14
22	III	191ME3T02	Computer Aided Engineering Drawing Practice	25
23	III	191ME3T03	Mechanics of Solids	5
24	III	191ME3T04	Thermodynamics	0
25	III	191ME3T05	Metallurgy &Material Science	0
26	III	191ME3L01	Fluid Mechanics & Hydraulic Machines Lab	0
27	III	191ME3L02	Mechanics of Solids &Metallurgy Lab	0
28	III	191MC3A03	Employability skills-I	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
29	III	191MC3A04	Essence of Indian Traditional Knowledge	100
30	IV	191BS4T16	Numerical Methods& Statistical Techniques	100
31	IV	191HS4T04	Managerial Economics and Financial Analysis	0
32	IV	191ES4T15	Internet of Things	100
33	IV	191ME4T06	Production Technology	0
34	IV	191ME4T07	Kinematics of Machinery	20
35	IV	191ME4T08	Thermal Engineering-I	45
36	IV	191ME4L03	Production Technology Lab	0
37	IV	191ME4L04	Computer Aided Machine Drawing	50
38	IV	191MC4A05	Employability Skills -II	0
39	IV	191MC4A06	Biology for Engineers	100
40	V	171ME5T08	Dynamics of Machinery	0
41	V	171ME5T09	Metal Cutting and Machine Tools	0
42	V	171ME5T10	Thermal Engineering -II	0
43	V	171ME5T11	Design of Machine members-II	0
44	V	171ME5T12	Operations Research	0
45	V	171ME5E01	Automobile Engineering	0
46	V	171ME5E02	Mechanical Vibrations	0
47	V	171ME5E03	Additive Manufacturing	0
48	V	171HS5T06	Employability Skills -III	0
49	V	171ME5L02	Theory of Machines Lab	0
50	V	171ME5L03	Thermal Engineering Lab	0
51	V	171ME5S01	MOOCS-I	0
52	VI	171ME6T13	Heat Transfer	0
53	VI	171ME6T14	Refrigeration and Air Conditioning	0
54	VI	171ME6T15	Metrology and Instrumentation	0
55	VI	171ME6E04	Robotics	0
56	VI	171ME6E05	Design for Manufacturing	0
57	VI	171ME6E06	Non-Destructive Evaluation	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
58	VI	171ME6E07	Unconventional Machining Processes	0
59	VI	171ME6E08	Industrial Hydraulics and Pneumatics	0
60	VI	171ME6E09	Quality &Reliability Engineering	0
61	VI	171HS6T07	Employability Skills-IV	0
62	VI	171ME6L04	Machine Tools Lab	0
63	VI	171ME6L05	Heat Transfer Lab	0
64	VI	171ME6L06	Metrology & Instrumentation Lab	0
65	VI	171ME6S02	MOOCS-II	0
66	VII	171ME7T16	CAD/CAM	5
67	VII	171ME7T17	Mechatronics	20
68	VII	171ME7T18	Finite Element Methods	25
69	VII	171ME7T19	Power Plant Engineering	10
70	VII	171ME7E10	Computational Fluid Dynamics	0
71	VII	171ME7E11	Green Engineering Systems	0
72	VII	171ME7E12	Nano Materials and Technology	10
73	VII	171ME7E13	Gas Dynamics	40
74	VII	171ME7E14	Condition Monitoring	16
75	VII	171ME7E15	Flexible Manufacturing Systems	100
76	VII	171ME7L07	CAD/CFD Lab	60
77	VII	171ME7L08	CAM/Mechatronics Lab	50
78	VII	171ME7P01	Industry Oriented (Internship) Mini Project	0
79	VIII	171ME8E16	Production Planning and Control	0
80	VIII	171ME8E17	Advanced Materials	0
81	VIII	171ME8E18	Thermal Equipment Design	20
82	VIII	171CE8O04	Neural Networks and Fuzzy Logic	100
83	VIII	171EE8O03	Data Base Management Systems	0
84	VIII	171ME8P02	Major Project	0
Total number of courses in the academic year 2020-2021				**= 84**
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				**= 19**
Percentage of syllabus revision carried out in the academic year 2020-2021 = (19/84)*100				**= 22.61**

Program Coordinator

Head of the Department

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Department of Mechanical Engineering
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PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T02	Engineering Physics	BSC	Theory	3	0	0	3	3
201ES1T03	Essential Electrical and Electronics Engineering	ESC	Theory	3	0	0	3	3
201ES1T05	Engineering Graphics	ESC	Theory	1	0	4	5	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L01	Engineering Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L03	Essential Electrical and Electronics Engineering Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	15	0	13	28	19.5

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T08	Chemistry of Materials	BSC	Theory	3	0	0	3	3
201ES2T06	Engineering Mechanics	ESC	Theory	3	0	0	3	3
201ES2T08	Programming for Problem Solving Using C	ESC	Theory	3	0	0	3	3
201ES2L07	Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201ES2L12	Computer Aided Drafting Lab	ESC	Lab	0	0	3	3	1.5
201HS2L02	Professional Communications Skills Lab	HSMC	Lab	0	0	3	3	1.5
201BS2L05	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES2L10	Programming for Problem Solving Using C Lab	ESC	Lab	0	0	3	3	1.5
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	14	0	15	29	19.5

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III SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS3T11	Integral Transforms And Applications Of Partial Differential Equations (CE, ME, Ag.E)	BSC	3	0	0	3	3
191ME3T01	Fluid Mechanics and Hydraulic Machinery	PCC	3	0	0	3	3
191ME3T02	Computer Aided Engineering Drawing Practice	PCC	2	0	2	4	3
191ME3T03	Mechanics of Solids	PCC	3	0	0	3	3
191ME3T04	Thermodynamics	PCC	3	0	0	3	3
191ME3T05	Metallurgy & Material Science	PCC	3	0	0	3	3
191ME3L01	Fluid Mechanics & Hydraulic Machines Lab	PCC	0	0	3	3	1.5
191ME3L02	Mechanics of Solids & Metallurgy Lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	19	0	10	29	21

IV SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS4T16	Numerical methods & Statistical Techniques (CE, ME, Ag. E)	BSC	3	0	0	3	3
191HS4T04	Managerial Economics & Financial Analysis	HSMC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191ME4T06	Production Technology	PCC	3	0	0	3	3
191ME4T07	Kinematics of Machinery	PCC	3	0	0	3	3
191ME4T08	Thermal Engineering-I	PCC	3	0	0	3	3
191ME4L03	Production Technology Lab	PCC	0	0	3	3	1.5
191ME4L04	Computer Aided Machine Drawing	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	20	0	8	28	21

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V SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171ME5T08	Dynamics of Machinery	PC	3	1	---	4	3
171ME5T09	Metal Cutting and Machine Tools	PC	3	1	---	4	3
171ME5T10	Thermal Engineering – II	PC	3	1	---	4	3
171ME5T11	Design of Machine Members – II	PC	3	1	---	4	3
171ME5T12	Operations Research	PC	3	1	---	4	3
---	Professional Elective – I	PE	3	1	---	4	3
171HS5T06	Employability Skills – III	HSS	2	---	---	2	1
171ME5L02	Theory of Machines Lab	PC	---	---	3	3	2
171ME5L03	Thermal Engineering Lab	PC	---	---	3	3	2
171ME5S01	MOOCs – I	SS	---	---	---	---	---
		TOTAL	20	6	6	32	23

VI SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171ME6T13	Heat Transfer	PC	3	1	---	4	3
171ME6T14	Refrigeration and Air – Conditioning	PC	3	1	---	4	3
171ME6T15	Metrology and Instrumentation	PC	3	1	---	4	3
---	Professional Elective – II	PE	3	1	---	4	3
---	Professional Elective – III	PE	3	1	---	4	3
171HS6T07	Employability Skills - IV	HSS	2	---	---	2	1
171ME6L04	Machine Tools Lab	PC	---	---	3	3	2
171ME6L05	Heat Transfer Lab	PC	---	---	3	3	2
171ME6L06	Metrology / Instrumentation Lab	PC	---	---	3	3	2
171ME6S02	MOOCs – II	SS	---	---	---	---	---
		TOTAL	17	5	09	31	22

MOOCs – Massive Open Online Courses

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VII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171ME7T16	CAD / CAM	PC	3	1	---	4	3
171ME7T17	Mechatronics	PC	3	1	---	4	3
171ME7T18	Finite Element Methods	PC	3	1	---	4	3
171ME7T19	Power Plant Engineering	PC	3	1	---	4	3
---	Professional Elective - IV	PE	3	1	---	4	3
---	Professional Elective - V	PE	3	1	---	4	3
171ME7L07	CAD / CFD Lab	PC	---	---	3	3	2
171ME7L08	CAM / Mechatronics Lab	PC	---	---	3	3	2
171ME7P01	Industry Oriented (Internship) Minor Project	PR	---	---	---	---	1
		TOTAL	18	6	6	30	23

VIII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits(C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
---	Professional Elective - VI	PE	3	1	---	4	3
---	Open Elective	OE	3	1	---	4	3
171ME8P02	Major Project	PR	---	---	---	---	14
		TOTAL	6	2	---	8	20

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Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171ME5E01	Automobile Engineering
2	171ME5E02	Mechanical Vibrations
3	171ME5E03	Additive Manufacturing

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171ME6E04	Robotics
2	171ME6E05	Design for Manufacturing
3	171ME6E06	Non-Destructive Evaluation

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171ME6E07	Unconventional Machining Processes
2	171ME6E08	Industrial Hydraulics and Pneumatics
3	171ME6E09	Quality and Reliability Engineering

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171ME7E10	Computational Fluid Dynamics
2	171ME7E11	Green Engineering Systems
3	171ME7E12	Nano Materials and Technology

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171ME7E13	Gas Dynamics
2	171ME7E14	Condition Monitoring
3	171ME7E15	Flexible Manufacturing Systems

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171ME8E16	Production Planning and Control
2	171ME8E17	Advanced Materials
3	171ME8E18	Thermal Equipment Design

Open Elective (VIII Semester)

S.No	Course Code	Name of the Course
1	171ME8O01	Java Programming
2	171ME8O02	Electrical Safety Management
3	171EE8O04	Neural Networks And Fuzzy Logic
4	171CE8O02	Database Management Systems
5	171ME8O03	Entrepreneur Resource Planning
6	171ME8O04	Computer Graphics

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ENGINEEING GRAPHICS
(Common to CE, ME, Min.E, PT & Ag.E)

I Semester

Course Code: 201ES1I05

L	T	P	C
1	0	4	3

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

- CO1: Sketch the polygons, conics and scales by using the principles of drawing
- CO2: Draw Orthographic projections of points and lines..
- CO3: Draw Orthographic projections of planes in various positions
- CO4: Draw Orthographic projections of solids in various positions.
- CO5: Construct isometric scale and isometric projections

Mapping of Course Outcomes with Program Outcomes:

	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	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

Unit - I

Introduction to Engineering Drawing:Lettering, Dimensioning, Types of lines.
Conic Sections:Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.
Scales:Plain Scale, Diagonal Scale and Vernier Scales.

Unit – II

Orthographic Projections:Introduction to orthographic projections, Projections of Points, Projections of Lines.

Unit – III

Projections of Planes:Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.

Unit – IV

Projections of Solids:Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

Unit – V

Isometric Projections:Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

Text Books:

1. Engineering Drawing by N.D.Bhatt, Charotar Publishers
2. Engineering Drawing by K.L.Narayana and P. Kannaiah. Scitech Publishers.

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Reference Books:

1. Engineering Drawing by K. Venugopal, New Age Publications
2. Engineering Drawing by M. B. shah & B.C. Rana., Pearson's Publishers.
3. Engineering Drawing by B. Agrawal & C.M. Agrawal, Tata Mcgraw Hill Publishers

Web Links:

1. http://nptel.ac.in/courses/112103019
2. http://freevideolectures.com/Course/3420/Engineering-Drawing
3. http://engineeringdrawing.org
4. http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html

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INTEGRAL TRANSFORMS AND APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
(Common to CE, ME, Ag. E)

III Semester
Course Code: 191BS3T11

L	T	P	C
3	0	0	3

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

CO 1: Compute the Fourier series of a function.
CO 2: Compute the Fourier transform of a function.
CO 3: Compute Laplace transform of a function.
CO 4: Apply Laplace transform to solve initial value problems.
CO 5: Solve one dimensional heat equation, wave equation and two dimensional Laplace equation

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

UNIT-I:
Fourier series:
Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

UNIT-II:
Fourier Transforms:
Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

UNIT-III:
Laplace Transforms:
Laplace transforms of standard functions, First Shifting theorem, Change of scale, Multiplication with t, Division by t, Transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, Evaluating improper integrals by using Laplace Transform.

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UNIT-IV:

Inverse Laplace Transforms:

Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem,

Solving differential equations and integro-differential equations using Laplace transforms,

**(MATLAB Exercise: Computing Laplace transform of f(t) using symbolic toolbox, Solving initial value problems)

UNIT-V:

Application of PDE:

Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Textbooks:

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyengar, 4th Edition, Alpha Science Publications
2. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley-
3. Higher Engineering Mathematics, B.S.Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced engineering mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er.,S. Chand Co. Pvt. Ltd, Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Weblinks:

1. https://nptel.ac.in/courses/111105123/
2. https://nptel.ac.in/courses/111105093/
3. https://www.khanacademy.org

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COMPUTER AIDED ENGINEERING DRAWING PRACTICE

(Common to ME & Min. E)

III Semester
Course Code: 191ME3T02

L	T	P	C
2	0	2	3

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

CO 1: Draw the sectional view of the solids.
CO 2: Develop the surfaces of solids like prism, pyramid, cone and cylinder.
CO 3: Sketch the intersection of solids and Isometric Views.
CO 4: Draw the orthographic projections of the machine parts through AutoCAD.
CO 5: Draw the isometric projections of the machine parts through AutoCAD.

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	-	1
CO2	1	-	-	-	-	-	-	-	-	1	-	1
CO3	1	-	-	-	2	-	-	-	-	1	-	1
CO4	1	-	-	-	2	-	-	-	-	1	-	1
CO5	1	-	-	-	2	-	-	-	-	1	-	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:
Sections of Solids: Cylinder, Cone, Prism and Pyramid.
Development of Surfaces: Cylinder, Cone, Prism and Pyramid

UNIT-II:
Intersection of Solids: Cylinder, Cone, Prism and Pyramid.

UNIT-III:
Isometric Projections: Conversion of orthographic views to isometric views.

UNIT-IV:
Computer Aided Drafting: 2D wire frame modelling, 3D wire frame modelling. View point coordinates and view(s) displayed, Examples to exercise different options like save, Restore, Delete, Joint, Single option.

UNIT-V:
Computer Aided Solid Modeling: Isometric projections, Orthographic projections of isometric projections,Modeling of simple solids, Modeling of Machines & Machine Parts.

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Textbooks:

1. Engineering Drawing, N.D Bhatt, Charotar Publications, 53rd Edition.
2. Text book of Engineering Drawing with Auto-CAD, K. Venkata Reddy, B.S. Publications, 4th Edition.

Reference Books:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex Publication.
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publication.
3. Engineering Drawing and Graphics using AutoCAD, T. Jeyapoovan, Vikas Publication.
4. Engineering Drawing, Auto CAD, K. Venugopal, V. Prabhu Raja, New Age Publication.

Weblinks:

1. http://nptel.ac.in/courses/112103019/35.
2. http://nptel.ac.in/courses/112103019/33.
3. http://www.engineeringdrawing.org/category/projection_of_solids.
4. http://www.engineeringdrawing.org/category/section_of_solids.

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KINEMATICS OF MACHINERY

IV Semester **L T P C**
Course Code: 191ME4T07 **3 0 0 3**

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

CO 1: Explain the inversions of a kinematic chain and its applications.
CO 2: Construct the velocity and acceleration diagrams using Relative velocity method and Instantaneous Centre method.
CO 3: Construct displacement diagram and profile of Cam with different types of follower motions.
CO 4: Calculate the velocities of different components of a gear train.
CO 5: Explain how real time machines work and operate.

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	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	-
CO4	1	2	1	-	-	-	-	-	-	-	-	-
CO5	1	1	1	1	-	-	-	-	-	-	-	-

Mapping of course outcomes with Program Specific Outcomes:

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

UNIT-I:
Classification of mechanisms- Basic kinematic concepts and definitions- Degree of freedom, mobility- Grashof's law, Kinematic inversions of four bar chain and slider crank chains-Limit positions- Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line generators- Universal Joint- Rocker mechanisms.

UNIT-II:
Kinematics: Plane motion of body: Instantaneous Centre of rotation, centrode and axode - relative motion between two bodies – Kennedy's three centres in line theorem – Graphical determination of instantaneous centre for simple bar four bar and single slider crank chain mechanisms and determination of angular velocity of points and links.
Motion of a link in machine - Determination of Displacement, velocity and acceleration for a Simple Four Bar Mechanism, Single slider crank chain mechanism, Double slider crank chain mechanism (Whitworth Quick Return Motion mechanisms).

UNIT-III:
CAMS: Definition and classification of cams and followers - their uses - Terminology - Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation, Cycloidal motion for Knife edge, Flat face and Roller

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follower and offset follower.

UNIT-IV:

Power Transmission: Introduction –Modes of power transmission applications.

Gears and Gear trains: Classification, Terminology, Law of Gearing, path of contact, arc of contact. Interferences, methods of avoiding interferences. Simple gear train, compound gear train, reverted gear train, epicyclical gear train and Differential.

UNIT-V:

Practical Applications: Design and fabrication of any one of the following mechanisms: Whitworth Quick Return Mechanism, Oscillating Cylinder Mechanism, Elliptical Trammel, Manual/Motorized Scotch Yoke Mechanism Piston, Bench Tapping Machine, Mini Conveyor using Geneva Mechanism, Mini Hacksaw Powered by Beam Engine.

Textbooks:

1. Theory of Machines, Thomas Bevan, 3rd edition, CBS Publishers & Distributors, 2005.
2. Theory of Machines – S. S. Rattan – TMH.
3. Theory of Mechanisms and Machines – Amithaba Ghosh and A. K. Mallik – East-West Press.

Reference Books:

1. Cleghorn W.L., Mechanisms of Machines, Oxford University Press, 2005.
2. Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGrawHill, 2009.
3. Ghosh A. and Mallick A.K., Theory of Mechanisms and Machines, Affiliated East West Pvt. Ltd, New Delhi, 1988.
4. Kinematics of Machinery through Hyper Works J.S. Rao Springer Publ.
5. Theory of Machines by Jagadishlal-Metropolitan Book Co.,
6. Theory of Machines by RS Khurmi and J K Gupta – S Chand Publishers.

Web Links:

1. https://en.wikiversity.org/wiki/Theory_of_Machines.
2. https://www.slideshare.net/rajendratelvekar/theory-of-machines-lecturer-notes.
3. http://nptel.ac.in/courses/112104121/1.

Prasad

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THERMAL ENGINEERING-I

IV Semester | **L T P C**
Course Code: 191ME4T08 | **3 0 0 3**

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

- CO 1: Differentiate the ideal, air standard cycles and actual thermodynamic cycles.
- CO 2: Evaluate the Engine performance based on the experimental data
- CO 3: Analyze the fueling system and combustion behaviour of SI engine
- CO 4: Analyze the fueling system and combustion behaviour of CI engine
- CO 5: Explain the formation of emissions and its control strategies of both SI & CI Engines.

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	-	-	-	-	1
CO2	3	-	-	-	-	3	1	-	-	-	-	1
CO3	3	-	-	-	-	3	1	-	-	-	-	1
CO4	3	-	-	-	-	3	1	-	-	-	-	1
CO5	3	-	-	-	-	3	2	-	-	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I:

Actual Cycles and Engine Construction: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines; Constructional Details of Four Stroke SI and CI Engines, Working Principle, Actual Indicator Diagram, Two Stroke Engine Construction and Operation, Comparison of Four Stroke and Two Stroke Engine Operation, Firing Order and Its Significance.

UNIT-II

ENGINE TESTING & PERFORMANCE

Engine Performance Testing & Numerical- methods and Performance Characteristics; Testing and measurement equipment- dynamometers, Air & Fuel consumption, temperature, etc. Variables Affecting Engine Performance, Performance Maps. Lubrication and Cooling systems, Introduction to Supercharging and Turbocharging

UNIT-III:

SI ENGINE FUELING & COMBUSTION

Carburetor Working Principle, Requirements of an Automotive Carburetor, and types, Fuel Injection Systems; Pre-mixed charge combustion, SI Engine Combustion Conceptual models, Thermodynamic Analysis of Combustion, Cycle-to-Cycle

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Combustion variations and Knocking Combustion.

UNIT-IV:
CI ENGINE FUELING & COMBUSTION
Fuel Injection and Spray Structure: Fuel Atomization and Droplet size distribution, Sauter Mean Diameter, Spray Penetration. CI Engine Combustion Conceptual Models: Conventional and Dec's Combustion Models. Diesel Combustion Process Characterization: Ignition Delay, Effect of Engine and Operational Parameters on Delay, Pre-mixed Combustion, Mixing Controlled Combustion. Thermodynamic Analysis. Multi Pulse Injections, Introduction to Low Temperature Combustion Like: Homogeneous Charge Compression Ignition(HCCI), Fuel Stratified Charge combustion/ Reactivity Controlled Compression Ignition (RCCI) Technologies, Pre-mixed Charge Compression (PCCI) and Dual fuel technologies

UNIT-V:
FORMATION OF ENGINE EMISSIONS & CONTROL TECHNOLOGIES (SI & CI)
Emission Effects on Health & Environment: Sources of Engine emissions: Formation of CO, NO, UBHC, Soot and Particulate Matter. Diesel NOx-Particulate Trade off: Effect of SI Design and operating variables: Effect of Diesel Engine Design and operating Variables. SI Engine Emission Control Technology: Add-on systems for treatment of Emissions with in Engine, Exhaust After treatment. CI Engine Emission Control Technology: Application of EGR, Exhaust after treatment and new engine technologies for emission control.

Textbooks:
1. IC Engines, M.L. Mathur & R.P. Sharma, Dhanpath Rai & Sons
2. Engine Emissions, Pollutant Formation and Advances in Control Technology, B.P. Pundir, Narosa Publishing House

Reference Books:
1. IC Engines Fundamentals, John B. Heywood, Mc Graw Hill Publications
2. Engineering Fundamentals of I C Engines, Wiliard W.Pulkrabek, Prentice Hall Publications
3. Mixture Formation in Internal Combustion Engines, Carsten Baumgaten, Springer Pub
4. Thermal Engineering, PL Ballaney, Khanna Publishers, 25th Edition.

Weblinks:
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/

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COMPUTER AIDED MACHINE DRAWING

IV Semester **L T P C**
Course Code: 191ME4L04 **0 0 3 1.5**

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

CO 1: Discuss 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	-	-	-	-	2	-	1
CO2	-	1	-	-	2	-	-	-	-	2	-	1
CO3	-	1	-	-	2	-	-	-	-	2	-	1
CO4	-	1	-	-	2	-	-	-	-	2	-	1
CO5	-	1	-	-	2	-	-	-	-	2	-	1
CO6	-	1	-	-	2	-	-	-	-	2	-	1

Mapping of course outcomes with Program Specific Outcomes:

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

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, 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.

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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 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.

Note: Sheets under unit I need to be practiced with any one basic 2D drafting software. Sheets under assembly drawing need to be practiced with any one solid modelling software. Sheets under production drawing need to be practiced with Drafting and solid modelling software.

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.

Textbooks:

1. Machine Drawing, N.Siddeswar, P.Kannaiah, V.V.S.Sastry, Mcgraw hill education.
2. Machine Drawing, G.R.Nagpal, Khanna publications.
3. . Machine Drawing, N.D.Bhatt.

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.

Weblinks:

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

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MECHATRONICS

VII Semester L T P C

Course Code: 171ME7T17 3 1 0 3

Course Outcomes:

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

CO 1: Summarize the different types of mechatronics systems and sensors.
CO 2: Classify the different types of solid state electronic devices.
CO 3: Describe various types of actuators.
CO 4: Choose the appropriate controller or processor.
CO 5: Make use of data interfacing and data acquisition

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	2	-	-	1	-	-	-	-	-	-
CO2	-	2	-	-	1	-	-	-	-	-	-	-
CO3	1	2	2	-	-	1	-	-	-	-	-	-
CO4	-	-	-	-	1	-	-	-	-	-	1	-
CO5	-	1	-	-	2	-	-	-	-	-	1	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Mechatronics systems:

Elements & levels of mechatronics system, Mechatronics design process, System, Measurement systems, Control systems, Microprocessor-based controllers, Advantages and disadvantages of mechatronics systems.

Sensors and transducers:

Types, Displacement, Position, Proximity, Velocity, Motion, Force, Acceleration, Torque, Fluid pressure, Liquid flow, Liquid level, Temperature and light sensors.

UNIT-II

Solid state and digital electronic devices:

DIAC, TRIAC and LEDs. Analog signal conditioning, Operational amplifiers, Noise reduction, Filtering, Digital electronics and systems, Digital logic control, microprocessors and micro controllers.

UNIT-III

Hydraulic and pneumatic actuating systems:

Fluid systems, Hydraulic systems, and pneumatic systems, Components, Control valves, Electro-pneumatic, Hydro-pneumatic, Electro-hydraulic servo systems.

Mechanical and Electrical actuating systems:
Mechanical actuating systems and electrical actuating systems – basic principles and elements.

UNIT-IV
Programmable logic controller:
Basic Structure – Memory - Input / Output Processing – Programming – Mnemonics – Timers, Internal relays and counters – Shift Registers – Master and Jump Controls – Data Handling – Analogs Input / Output – Selection of a PLC – PLC Applications

UNIT-V
Dynamic models and analogies:
System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.
System and interfacing and data acquisition:
Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, Block diagrams, Typical layouts, Interfacing motor drives.

Text Books:

1. Mechatronics Integrated Mechanical Electronics Systems, K P Ramachandran, GK Vijaya Raghavan & MS Bala sundaram, WILEY India Edition.
2. Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering, W. Bolton, 4th Edition, pearson publication.

Reference Books:

1. Mechatronics, Smaili A, MradF, Oxford Higher Education, Oxford University Press.
2. Mechatronics Source Book, Newton C Braga, Thomson Publications, Chennai.
3. Mechatronics, N. Shanmugam, Anuradha AgenciesPublishers
4. Mechatronics System Design, Devdasshetty, Richard, Thomson Publications, Chennai.

Web Links:

1. https://www.electronicshub.org/different-types-sensors/
2. https://en.wikipedia.org/wiki/Solid-state_electronics
3. http://www.htl-worldwide.com/the-difference-between-pneumatic-hydraulic- and-electrical-actuators/
4. https://www.worldscientific.com/worldscibooks/10.1142/10193

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FINITE ELEMENT METHODS

VII Semester L T P C

Course Code: 171ME7T18 3 1 0 3

Course Outcomes:

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

- CO 1: Summarize the finite element methods and involved procedure.
- CO 2: Apply finite element methods to trusses and beams.
- CO 3: Solve structural problems using CST and axis – symmetric formulation.
- CO 4: Apply finite elements to higher order, iso parametric elements, and one Dimensional heat transfer analysis.
- CO 5: Apply finite element methods to dynamic analysis.

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	PO1 1	PO1 2
CO 1	2	1	-	-	2	-	-	-	3	-	-	-
CO 2	3	2	3	-	2	-	-	-	-	-	-	-
CO 3	3	2	3	-	2	-	-	-	-	-	-	-
CO 4	2	2	2	-	3	-	-	-	-	-	-	-
CO 5	3	2	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Fundamental concepts:

Introduction to finite element method, concepts of solid mechanics - stress and equilibrium, boundary conditions, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variation and weighted residual methods, concept of potential energy. One dimensional problems – bar element.

UNIT –II

Analysis of trusses:

Introduction, analysis of plane trusses, local and global stiffness matrix, treatment of boundary conditions, solutions, temperature effects.

Analysis of beams:

Formulation, load vector, boundary conditions, shear force and bending moment, solutions.

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UNIT-III

CST and Axis - symmetric problems:

Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axis - symmetric problems.

UNIT –IV

Higher order and isoparametric elements:

One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

Steady State Heat Transfer Analysis:

One dimensional analysis of conduction, convection problems and fins.

UNIT-V

Dynamic Analysis:

Formulation of finite element model, element consistent and lumped mass matrices, evaluation of Eigen values and Eigen vectors, free vibration analysis

Text Books:

1. Introduction to Finite Elements in Engineering, T.R. Chandrupatla and A.D. Belegundu, PHI publications, 3rd edition.
2. A First Course in the Finite Element Method, Daryl L. Logan, Cengage Learning India Private Limited, 5th edition.

Reference Books:

1. The finite element method in engineering, S.S. Rao, Butterworth-Heinemann, 5th edition.
2. An Introduction to the Finite Element Method, J.N. Reddy, McGraw Hill Education, 3rd edition.

Web Links:

1. https://nptel.ac.in/courses/112104115/
2. https://engineering.purdue.edu/~aprakas/CE297/CE297-Ch6.pdf
3. https://www.open.edu/openlearn/science-maths- technology/introduction-finite-element-analysis/content-section-1.5

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GAS DYNAMICS
(Professional Elective - V)

VII Semester L T P C

CourseCode: 171ME7E13 3 1 0 3

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

CO 1: Illustrate the differences between compressible and incompressible flows.
CO 2: Explain the behavior of isentropic of flow of an ideal gas.
CO 3: Evaluate the performance of area changing devices called nozzles.
CO 4: The governing equations in simple frictional flow.
CO 5: Analyze the effect of heat transfer on flow parameters using Fanno and Rayleigh lines.

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	-	-	-	-	-	-	-
CO 2	2	1	-	-	2	-	-	-	-	-	-	-
CO 3	3	2	-	-	2	-	2	-	-	-	-	-
CO 4	2	1	-	-	2	-	-	-	-	-	-	-
CO 5	-	3	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Introduction to gas dynamics:

Control volume and system approaches acoustic waves and sonic velocity – mach number – classification of fluid flow based on mach number – mach cone- compressibility factor – general features of one dimensional flow of a compressible fluid – continuity and momentum equations for a control volume.

UNIT-II

Isentropic flow of an ideal gas:

Basic equation – stagnation enthalpy, temperature, pressure and density-stagnation, acoustic speed – critical speed of sound- dimensionless velocity-governing equations for isentropic flow of a perfect gas – critical flow area – stream thrust and impulse function.

UNIT-III

Isentropic Flow with area change:

Steady one dimensional isentropic flow with area change-effect of area change on flow parameters- chocking- convergent nozzle – performance of a nozzle under decreasing back pressure -De lavel nozzle – optimum area ratio effect of backpressure – nozzle discharge coefficients – nozzle efficiencies.

UNIT- IV

Simple frictional flow:

Adiabatic flow with friction in a constant area duct- governing equations – fanno line limiting conditions – effect of wall friction on flow properties in an Isothermal flow with friction in a constant area duct- governing equations – limiting conditions. Steady one dimensional flow with heat transfer in constant area ducts- governing equations Rayleigh line entropy change caused by heat transfer – conditions of maximum enthalpy and entropy.

UNIT-V

Effect of heat transfer on flow parameters:

Intersection of Fanno and Rayleigh lines. Shock waves in perfect gas- properties of flow across a normal shock – governing equations – RankineHugoniat equations – Prandtl's velocity relationship – converging diverging nozzle flow with shock thickness – shock strength.

Text Books:

1. Fundamental of Gas dynamics, 2nd edition– Zucker- Wileypublishers.
2. Fundamentals of compressible flow with aircraft and rocket propulsion- S. M. Yahya, 5th Edition 2016, New Age International publishers.

Reference Books:

1. Compressible fluid flow, A. H. Shapiro, John Wiley And Sons Publishers, volume1.
2. Elements of gas dynamics – Liepman & Roshko.
3. Aircraft & Missile propulsion –Zucrow.
4. Gas dynamics – M.J. Zucrow & Joe D.Holfman.

Web Links:

1. https://nptel.ac.in/courses/112106166
2. https://link.springer.com/article/10.1007/BF00827527
3. https://nptel.ac.in/courses/112103021/15
4. https://books.google.co.in/books?isbn=0070606285

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CAM/MECHATRONICS LAB

VII Semester	L T P C
Course Code: 171ME7L08	0 0 3 2

Course Outcomes:

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

CO1: Analyze the different transducers by using DYNA 1750 Transducers Kit.
CO2: Construct a ladder diagram for logical operations.
CO3: Develop a Hydraulic circuit in AUTOMATION STUDIO Software.
CO4: Make use of Automated CNC Tool path & G-Code generation using Pro/E/Master CAM.
CO5: Construct a CNC programming for turning and milling process.

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	-	1	-	-	-	-	-	-	2	-
CO3	3	2	-	1	-	-	-	-	-	-	2	-
CO4	3	2	-	1	-	-	-	-	-	-	1	-
CO5	3	2	-	1	-	-	-	-	-	-	2	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

List of Experiments:

Section A: Mechatronics Lab

1. Characteristics of LVDT and Strain gauge by using DYNA 1750kits.
2. Characteristics of Summing Amplifier and Reflective Opto Transducer.
3. Ladder programming Logic gates, Timers, counters &digital & Analogy sensors
4. Draw & Simulate the Hydraulic circuit for series & parallel cylinders Connection.
5. Draw & Simulate Meter-in, Meter-out and hydraulic press and clamping.

Section B: CAM Lab

6. Practice on CNC Sinutrain Turning.
7. Practice on CNC Sinutrain Milling.
8. CNC programming for turned components using FANUC Controller
9. CNC programming for milled components using FANUC Controller
10. Automated CNC Tool path & G-Code generation using Pro/E/Master CAM

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List of Augmented Experiments:

Mechatronics Lab

(Any one of the following experiments can be performed)

11. Ladder programming for Traffic Light control, Water level control and Lift control Modules.
12. Draw & Simulate Meter-in, Meter-out and hydraulic press and clamping.

CAM Lab

(Any one of the following experiments can be performed)

13. Machining of simple component on NC lathe by transferring NC code from a CAM package through RS232.
14. Machining of simple component on NC milling by transferring NC code from a CAM package through RS232.

Reference Books:

1. Mechatronics, Smaili A, Mrad F, Oxford Higher Education, Oxford University Press.
2. Automation, Production systems & Computer integrated Manufacturing, M.P. Groover, Pearson publications Education.

Web Links:

1. https://nptel.ac.in/courses/112102011/11
2. https://www.famictech.com/pro/online-demo-professional.asp
3. https://nptel.ac.in/courses/112103174/35
4. https://en.wikipedia.org/wiki/G-code

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THERMAL EQUIPMENT DESIGN
(Professional Elective-VI)

VIII Semester L T P C

Course Code:171ME8E18 3 1 0 3

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

CO 1: Explain the different types of heat exchangers.
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 characteristics of single vapor's.
CO 5: Estimate the heat transfer performance in vaporizers, evaporator.

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	3	2	1	-	2	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-
CO4	-	2	2	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I
Classification of Heat Exchangers:
Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Cascaded plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.

UNIT-II
Double Pipe Heat Exchanger:
Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature. 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.

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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.

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, 1stEdition.
2. Fundamentals of Heat Exchanger Design, Ramesh K. Shah &Dusan P. Sekulic, Wiley Wiley India Pvt Ltd, 1stEdition.

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 Edition
3. Cooling Towers, J.D.Gurney and I.A. Cotter, Elsevier Science Ltd, 1stEdition.

Web Links:

1. http://nptel.ac.in/courses/103103027/
2. https://www.slideshare.net/acpammar/heat-exchangers-35430932
3. www.coursehero.com/file/14558795/Lecture-1-Thermal-Equipment-Design

CAD/ CFD LAB

VII Semester L T P C

Course Code: 171ME7L07 0 0 3 2

Course Outcomes:

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

- CO 1: Develop the various components using Cad software.
- CO 2: Explain the concepts of Drafting.
- CO 3: Analyze deflection and stresses in 2D and 3DBeams
- CO 4: Model the temperature distribution in case of Fin by using the BC.
- CO 5: Solve heat equations, conduction equation & Parabolic PDE equations
- CO 6: Apply the concepts FDM to solve problems in heat transfer.

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	-	2
CO2	-	1	2	-	-	-	-	-	-	1	-	3
CO3	-	3	2	-	1	-	-	-	-	2	-	2
CO4	-	3	2	-	1	-	-	-	-	-	-	2
CO5	-	3	2	-	1	-	-	-	-	-	-	2
CO6	-	3	2	-	1	-	-	-	-	-	-	2

Mapping of Course Outcomes with Program Specific Outcomes:

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

List of Experiments:

Section A : CAD LAB

1. Introduction to CATIA, Applications & Scope, Workbenches, Extensive Capabilities, Creating Axis System.
2. Work Bench – sketcher, Sketcher Menu Bar & Sketcher Toolbar, Tools, sketcher, constraints, Profiles & Operations.
3. Work Bench - Part Design, Sketch Based Features, Dress up Features, transformation Features, Reference Elements, Boolean operations, sketchertoolbar.
4. Work Bench – GSD, Menu Bar, Wireframe Toolbar, Surfaces Toolbar, Operations, Toolbar, Tools Toolbar, Generic Tools Toolbars, Replication Toolbar, Advanced surfaces toolbar.
5. Work Bench – Drafting, Generative Drafting, Views Toolbar Automat Dimension creation.

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Section B : CFD LAB

6. Introduction to MAT Lab - Application, Scope.
7. Solve temperature plot on a fin by using MAT Lab Coding.
8. Solve differential equation using MAT Lab for Fourier lab of Conduction.
9. Solution of heat equation by using Mat Lab coding.
10. Solve 2D steady state conduction problem.

List of Augmented Experiments:
CAD LAB
(Any two of the following experiments can be performed)

11. Interactive Drafting, Geometry Creation, Transformations Toolbar Re limitations Toolbar.
12. Work Bench Assembly Design, Product Structure Tools, Move Toolbar, Constraints toolbar.
13. Determination of deflection and stresses in 2D, 3D trusses, beam elements and deflections Component, principal and Von-Misses stresses in plane stress, plane strain, Axi - symmetric components.

CFD LAB
(Any two of the following experiments can be performed)

14. MAT Lab Programming to ODE
15. MAT Lab Solution for differential Equations
16. Solve Parabolic equations by using Mat Lab coding.

References:

1. CATIA Reference Guide Paperback–March1, 1998, by Paul Carman.
2. Finite Element Methods with Programming and Ansys, Mar7, 2013, by Meung Kim.
3. Computational Fluid Flow and Heat Transfer, Niyogi, Pearson Publications, 2005 1stEdition.

Web Links:
1. http://nptel.ac.in/downloads/112104030/
2. http://nptel.ac.in/courses/112107080/module3/lecture1/lecture1.pdf
3. www.Mathworks.com

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COMPUTER GRAPHICS
(Open Elective)

VIII Semester
Course Code: 171ME8O04

L	T	P	C
3	1	0	3

Course Outcomes:
At the end of this course the student will be able to:

- CO 1: List the applications of computer graphics and Video Display devices for implementing Graphical user interface.
- CO 2: Analyze the concepts of output primitives and filled area primitives in implementing various algorithms.
- CO 3: Apply the concepts of Geometric Transformations, Viewing and Clipping in 2D & 3D Graphics.
- CO 4: Explain the basic graphics application programs including animation.
- CO 5: Apply OpenGL for General Computer Animations.
- CO 6: Illustrate the concepts of Visual Surface detection Methods in 3D Graphics.

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	2	3	2	2	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	1	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	-	-	-	-
CO6	2	1	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT -I
Introduction:
Application areas of computer graphics, overview of graphic system, video-display devices, raster -scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT -II
Output Primitives:
Points and lines, line drawing algorithms, mid- point circle algorithm
Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.
2-D Geometrical Transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

UNIT- III

2-D Viewing:

The viewing pipe-line, viewing coordinate reference frame, window to view-port coordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland- Hodgeman polygon clipping algorithm.

UNIT -IV

Computer animation:

Design of animation sequence, general computer animation functions, raster animation, computer animation language **Color models**: RGB, YIQ, CMY, HSV. **Graphics programming using OPENGL**: basic graphics primitives.

UNIT- V

3-D Geometric Transformations:

Translation, rotation, scaling, reflection and shear transformation and composite transformations.

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

Text Books:

1. Computer Graphics C Version/ Donald D.Hearn, M.Pauline Baker, Pearson/PHI.
2. Computer Graphics using OPENGL, Stephen M. Kelley, Francis S. Hill, Pearson, Second Edition.

Reference Books:

1. Computer Graphics, Zhigandxiang, Roy Plastock, Schaum' soutlines, TataMc- Graw hill edition, Second edition.
2. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2ndedition.
3. Principles of Interactive Computer Graphics, Neuman and Sproul,TMH.
4. Computer Graphics, Steven Harrington, TMH.

Web Links:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6- 837-computer-graphics-fall-2012/
2. http://nptel.ac.in/courses/106106090/
3. https://in.udacity.com/course/interactive-3d-graphics--cs291
4. http://www.cse.iitm.ac.in/~vplab/computer_graphics.html
5. https://www.okino.com/links.htm
6. http://www.graphics.cornell.edu/online/links.html

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Syllabus revision Index (2020-21)

S.No	Name of the course	Percentage of syllabus change
1	Engineering Graphics	45
2	Integral Transforms &Applications of Partial Differential Equations	40
3	Computer Aided Engineering Drawing Practice	25
4	Kinematics of Machinery	20
5	Thermal Engineering – I	45
6	Computer Aided Machine Drawing	50
7	Mechatronics	20
8	Finite Element Methods	25
9	Gas Dynamics	40
10	Thermal Equipment Design	20
11	CAD/CFD Lab	60
12	CAM/Mechatronics Lab	50
13	Computer Graphics	20

Program Coordinator **Head of the Department**

Head of the Department
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Aditya Engineering College (A)
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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	Mathematics-II	Integral Transforms and Applications of Partial differential equations
Course Code	171BS2T02	191BS3T12
Syllabus	UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation: Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method.Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Relation between operators - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	UNIT-I: Fourier series: Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations- Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	UNIT-III: Laplace Transforms: Laplace transforms of standard functions, First Shifting theorem, change of scale, Multiplication with t, Division by t, transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, evaluating improper integrals by using Laplace Transform.
	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.	UNIT-IV: Inverse Laplace Transforms: Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, Solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise:

		Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems
	UNIT V: Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.	UNIT-V: Application of PDE: Classification of Higher order P.D.E - Method of separation of Variables- Solution of Onedimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Signature of the course coordinator

Signature of the HOD

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Aditya Engineering College (A9)

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Engineering Graphics &Design**	**Engineering Graphics**
Course Code	**191ES2T02**	**201ES1T05**
Syllabus	**UNIT-I:** **Introduction to Engineering graphics:** Principles of Engineering Graphics and their significance-conventions in drawing- lettering – BIS Conventions- - Conic sections - Cycloid, epicycloids and hypocycloid-Involutes	**UNIT-I:** **Introduction to Engineering Drawing:** Lettering, Dimensioning, Types of lines. **Conic Sections:** Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods. Scales: Plain Scale, Diagonal Scale and Vernier Scales.
	UNIT-II: **Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.	**UNIT-II:** **Orthographic Projections:** Introduction to orthographic projections, Projections of Points, Projections of Lines.
	UNIT-III: **Projections of solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.	**UNIT-III:** **Projections of Planes:** Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.
	UNIT-IV: **Introduction to Computer Aided Drafting:** Basic drawing and editing commands-Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections	**UNIT-IV:** **Projections of Solids:** Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

	UNIT-V: **Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids	**UNIT-V:.** **Isometric Projections:** Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

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	**Computer aided Engineering Drawing Practice**	**Computer aided Engineering Drawing Practice**
Course Code	**171ME3T01**	**20ES2L12**
Syllabus	**Unit-I** **Projections of Solids:** Projections of Solids inclined to both planes – Auxiliary Views **Sections of Solids:** Section of solids like Prism, Cylinder, Pyramid, Cone. **Development of Solids:** Development of surfaces of solids like Prisms, Cylinder, Pyramid, Cone and their parts.	**Unit-I** **Sections of Solids:** Cylinder, Cone, Prism and Pyramid. **Development of Surfaces:** Cylinder, Cone, Prism and Pyramid
	Unit-II **Intersection of Solids:** Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone. **Isometric Projections:** Conversion of orthographic views to isometric views.	**Unit-II** **Intersection of Solids:** Cylinder, Cone, Prism and Pyramid
	Unit-III **Introduction to Computer Aided Drafting:** Generation of points, Lines, Curves, Polygons, Dimensioning. Types of modeling: object selection commands –Edit, Zoom, Cross hatching, Pattern filling, Utility commands, 2D wire frame modeling, 3D wire frame modeling.	**Unit-III** **Isometric Projections:** Conversion of orthographic views to isometric views.
	UNIT IV **View Points and View Ports:** View point coordinates and view (s) displayed, Examples to exercise different options like save, Restore, Delete, Joint, Single option.	**Unit-IV** **Computer Aided Drafting:** 2D wire frame modelling, 3D wire frame modelling. View point coordinates and view(s) displayed, Examples to exercise different options like save, Restore, Delete, Joint, Single option.

	UNIT-V: **Computer Aided Solid Modeling**: Isometric projections, Orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.	**UNIT-V:** **Computer Aided Solid Modeling:** Isometric projections, Orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Kinematics of Machinery	Kinematics of Machinery
Course Code	171ME4T02	191ME4T07
Syllabus	**UNIT-I:** **Mechanisms**: Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs- Sliding, Turning, Rolling, Screw and spherical pairs – Lower and higher pairs – Closed and open pairs – Constrained motion – Completely, Partially orsuccessfully constrained and incompletely constrained. Grublers criteria ,Grashoff's law , Degrees of freedom, Kutzbach criterion for planar mechanisms, Inversion Of Mechanisms: Kinematic chain –Inversions of quadric cycle chain – Inversion of mechanism – Single and double slider crank chains.	**UNIT-I:** **Classification of mechanisms:** Basic kinematic concepts and definitions- Degree of freedom, mobility- Grashof's law, Kinematic inversions of four bar chain and slider crank chains-Limit positions- Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line generators- Universal Joint- Rocker mechanisms.
	UNIT-II: **Lower Pair Mechanisms:** Exact Straight Line Motion Mechanisms– Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and Approximate straight line motion Mechanisms, Pantograph. Conditions for correct steering – Davis Steering gear, Ackerman's steering gear – Velocity ratio of single and double Hooke's Joint.	**UNIT-II:** **Kinematics:** **Plane motion of body:** Instantaneous centre of rotation, centrode and axode - relative motion between two bodies – Kennedy's three centres in line theorem– Graphical determination of instantaneous centre for simple bar four bar and single slider crank chain mechanisms and determination of angular velocity of points and links.

		Motion of a link in machine - Determination of Displacement, velocity and acceleration for a Simple Four Bar Mechanism, Single slider crank chain mechanism, Double slider crank chain mechanism (Whitworth Quick Return Motion mechanisms)
	UNIT-III: **Kinematics:** Velocity Analysis Velocity – Motion of link in machine – Determination of Velocity diagrams Graphical method – Application of relative velocity method four bar chain. Analysis of slider cranks chain for displacement, velocity. Acceleration Analysis: Angular acceleration of Links, Acceleration of Intermediate and offset points- Four Link Mechanism-Slider Crank Mechanism, Kliens construction, Coriolis component of acceleration. Plane Motion of Body: Instantaneous center of rotation, Three Centres In line theorem – Graphical method determination of instantaneous centre for four bar mechanism.	**UNIT-III:** **Cams**: Definition and classification of cams and followers - their uses - Terminology - Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation, Cycloidal motion for Knife edge, Flat face and Roller follower and offset follower.
	UNIT-IV: **Cams and Followers:** Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion uniform acceleration and retardation, cycloidal motion. Maximum velocity and maximum acceleration during outward and return strokes in the above four cases.	**UNIT-IV:** **Power Transmission:** Introduction –Modes of power transmission applications. Gears and Gear trains: Classification, Terminology, Law of Gearing, path of contact, arc of contact. Interferences, methods of avoiding interferences. Simple gear train, compound gear train, reverted gear train, epicyclical gear train and Differential
	UNIT-V: **Gears:** Introduction, Higher pairs, friction wheels and toothed gears–types – Law of gearing, Condition for constant velocity ratio for transmission of motion, Form of teeth: Cycloidal and involute profiles. Velocity of sliding – Phenomena of interferences. Condition for minimum number of teeth to avoid interference,	**UNIT-V:** **Practical Applications:** Design and fabrication of any one of the following mechanisms: Whitworth Quick Return Mechanism, Oscillating Cylinder Mechanism, Elliptical Trammel, Manual/Motorized Scotch Yoke Mechanism Piston, Bench Tapping Machine, Mini Conveyor using Geneva Mechanism, Mini Hacksaw Powered by Beam Engine.

	Expressions for arc of contact and path of contact, Introduction to Helical, Bevel and worm gearing. **Gear Trains:** Introduction, Train value, Types – Simple and reverted gear train – Epicyclic gear Train. Methods of finding train value or velocity ratio, Selection of gear box- Differential gear for an automobile.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Thermal Engineering -I**	**Thermal Engineering -I**
Course Code	**171ME4T03**	**191ME4T08**
	UNIT-I: **Actual Cycles and their Analysis:** Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines. 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-I:** **Actual Cycles and Engine Construction:** Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines; Constructional Details of Four Stroke SI and CI Engines, Working Principle, Actual Indicator Diagram, Two Stroke Engine Construction and Operation, Comparison of Four Stroke and Two Stroke Engine Operation, Firing Order and Its Significance.
Syllabus	**UNIT-II:.** **Combustion in S.I. Engine:** Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Types of Abnormal combustion, Pre-ignition and knocking – Fuel requirements and fuel rating, Anti knock additives . Combustion in C.I. Engine: Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, Compression and combustion induced turbulence – Open and divided combustion	**UNIT-II:** **Engine Testing & Performance:** Engine Performance Testing & Numerical- methods and Performance Characteristics; Testing and measurement equipment-dynamometers, Air & Fuel consumption, temperature, etc. Variables Affecting Engine Performance, Performance Maps. Lubrication and Cooling systems, Introduction to Supercharging and Turbocharging

	chambers and nozzles used – Fuel requirements and fuel rating.	
	UNIT-III: **Measurement, Testing and Performance:** Parameters of performance - Measurement of cylinder pressure, Fuel consumption, Air intake, Exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.	**UNIT-III:** **SI Engine Fueling & Combustion:** Carburetor Working Principle, Requirements of an Automotive Carburetor, and types, Fuel Injection Systems; Pre-mixed charge combustion, SI Engine Combustion Conceptual models, Thermodynamic Analysis of Combustion, Cycle-to-Cycle Combustion variations and Knocking Combustion.
	UNIT-IV: **Compressors:** Classification –Positive displacement and roto dynamic machinery – Power producing and power absorbing machines, Fan, Blower and Compressor – Positive displacement and dynamic types – Reciprocating and rotary types. Reciprocating Compressor: Principle of operation, Work required, Isothermal efficiency, Volumetric efficiency and effect of clearance, Multi stage compression, Under cooling, Saving of work, Minimum work condition for two stage compression.	**UNIT-IV:** **CI Engine Fueling & Combustion:** Fuel Injection and Spray Structure: Fuel Atomization and Droplet size distribution, Sauter Mean Diameter, Spray Penetration. CI Engine Combustion Conceptual Models: Conventional and Dec's Combustion Models. Diesel Combustion Process Characterization: Ignition Delay, Effect of Engine and Operational Parameters on Delay, Pre-mixed Combustion, Mixing Controlled Combustion. Thermodynamic Analysis. Multi Pulse Injections, Introduction to Low Temperature Combustion Like: Homogeneous Charge Compression Ignition(HCCI), Fuel Stratified Charge combustion/ Reactivity Controlled Compression Ignition (RCCI) Technologies, Pre-mixed Charge Compression (PCCI) and Dual fuel technologies
	UNIT-V: **Rotary Compressor (Positive Displacement Type):** Roots Blower, Vane sealed compressor, Lysholm compressor – Mechanical details and Principle of working – Efficiency considerations. Centrifugal Compressors: Mechanical details and principle of operation – Velocity and pressure variation. Energy transfer-Impeller blade shape-losses, Slip factor, Power input factor, Pressure	**UNIT-V:** **Formation Of Engine Emissions & Control Technologies (SI& CI)** Emission Effects on Health & Environment: Sources of Engine emissions: Formation of CO, NO, UBHC, Soot and Particulate Matter. Diesel NOx-Particulate Trade off: Effect of SI Design and operating variables: Effect of Diesel Engine Design and operating Variables. SI Engine Emission Control Technology: Add-on systems for treatment of

	coefficient and adiabatic coefficient – Velocity diagrams – Power. Axial Flow Compressors: Mechanical details and principle of operation – Velocity triangles and energy transfer per stage degree of reaction, Work done factor - Isentropic efficiency- Pressure rise calculations – Polytropic efficiency.	Emissions with in Engine, Exhaust After treatment. CI Engine Emission Control Technology: Application of EGR, Exhaust after treatment and new engine technologies for emission control.

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	Computer Aided Machine Drawing	Computer Aided Machine Drawing
Course Code	171ME4T07	191ME4L04
Syllabus	**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, 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.	**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, 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.

	UNIT-II: 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.	**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 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. **Note**: Sheets under unit I need to be practiced with any one basic 2D drafting software. Sheets under assembly drawing need to be practiced with any one solid modelling software. Sheets under production drawing need to be practiced with Drafting and solid modelling software.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mechatronics	Mechatronics
Course Code	R1641031	171ME7T17
Syllabus	**UNIT-I:** **Mechatronics systems:** elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.	**UNIT-I:** **Mechatronics systems:** Elements & levels of mechatronics system, Mechatronics design process, System, Measurement systems, Control systems, Microprocessor-based controllers, Advantages and disadvantages of mechatronics systems. Sensors and transducers: Types, Displacement, Position, Proximity, Velocity, Motion, Force, Acceleration, Torque, Fluid pressure, Liquid flow, Liquid level, Temperature and light sensors.
	UNIT-II: **Solid state electronic devices** – PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.	**UNIT-II:** **Solid state and digital electronic devices:** DIAC, TRIAC and LEDs. Analog signal conditioning, Operational amplifiers, Noise reduction, Filtering, Digital electronics and systems, Digital logic control, microprocessors and micro controllers.
	UNIT-III: **Hydraulic and pneumatic actuating systems** - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.	**UNIT-III:** **Hydraulic and pneumatic actuating systems:** Fluid systems, Hydraulic systems, and pneumatic systems, Components, Control valves, Electro-pneumatic, Hydro-pneumatic, Electro-hydraulic servo systems. Mechanical and Electrical actuating systems: Mechanical actuating systems and electrical actuating systems – basic principles and elements.

	UNIT-IV: **Digital electronics and systems:** digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.	**UNIT-IV:** **Programmable logic controller**: Basic Structure – Memory - Input / Output Processing – Programming – Mnemonics – Timers, Internal relays and counters – Shift Registers – Master and Jump Controls – Data Handling – Analogs Input / Output – Selection of a PLC – PLC Applications
	UNIT-V: **System and interfacing and data acquisition** – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.	**UNIT-V:** **Dynamic models and analogies:** System response Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends. System and interfacing and data acquisition: Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, Block diagrams, Typical layouts, Interfacing motor drives.
	UNIT-VI: **Dynamic models and analogies:** System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.	

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Finite Element Methods	Finite Element Methods
Course Code	R1641033	171ME7T18
Syllabus	**UNIT-I:** **Introduction to finite element method:** stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.	**UNIT-I:** **Fundamental concepts:** Introduction to finite element method, concepts of solid mechanics - stress and equilibrium, boundary conditions, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy. One dimensional problems – bar element.
	UNIT-II:. **Discretization of domain:** Element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.	**UNIT-II:** **Analysis of Trusses:** Introduction, analysis of plane trusses, local and global stiffness matrix, treatment of boundary conditions, solutions, temperature effects. Analysis of beams: Formulation, load vector, boundary conditions, shear force and bending moment, solutions.
	UNIT-III: **Analysis of Trusses**: Finite element modelling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, **stress, strain and support reaction calculations**. Analysis of Beams: Element stiffness matrix for Hermite beam element, derivation of load vector for concentrated and UDL, simple problems on beams.	**UNIT-III:** **CST and Axis - symmetric problems**: Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axis - symmetric problems.

	UNIT-IV: **Finite element modelling** Two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems.	**UNIT-IV:** **Higher order and isoparametric elements:** One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration. Steady State Heat Transfer Analysis: One dimensional analysis of conduction, convection problems and fins.
	UNIT-V: **Higher order and isoparametric elements**: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.	**UNIT-V:** **Dynamic Analysis:** Formulation of finite element model, element consistent and lumped mass matrices, evaluation of Eigen values and Eigen vectors, free vibration analysis
	UNIT-VI: **Steady state heat transfer analysis:** one dimensional analysis of a fin and two-dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion. Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.	

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Department of Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Gas Dynamics and jet Propulsion**	**Gas Dynamics**
Course Code	**R164103F**	**171ME7E13**
Syllabus	**UNIT-I:** **Introduction to gas dynamics:** control volume and system approaches acoustic waves and sonic velocity - mach number - classification of fluid flow based on mach number - mach cone- compressibility factor - general features of one dimensional flow of a compressible fluid - continuity and momentum equations for a control volume.	**UNIT-I:** **Introduction to gas dynamics:** Control volume and system approaches acoustic waves and sonic velocity – mach number – classification of fluid flow based on mach number – mach cone- compressibility factor – general features of one dimensional flow of a compressible fluid – continuity and momentum equations for a control volume.
	UNIT-II: **Isentropic flow of an ideal gas:** Basic equation - stagnation enthalpy, temperature, pressure and densitystagnation, acoustic speed - critical speed of sound- dimensionless velocity-governing equations for isentropic flow of a perfect gas - critical flow area - stream thrust and impulse function. Steady one dimensional isentropic flow with area change-effect of area change on flow parameters- chocking- convergent nozzle - performance of a nozzle under decreasing back pressure -De lavel nozzle - optimum area ratio effect of back pressure - nozzle discharge coefficients - nozzle efficiencies.	**UNIT-II:** **Isentropic flow of an ideal gas:** Basic equation – stagnation enthalpy, temperature, pressure and density- stagnation, acoustic speed – critical speed of sound- dimensionless velocity-governing equations for isentropic flow of a perfect gas – critical flow area – stream thrust and impulse function.
	UNIT-III: **Simple frictional flow:** Adiabatic flow with friction in a constant area duct-governing equations - fanno line limiting conditions - effect of wall friction on flow properties in an Isothermal flow	**UNIT-III:** **Isentropic Flow with area change**: Steady one dimensional isentropic flow with area change-effect of area change on flow parameters- chocking- convergent nozzle – performance of a nozzle under decreasing back pressure

	with friction in a constant area duct-governing equations - limiting conditions. Steady one dimensional flow with heat transfer in constant area ducts- governing equations - Rayleigh line entropy change caused by heat transfer - conditions of maximum enthalpy and entropy.	-De lavel nozzle – optimum area ratio effect of back pressure – nozzle discharge coefficients – nozzle efficiencies.
	UNIT-IV: **Effect of heat transfer on flow parameters:** Intersection of Fanno and Rayleigh lines. Shock waves in perfect gas-properties of flow across a normal shock - governing equations - Rankine Hugoniat equations - Prandtl's velocity relationship - converging diverging nozzle flow with shock thickness - shock strength.	**UNIT-IV:** **Simple frictional flow:** Adiabatic flow with friction in a constant area duct- governing equations – fanno line limiting conditions – effect of wall friction on flow properties in an Isothermal flow with friction in a constant area duct-governing equations – limiting conditions. Steady one dimensional flow with heat transfer in constant area ducts- governing equations Rayleigh line entropy change caused by heat transfer – conditions of maximum enthalpy and entropy.
	UNIT-V: **Propulsion**: Air craft propulsion: - types of jet engines - energy flow through jet engines, thrust, thrust power and propulsive efficiency turbojet components-diffuser, compressor, combustion chamber, turbines, exhaust systems.	**UNIT-V:** **Effect of Heat Transfer on Flow Parameters:** Intersection of Fanno and Rayleigh lines. Shock waves in perfect gas-properties of flow across a normal shock – governing equations – RankineHugoniat equations – Prandtl's velocity relationship – converging diverging nozzle flow with shock thickness – shock strength.
	UNIT-VI: **Performance of turbo propeller engines:** Ramjet and pulsejet, scramjet engines. Rocket propulsion - rocket engines, Basic theory of equations - thrust equation - effective jet velocity - specific impulse - rocket engine performance - solid and liquid propellant rockets - comparison of various propulsion systems.	

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Department of Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Thermal Equipment Design	Thermal Equipment Design
Course Code	R164203A	171ME8E18
Syllabus	**UNIT-I:.** **Classification of heat exchangers:** Introduction, Recuperation & Regeneration – Tubular 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 Tubular fin.	**UNIT-I:.** **Classification of Heat Exchangers:** Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Cascaded plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.
	UNIT-II:. **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. **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.	**UNIT-II:** **Double Pipe Heat Exchanger:** Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature. 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: **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 calculation of shell & tube heat exchangers. Flow arrangements for increased heat recovery, the calculations 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: **Condensation of single vapors:** Calculation of a horizontal condenser, vertical condenser, De-super heater condenser, vertical condenser – sub-cooler, horizontal condenser – subcooler, 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.
	UNIT-V: **Vaporizers, Evaporators and Reboilers:** Vaporizing processes, forced circulation vaporizing exchangers, 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-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-VI: **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, Design of cooling towers, Determination of the number of diffusion units, calculation of cooling tower performance.	

J. D. M
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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 Mechanical Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mechatronics Lab	CAM/Mechatronics
Course Code	R1641088	171ME7L08
Syllabus	**List of Experiments:** **Mechatronics:** 1. DYNA 1750 Transducers Kit: - a. Characteristics of LVDT b. Principle & Characteristics of Strain Gauge c. Characteristics of Summing Amplifier d. Characteristics of Reflective Opti Transducer 2. PLC PROGRAMMING a. Ladder programming on Logic gates, Timers & counters b. Ladder Programming for digital & Analogy sensors c. Ladder programming for Traffic Light control, Water level control and Lift control Modules 3. AUTOMATION STUDIO software a. Introduction to Automation studio & its control b. Draw & Simulate the Hydraulic circuit for series & parallel cylinders connection c. Draw & Simulate Meter-in, Meter-out and hydraulic press and clamping. 4. MATLAB Programming a. Sample programmes on Matlab b. Simulation and analysis of PID controller using SIMULINK	**List of Experiments:** **Mechatronics:** 1. Characteristics of LVDT and Strain gauge by using DYNA 1750 kits. 2. Characteristics of Summing Amplifier and Reflective Opto Transducer. 3. Ladder programming Logic gates, Timers, counters &digital & Analogy sensors 4. Draw & Simulate the Hydraulic circuit for series & parallel cylinders Connection. 5. Draw & Simulate Meter-in, Meter-out and hydraulic press and clamping. 6. Ladder programming for Traffic Light control, Water level control and Lift control Modules. 7. Draw & Simulate Meter-in, Meter-out and hydraulic press and clamping.

		CAM: 1. Practice on CNC Sinutrain Turning. 2. Practice on CNC Sinutrain Milling. 3. CNC programming for turned components using FANUC Controller 4. CNC programming for milled components using FANUC Controller 5. Automated CNC Tool path & G-Code generation using Pro/E/Master 6. Machining of simple component on NC lathe by transferring NC code from a CAM package through RS 232. 7. Machining of simple component on NC lathe by transferring NC code from a CAM package through RS 232.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	CAD/CAM Lab	CAD/CFD Lab
Course Code	R16 41037	171ME7L07
Syllabus	**List of Experiments:** **CAD:** **DRAFTING**: Development of part drawings for various components in the form of orthographic and isometric representation of dimensioning and tolerances scanning and plotting. study of script, DXE and IGES files. **Part Modeling**: Generation of various 3D models through protrusion, revolve, shell sweep. Creation of various features. study of parent child relation. feature based and boolean based modelling surface and assembly modelling. study of various standard translators. design simple components. 1. Determination of deflection and stresses in 2D and 3D trusses and beams 2. Determination of deflections component and principal and Von-mises stresses in plane 3. stress, plane strain and Axisymmetric components. 4. Determination of stresses in 3D and shell structures (at least one example in each case) 5. Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam. 6. Steady state heat transfer Analysis of plane and Axisymmetric components.	**List of Experiments:** **CAD:** 1. **Introduction to CATIA**, Applications & Scope, Workbenches, Extensive Capabilities, Creating Axis System. 2. **Work Bench – sketcher**, Sketcher Menu Bar & Sketcher Toolbar, Tools, sketcher, constraints, Profiles & Operations. 3. **Work Bench - Part Design**, Sketch Based Features, Dress up Features, transformation Features, Reference Elements, Boolean operations, sketcher toolbar. 4. **Work Bench – GSD**, Menu Bar, Wireframe Toolbar, Surfaces Toolbar, Operations, Toolbar, Tools Toolbar, Generic Tools Toolbars, Replication Toolbar, Advanced surfaces toolbar. 5. **Work Bench – Drafting,** Generative Drafting, Views Toolbar Automat Dimension creation. 6. **Interactive Drafting**, Geometry Creation, Transformations Toolbar Re limitations Toolbar. 7. **Work Bench Assembly** Design, Product Structure Tools, Move Toolbar, Constraints toolbar. 8. Determination of deflection and stresses in 2D, 3D trusses, beam elements and deflections Component, principal and Von-Misses stresses in plane stress,

	CAM: 1. Study of various post processors used in NC Machines. 2. Machining of simple components on NC lathe and Mill by transferring NC Code / from a 3. CAM package. Through RS 232. 4. Practice on CNC Sinutrain Turning 5. Practice on CNC Sinutrain Milling 6. CNC programming for turned components using FANUC Controller 7. CNC programming for milled components using FANUC Controller 8. Automated CNC Tool path & G-Code generation using Pro/E/Master CAM	plane strain, Axi - symmetric components. **CFD:** 1. Introduction to MAT Lab - Application, Scope. 2. Solve temperature plot on a fin by using MAT Lab Coding. 3. Solve differential equation using MAT Lab for Fourier lab of Conduction. 4. Solution of heat equation by using Mat Lab coding. 5. Solve 2D steady state conduction problem. 6. MAT Lab Programming to ODE 7. MAT Lab Solution for differential Equations 8. Solve Parabolic equations by using Mat Lab coding.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Computer Graphics	Computer Graphics
Course Code	R163203B	171ME8O04
Syllabus	**UNIT -I:** **Introduction:** Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.	**UNIT -I:** **Introduction:** Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.
	UNIT-II: **Output Primitives:** Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm. **2-D Geometrical Transformations:** Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates	**UNIT -II:** **Output Primitives:** Points and lines, line drawing algorithms, mid- point circle algorithm **Filled area primitives**: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm. **2-D Geometrical Transformations**: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.
	UNIT -III: **2-D Viewing:** The viewing pipe-line, viewing coordinat4 reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm	**UNIT- III:** **2-D Viewing:** The viewing pipe-line, viewing coordinate reference frame, window to view-port coordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

	UNIT -IV: **3-D Object Representation:** spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, , Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms	**UNIT -IV:** **Computer animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation language Color models: RGB, YIQ, CMY, HSV. Graphics programming using OPENGL: basic graphics primitives.
	UNIT -V: **3-D Geometric Transformations:** Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depthbuffer, scan-line, depth sorting	**UNIT- V:** **3-D Geometric Transformations:** Translation, rotation, scaling, reflection and shear transformation and composite transformations. **Visible surface detection methods**: Classification, back-face detection, depth-buffer, scan-line, depth sorting.
	UNIT-VI: **Computer Animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification	

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

Syllabus Revision for the Academic Year 2020-21

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential Equations and Linear Algebra	0
3	I	201BS1T04	Engineering Chemistry	0
4	I	201ES1T02	Programming for Problem Solving using C	0
5	I	201ES1I01	Engineering Graphics and Design	55
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L03	Engineering Chemistry Lab	0
8	I	201ES1L02	Programming for Problem Solving using C Lab	0
9	I	201MC1T01	Environmental Science	0
10	II	201BS2T06	Transform Techniques	0
11	II	201BS2T09	Applied Physics	0
12	II	201ES2I03	Object Oriented Programming through JAVA	100
13	II	201ES2T10	Basic Electrical Engineering	3
14	II	201ES2T14	Network Analysis	0
15	II	201ES2L08	Electronics Engineering Workshop	0
16	II	201BS2L04	Applied Physics Lab	0
17	II	201ES2L13	Basic Electrical Engineering Lab	0
18	II	201MC2L01	Professional Communication Skills Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T13	Numerical Methods & Vector Calculus	40
21	III	191ES3T12	Random Variables and Stochastic Processes	10
22	III	191HS3T02	Managerial Economics and Financial Analysis	0
23	III	191EC3T01	Electronic Devices and Circuits	40
24	III	191EC3T02	Digital Electronics and Logic Design	0
25	III	191EC3T03	Signals and Systems	20
26	III	191EC3L01	Electronic Devices and Circuits Lab	29.4

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
27	III	191ES3L16	Digital Electronics and Logic Design Lab	100
28	III	191MC3A03	Employability Skills – I	0
29	III	191MC3A04	Essence of Indian Traditional Knowledge	100
30	IV	191ES4T16	Data Structures	0
31	IV	191ES4T17	Control Systems	20
32	IV	191EC4T04	Analog Electronic Circuits	10
33	IV	191EC4T05	Electromagnetic Waves and Transmission Lines	0
34	IV	191EC4T06	Microprocessors & Micro Controllers	10
35	IV	191EC4T07	Analog Communications	0
36	IV	191EC4L02	Analog Electronic Circuits – Lab	23.5
37	IV	191EC4L03	Microprocessors & Micro Controllers Lab	0
38	IV	191EC4L04	Analog Communications Lab	18.75
39	IV	191MC4A05	Employability Skills – II	0
40	IV	191MC4A06	Biology for Engineers	100
41	V	171EC5T09	Linear IC Applications	0
42	V	171EC5T10	Digital IC Applications	0
43	V	171EC5T11	Digital Communications	0
44	V	171EC5T12	Antennas and Wave Propagation	0
45	V	171EC5E01	Computer Architecture and Organization	0
46	V	171EC5E02	OOPS through JAVA	0
47	V	171EC5E03	Electronic Switching Systems	0
48	V	171HS5T06	Employability Skills - III	0
49	V	171EC5L04	Linear IC Applications Lab	0
50	V	171EC5L05	Digital IC Applications Lab	0
51	V	171EC5L06	Pulse and Digital Circuits Lab	0
52	VI	171EC6T13	Micro Processors and MicroControllers	0
53	VI	171EC6T14	VLSI Design	0
54	VI	171EC6T15	Digital Signal Processing	0
55	VI	171EC6E04	CPLD and FPGA Architectures	0
56	VI	171EC6E05	Operating Systems	0
57	VI	171EC6E06	Computer Networks	0
58	VI	171EC6E07	Digital Design Through Verilog	0
59	VI	171EC6E08	Biomedical Engineering	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
60	VI	171EC6E09	Information Theory and Coding	0
61	VI	171HS6T07	Employability Skills - IV	0
62	VI	171EC6L07	Micro Processor and Micro Controllers Lab	0
63	VI	171EC6L08	VLSI lab	0
64	VI	171EC6L09	Digital Communications Lab	0
65	VII	171EC7T16	Microwave Engineering	0
66	VII	171EC7T17	Digital Image Processing	0
67	VII	171EC7T18	Electronic Measurements And Instrumentation	0
68	VII	171EC7T19	Optical Communications	4.1
69	VII	171EC7E10	Digital Signal Processors	100
70	VII	171EC7E11	Embedded Systems	8
71	VII	171EC7E12	Cellular and Mobile Communications	10
72	VII	171EC7E13	Analog IC Design	18
73	VII	171EC7E14	Cryptography and Network Security	0
74	VII	171EC7E15	Radar Systems	0
75	VII	171EC7L10	Microwave Engineering and Optical Communications Lab	13.3
76	VII	171EC7L11	Digital Signal and Image Processing Lab	16.6
77	VII	171EC7P01	Industry Oriented (Internship) Minor Project	100
78	VIII	171EC8E16	Mixed Signal IC Design	100
79	VIII	171EC8E17	Wireless Sensors and Networks	5.5
80	VIII	171EC8E18	Satellite Communications	8.3
81	VIII	171EC8O01	Basic Concrete Technology	100
82	VIII	171CE8O04	Waste Water Management	100
83	VIII	171EE8O05	Robotics	0
84	VIII	171EC8O02	Disaster Management	100
85	VIII	171EE8O07	Internet of Things	100
86	VIII	171EC8O03	Neural Networks	100
87	VIII	171CE8O03	Alternative Energy Sources	100
88	VIII	171CE8O02	Database Management Systems	100
89	VIII	171EC8O04	Web Technologies	100
90	VIII	171CE8O06	Green Fuel Technologies	100
91	VIII	171EC8P02	Major Project	0

Total number of courses in the academic year 2020-21	= 91
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-21	= 23
Percentage of syllabus revision carried out in the academic year 2020-21 = (23/91)100	= 25.27%

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Program Coordinator

G. Sridevi

Head of the Department

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20-21

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential Equations and Linear Algebra	BSC	Theory	3	0	0	3	3
201BS1T04	Engineering Chemistry	BSC	Theory	3	0	0	3	3
201ES1T02	Programming for Problem Solving using C	ESC	Theory	3	0	0	3	3
201ES1I01	Engineering Graphics and Design	ESC	Integrated	2	0	2	4	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L03	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES1L02	Programming for Problem Solving using C Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	16	0	11	27	19.5

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T06	Transform Techniques	BSC	Theory	3	0	0	3	3
201BS2T09	Applied Physics	BSC	Theory	3	0	0	3	3
201ES2I03	Object Oriented Programming through JAVA	ESC	Integrated	2	0	2	4	3
201ES2T10	Basic Electrical Engineering	ESC	Theory	3	0	0	3	3
201ES2T14	Network Analysis	ESC	Theory	3	0	0	3	3
201ES2L08	Electronics Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201BS2L04	Applied Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES2L13	Basic Electrical Engineering Lab	ESC	Lab	0	0	3	3	1.5
201MC2L01	Professional Communication Skills Lab	MC	Lab	0	0	3	3	0
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	16	0	16	0	19.5

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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	
191BS3T13	Numerical Methods & Vector Calculus	BSC	3	0	0.	3	3
191ES3T12	Random Variables and Stochastic Processes	ESC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	3	0	0	3	3
191EC3T01	Electronic Devices and Circuits	PCC	3	0	0	3	3
191EC3T02	Digital Electronics and Logic Design	PCC	3	0	0	3	3
191EC3T03	Signals and Systems	PCC	3	0	0	3	3
191EC3L01	Electronic Devices and Circuits Lab	PCC	0	0	3	3	1.5
191ES3L16	Digital Electronics and Logic Design Lab	PCC	0	0	2	2	1
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	20	0	7	27	20.5

IV SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
191ES4T16	Data Structures	ESC	3	0	0	3	3
191ES4T17	Control Systems	ESC	3	0	0	3	3
191EC4T04	Analog Electronic Circuits	PCC	3	0	0	3	3
191EC4T05	Electromagnetic Waves and Transmission Lines	PCC	3	0	0	3	3
191EC4T06	Microprocessors & Micro Controllers	PCC	3	0	0	3	3
191EC4T07	Analog Communications	PCC	3	0	0	3	3
191EC4L02	Analog Electronic Circuits – Lab	PCC	0	0	3	3	1.5
191EC4L03	Microprocessors & Micro Controllers Lab	PCC	0	0	2	2	1
191EC4L04	Analog Communications Lab	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	20	0	10	30	22

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Aditya Engineering College (A9)

20-21

V SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171EC5T09	Linear IC Applications	PC	3	1	0	4	3
171EC5T10	Digital IC Applications	PC	3	1	0	4	3
171EC5T11	Digital Communications	PC	3	1	0	4	3
171EC5T12	Antennas and Wave Propagation	PC	3	1	0	4	3
---	**Professional Elective - I**	PE	3	1	0	4	3
171HS5T06	Employability Skills - III	HSS	0	0	2	2	1
171EC5L04	Linear IC Applications Lab	PC	0	0	3	3	2
171EC5L05	Digital IC Applications Lab	PC	0	0	3	3	2
171EC5L06	Pulse and Digital Circuits Lab	PC	0	0	3	3	2
171EC5S01	MOOCs – I	SS	0	0	0	0	0
		Total	**13**	**5**	**13**	**31**	**22**

VI SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171EC6T13	Micro Processors and Micro Controllers	PC	3	1	0	4	3
171EC6T14	VLSI Design	PC	3	1	0	4	3
171EC6T15	Digital Signal Processing	PC	3	1	0	4	3
---	**Professional Elective – II**	PE	3	1	0	4	3
---	**Professional Elective - III**	PE	3	1	0	4	3
171HS6T07	Employability Skills - IV	HSS	0	0	2	2	1
171EC6L07	Micro Processor and Micro Controllers Lab	PC	0	0	3	3	2
171EC6L08	VLSI Lab	PC	0	0	3	3	2
171EC6L09	Digital Communications Lab	PC	0	0	3	3	2
171EC6S02	MOOCs – II	SS	0	0	0	0	0
		Total	**13**	**5**	**13**	**31**	**22**

MOOCs – Massive Open Online Courses

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VII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171EC7T16	Microwave Engineering	PC	3	1	0	4	3
171EC7T17	Digital Image Processing	PC	3	1	0	4	3
171EC7T18	Electronic Measurements And Instrumentation	PC	3	1	0	4	3
171EC7T19	Optical Communications	PC	3	1	0	4	3
---	**Professional Elective – IV**	PE	3	1	0	4	3
---	**Professional Elective – V**	PE	3	1	0	.4	3
171EC7L10	Microwave Engineering and Optical Communications Lab	PC	0	0	3	3	2
171EC7L11	Digital Signal and Image Processing Lab	PC	0	0	3	3	2
171EC7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	2
		Total	**18**	**6**	**6**	**30**	**24**

VIII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
---	**Professional Elective – VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171EC8P02	**Major Project**	PR	0	0	0	0	14
		Total	**6**	**2**	**0**	**8**	**20**

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Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171EC5E01	Computer Architecture and Organization
2	171EC5E02	OOPS through JAVA
3	171EC5E03	Electronic Switching Systems

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171EC6E04	CPLD and FPGA Architectures
2	171EC6E05	Operating Systems
3	171EC6E06	Computer Networks

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171EC6E07	Digital Design Through Verilog
2	171EC6E08	Biomedical Engineering
3	171EC6E09	Information Theory and Coding

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171EC7E10	Digital Signal Processors
2	171EC7E11	Embedded Systems
3	171EC7E12	Cellular and Mobile Communications

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171EC7E13	Analog IC Design
2	171EC7E14	Cryptography and Network Security
3	171EC7E15	Radar Systems

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171EC8E16	Mixed Signal IC Design
2	171EC8E17	Wireless Sensors and Networks
3	171EC8E18	Satellite Communications

Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171EC8O01	Basic Concrete Technology
2	171CE8O04	Waste Water Management
3	171EE8O05	Robotics
4	171EC8O02	Disaster Management
5	171EE8O07	Internet of Things
6	171EC8O03	Neural Networks
7	171CE8O03	Alternative Energy Sources
8	171CE8O02	Database Management Systems
9	171EC8O04	Web Technologies
10	171CE8O06	Green Fuel Technologies

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ENGINEERING GRAPHICS AND DESIGN
Common to EEE, ECE

	L	T	P	C
I Semester	**L**	**T**	**P**	**C**
Course Code:201ES1I01	**2**	**0**	**2**	**3**

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

CO1: Make use of fundamentals of Engineering Drawing to sketch basic curves, conic sections, cycloid and involute.
CO2: Apply the principles of orthographic projections for points, lines and planes.
CO3: Apply the principles of orthographic projections for solids.
CO4: Explain the basic functions of drawing software.
CO5: Apply the software for the orthographic projection of the machine parts.

Mapping of Course Outcomes with Program Outcomes:

C0/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	-	1
CO2	2	-	-	-	-	-	-	-	-	3	-	1
CO3	2	-	-	-	-	-	-	-	-	3	-	1
CO4	2	-	-	-	2	-	-	-	-	3	-	1
CO5	2	-	-	-	2	-	-	-	-	3	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Introduction to Engineering Graphics-Principles of Engineering graphics and their significance – Conventions in drawing – Lettering- BIS conventions – Conic Sections by Eccentricity method.

Unit – II
Cycloid -Involute of Circle-Introduction to Orthographic projections- Projection of points.

Unit – III
Projections of Straight Lines -Introduction -Projections of lines inclined to one plane and both the reference planes.

Unit – IV
Projections of planes -Introduction – Projections of perpendicular planes and oblique planes.

Unit – V
Projections of Solids – Introduction – Projections of Prisms and Pyramids inclined to one reference plane.

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Text Books:

1. N.D.Bhatt, Engineering Drawing, 53rd Edition, Charotar Publishers, 2016.
2. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3rd Edition, Scitech Publishers, Chennai, 2012.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Web Links:

1. https://www.wiziq.com/tutorials/engineering-drawing
2. www.me.umn.edu/courses

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NUMERICAL METHODS AND VECTOR CALCULUS

III Semester **L T P C**

Course Code: 191BS3T13 **3 0 0 3**

Course Outcomes:

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

CO 1: Apply numerical methods tosolve equations and interpolation of polynomials.

CO 2: Apply numerical methods to initial value problems and problems involving integration.

CO 3: Compute double integral over a region and triple integral over a volume.

CO 4: Compute the gradient of a scalar function, divergence and curl of a vector function.

CO 5: Apply line, surface and volume integrals.

Mapping of course outcomes with program outcomes:

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

UNIT-I

Solution of Algebraic and Transcendental Equations: Introduction to Numerical methods, Bisection method, Secant method, Method of false position, Iteration method, Newton - Raphson method.

Interpolation: Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.

UNIT-II

Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).

UNIT-III

Multiple Integrals: Double integrals, Change of order of integration, Change of variables, Double integral in polar coordinates, Triple integrals, Finding Area and Volume as a double integral.

Special Functions: Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-IV

Vector Differentiation: Introduction, Gradient of a scalar field, Directional Derivative, Divergence of a vector field, Curl of a vector field, Solenoidal and irrotational fields, Conservative force field, Scalar potential, Laplaceoperator, Vector identities.

UNIT-V

Vector Integration: Introduction, Line integral, Work done, Surface and volume integrals, Green's theorem, Stokes theorem and Gauss Divergence theorem (All theorems without proof) and related problems.

Text Books:

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyengar, 4th Edition, Alpha Science Publications.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, Wiley-
3. Higher Engineering Mathematics, B.S.Grewal, 43rdEdition, Khanna Publishers.

Reference Books:

1. Advanced engineering mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er.,S. Chand Co. Pvt. Ltd,Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://swayam.gov.in/nd1_noc19_ma21/preview
2. https://swayam.gov.in/nd1_noc19_ma19/preview

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ELECTRONIC DEVICES AND CIRCUITS

III Semester **L T P C**
Course Code: 191EC3T01 **3 0 0 3**

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Interpret the characteristics of semiconductor diodes.
CO 2: Compare the characteristics of rectifiers with and without filters.
CO 3: Summarize the characteristics of BJT and FET in different configurations.
CO 4: Apply biasing methods for stabilization of BJT and FET amplifiers.
CO 5: Interpret small signal low frequency equivalent models of BJT and FET.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	1
CO2	3	2	2	-	-	-	-	-	-	-	-	1
CO3	2	2	1	-	-	-	-	-	-	-	-	1
CO4	2	2	2	-	-	-	-	-	-	-	-	1
CO5	2	2	1	-	-	-	-	-	-	-	-	1

Mapping of course outcomes with program Specific Outcomes:

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

UNIT-I
Junction Diode Characteristics: Review on semiconductor materials, Open circuited PN junction, energy band structure of open circuited PN junction, forward and reverse bias of PN junction, current components in PN junction diode, drift and diffusion currents, law of junction, diode current equation, Breakdown mechanisms, V-I Characteristics, temperature dependence of V-I characteristics, static and dynamic diode resistances, Diffusion and Transition capacitances.
Special Semiconductor Diodes: Operation and characteristics of different diodes like Zener Diode, Zener diode applications, LED, Photo diode, Tunnel Diode, Varactor Diode and UJT.

UNIT-II
Rectifiers: Block diagram and requirements of Linear mode power supply, Types of rectifiers and their operation, input and output waveforms, derivations of parameters of rectifiers.
Filters: Inductor filter, Capacitor filter, L-section filter, π-section filter, multiple L-section and multiple π - section filters, comparison of various filter circuits in terms of ripple factor.

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UNIT-III

Transistor Characteristics:

BJT: Construction and operation of a transistor, transistor current components, transistor current equation, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/reach through, typical transistor junction voltage values.

FET: Construction, operation, characteristics and parameters of JFET, depletion and enhancement mode MOSFETs, comparison between JFET and MOSFET.

UNIT-V

Transistor Biasing and Thermal Stabilization: Need for biasing, load line analysis, basic stability and stability factors(S, S', S''), BJT biasing methods, fixed bias, collector to base bias, selfbias, Stabilization against variations in V_{BE}, Ic0 and β, Bias compensation, Thermal runaway, Thermal stability, FET Biasing methods and stabilization.

UNIT-V

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

Text 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.

Reference Books:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, Pearson Publications, 9th Edition, 2006.
2. Electronic Devices and Circuits, GK Mittal, Khannan Publishers, 23rd Edition, 2008.

Web Links:

1. https://www.electronics-tutorials.ws/diode/diode_2.html
2. http://fourier.eng.hmc.edu/e84/lectures/ch4/node3.html
3. http://nptel.ac.in/courses/117103063/11

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SIGNALS AND SYSTEMS

III Semester **L T P C**
Course Code:191EC3T03 **3 0 0 3**

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

CO 1: Categorize signals and systems based on their characteristics.
CO 2: Explain the concept of orthogonality for signal approximation.
CO 3: Implement various transform techniques for the analysis of signals and systems.
CO 4: Apply convolution and correlation for signal generation and signal extraction.
CO 5: Utilise the concept of sampling theorem.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	1
CO3	2	2	2	-	-	-	-	-	-	-	-	1
CO4	2	2	2	-	-	-	-	-	-	-	-	1
CO5	2	2	1	-	-	-	-	-	-	-	-	1

Mapping of course outcomes with program Specific Outcomes:

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

UNIT-I
Signals: Classification of Signals, Different deterministic signals: impulse, step, ramp, gate, signum, sinc, sinusoidal, exponential, complex exponential, operations on signals.
Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal signals, Mean square error, Closed or complete set of orthogonal signals, Orthogonality in complex functions.

UNIT-II
Fourier Series: Representation of Fourier series for continuous time periodic signals, Trigonometric Fourier series and Exponential Fourier series, Convergence of Fourier series: Dirichlet's conditions, properties of Fourier series, Complex Fourier spectrum, Fourier series of signals with different symmetry.
Fourier Transform: Deriving Fourier Transform (FT) from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Properties of Hilbert Transform. Applications of Fourier Transforms.

UNIT-III
Convolution of Signals: Convolution and it's properties, Graphical representation of convolution, convolution of signals through transforms.

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Correlation of Signals: Cross correlation and auto correlation of signals, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation.

UNIT-IV

Signal Transmission Through LTI Systems: Classification of Systems, Impulse response and step response of LTI systems, Transfer function of a LTI system. Filter characteristics of LTI systems. Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Signal bandwidth, system bandwidth, relationship between bandwidth and rise time.

Signal Detection/Extraction from noisy system: Noise, Properties of noise, Detection of periodic signals in the presence of noise using correlation, Extraction of signal using filtering.

UNIT-V

Causality and Stability Criteria: Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of continuous time signals, Laplace transform of certain signals using waveform synthesis. Region of convergence in Z-Transform, constraints on ROC for various classes of discrete time signals, Stability of system based on ROC of transfer function.

Sampling: Sampling, Sampling theorem – Graphical and analytical proof for Band Limited Signals, Nyquist rate, Nyquist duration, Impulse sampling, Natural sampling and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Text Books:

1. Signals and Systems - A.V. Oppenheim, A.S. Willsky, and S.H. Nawab, PHI, 2nd Edition, 2016.
2. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
3. Signals and Systems – A. Anand Kumar, PHI, 4th Edition, 2017.

Reference Books:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008

Web Links:

1. https://freevideolectures.com/course/3540/signals-and-systems-i
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
3. https://nptel.ac.in/courses/108104100/

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ELECTRONIC DEVICES AND CIRCUITS LAB

III Semester **L T P C**
Course Code: 191EC3L01 **0 0 3 1.5**

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

CO 1: Examine the functional characteristics of semiconductor devices.
CO 2: Design rectifier and regulator circuits using basic semiconductor devices.
CO 3: Examine the characteristics of transistor in different configurations.
CO 4: Analyze the frequency response of small signal low frequency amplifiers.
CO 5: Describe the behavior of negative resistance devices.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	2	1	-	-
CO2	3	2	-	-	-	-	-	-	2	1	-	-
CO3	3	2	-	-	-	-	-	-	2	1	-	-
CO4	2	2	-	-	-	-	-	-	2	1	-	-
CO5	2	2	-	-	-	-	-	-	2	1	-	-

Mapping of course outcomes with program Specific Outcomes:

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

List of Experiments:

1. Determine static and dynamic resistances of P-N Junction Diode (Ge & Si).
2. Obtain cut in and breakdown voltages of Zener diode and Verify the operation of Zener Diode as a voltage regulator.
3. Calculate the Ripple factor and percentage Regulation of Half-wave Rectifier (i) without filter (ii) with capacitor filter(iii) with Pi-section filter
4. Calculate the Ripple factor and percentage Regulation of Full-wave bridge Rectifier
   (i) without filter (ii) with capacitor filter(iii) with Pi-section filter
5. Determine h-parameters of CE Configuration from Input and Output Characteristics.
6. Determine h-parameters of CB Configuration from Input and Output Characteristics.
7. Obtain the Drain and Transfer Characteristics of FET-CS Configuration also find μ,g_m and rd.
8. Draw the V-I characteristics of UJT and Identify the negative resistance region.
9. Obtain the frequency response of BJT-CE Amplifier and verify the response using PSPICE.
10. Obtain the frequency response of FET-CS Amplifier and verify the response using PSPICE.

List of Augmented Experiments:

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(Any one Experiment)

11. Obtain the frequency response of Emitter Follower-CC Amplifier and verify the response using PSPICE.
12. Determine the Q point of given voltage divider bias 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

Tools Required:

1. PSPICE Software.

Reference Books:

1. Electronic Devices and circuits Lab Manual-Electronics and communication Engineering, Aditya Engineering College, Surampalem.
2. Electronic Devices and Circuit Theory, Robert L. Boylestad, Pearson New International Edition,2015.

Web Links:

1. https://nptel.ac.in/courses/122106025/
2. https://www.circuitlab.com/editor/#?id=6syafk
3. https://www.falstad.com/circuit/

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CONTROL SYSTEMS

(Common to ECE, EEE)

IV Semester

Course Code: 191ES4T17

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO 1: Develop the overall transfer function using block diagram algebra and signal flow graphs

CO 2: Identify time response specifications, error constants of second order systems

CO 3: Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method

CO 4: Analyze the stability of LTI systems using frequency response methods

CO 5: Develop state models for physical systems

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	1	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	2	2	1	-	-	-	-	-	-	-	-
CO5	2	2	1	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

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

UNIT-I

Mathematical Modeling of Control Systems:

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UN1T-II

Time Response Analysis: Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

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UNIT-III

Stability and Root locus Technique: The concept of stability – Routh's stability criterion-limitations of Routh's stability –Root locus concept - construction of root loci (Simple problems)

UNIT-IV

Frequency Response Analysis: Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion, Lag, Lead, Lag-Lead compensators.

UNIT-V

State Space Analysis of LTI systems: Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Control Systems, ManikDhanesh N, Cengage publications.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

Web Links:

1. http://engineering.electrical-equipment.org/panel-building/time-domain-analysis-of-control-systems.htm
2. http://www.cds.caltech.edu/~murray/amwiki/index.php/Frequency_Domain Analysis
3. https://www.electrical4u.com/mathematical-modelling-of-various-system%20/
4. https://www.electrical4u.com/state-space-analysis-of-control-system/

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ANALOG ELECTRONIC CIRCUITS LAB

	L	T	P	C
IV Semester	**L**	**T**	**P**	**C**
Course Code : 191EC4L02	**0**	**0**	**3**	**1.5**

Course Outcomes:

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

CO 1	Determine the frequency response, impedance and Q-point of different types of multi stage amplifiers.
CO 2	Construct voltage and current feedback amplifiers for given specifications.
CO 3	Analyze LC and RC types of oscillators for given specifications.
CO 4	Analyze the efficiency of class A power amplifier for given specifications.
CO 5	Determine the frequency response of single tuned amplifier for given specifications

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	-	-	1	-	-	-	2	-	-	-
CO2	3	2	-	-	1	-	-	-	1	-	-	-
CO3	2	3	-	-	2	-	-	-	2	-	-	-
CO4	2	1	-	-	-	-	-	-	2	-	-	-
CO5	2	2	-	-	1	-	-	-	1	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

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

List of Experiments has to be performed using software:

1. Frequency response of two stage RC coupled amplifier.
2. Frequency response of voltage series feedback amplifier.
3. Frequency of RC phase shift oscillator using BJT.
4. Efficiency of class-A power amplifier.
5. Frequency response of single tuned amplifier.

List of Experiments has to be performed using hardware:

1. Frequency response, output impedance and Q-point of two stage RC coupled amplifier.
2. Frequency response and output impedance of voltage series feedback amplifier.
3. Frequency of RC phase shift oscillator using BJT.
4. Efficiency and Q-point of class A power amplifier.
5. Frequency response of single tuned amplifier.

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List of Augmented Experiments
(Any two of the following experiments can be performed)

1. Frequency response of three stage RC coupled amplifier and compare with two stage RC coupled amplifiers
2. Bandwidth of Darlington pair amplifier.
3. Frequency of Colpitt's oscillator using BJT.
4. Bandwidth of Bootstrapped emitter follower.

Software Equipment required:

1. OrCAD family release 9.2

Hardware 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. Integrated Electronics, J. Millman and C.C.Halkias, Tata Mc Graw-Hill, 2000.
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TATA McGraw Hill, 3rd Edition, 2013.
3. Circuit Analysis PSpice- Nassir H., CRC press Taylor & Fransis group, 2017.

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Syllabus revision Index

2020-21

S.No	Name of the course	Percentage of syllabus change
1	Engineering Graphics and Design	55
2	Numerical Methods & Vector Calculus	40
3	Electronic Devices and Circuits	40
4	Signals and Systems	20
5	Electronic Devices and Circuits Lab	30
6	Control Systems	20
7	Analog Electronic Circuits – Lab	25

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	ENGINEERING GRAPHICS AND DESIGN	ENGINEERING GRAPHICS AND DESIGN
Course Code	191ES2T02	201ES1I01
Syllabus	**CONVENTIONAL DRAFTING** **UNIT-I** **Introduction To Engineering Graphics:** Principles of Engineering Graphics and their significance-conventions in drawing- lettering – BIS Conventions- - Conic sections -Cycloid, epicycloids and hypocycloid-Involutes	CONVENTIONAL DRAFTING UNIT-I: Introduction to Engineering Graphics-Principles of Engineering graphics and their significance – Conventions in drawing – Lettering- BIS conventions – Conic Sections by Eccentricity method.
	UNIT-II **Projection of Points, Lines And Planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.	UNIT-II: Cycloid -Involute of Circle-Introduction to Orthographic projections- Projection of points.
	UNIT-III **Projections of Solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.	UNIT-III: Projections of Straight Lines -Introduction - Projections of lines inclined to one plane and both the reference planes.
	COMPUTER AIDED DRAFTING **UNIT-IV** **Introduction To Computer Aided Drafting**: Basic drawing and editing commands-Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections	UNIT-IV: Projections of planes -Introduction – Projections of perpendicular planes and oblique planes.
	UNIT-V **Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures,	UNIT-V: Projections of Solids – Introduction – Projections of Prisms and Pyramids inclined to one reference plane.

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	simple and compound solids	
		COMPUTER AIDED DRAFTING List of Experiments: 1.Initiating the Graphics Package; Setting the paper size, setting the limits, units, Using Drawing Aids (functional keys) and control keys. 2. Selecting commands & Working with drawing. 3. Viewing drawing and Working with coordinates. 4. Draw 2d models using Different colors & font command. 5. Creating simple entities by using draw commands. 6. Manipulating Objects (Modifying Tool Bar). 7. Getting drawing information& working with annotating drawing and practice. 8. Dimensioning drawing and practice. 9. 2D Drawing practice. 10. Orthographic Projections. 11. Working with Layouts. 12. Plotting in Model spaces & Paper space, and exporting to an Electronic Format. List of Augmented Experiments (Any two of the following can be performed) 13. Apply the concept of layers and draw the 2D components. 14. Apply the concept of blocks and draw the 2D components. 15. Apply the concepts of Sections in drawing. 16. Drawing of various engineering components used in industry.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mathematics-III	Numerical Methods & Vector Calculus
Course Code	171BS2T06	191BS3T13
Syllabus	**UNIT - I:** **Laplace transforms:** Laplace transforms of standard functions-First Shifting theorem, Change of scale, Multiplication with t, Division by t - Transforms of derivatives and integrals – Unit step function –Dirac's delta function, Periodic functions.	UNIT-I Solution of Algebraic and Transcendental Equations: Introduction to Numerical methods, Bisection method, Secant method ,Method of false position, , Iteration method, Newton - Raphson method. Interpolation: Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.
	UNIT- II: **Inverse Laplace transforms:** Inverse Laplace transforms – Convolution theorem (without proof), Second shifting theorem. *(MATLAB Exercise: Computing Laplace transform off (t) using symbolic toolbox, Solving initial value problems using 'dsolve') **Applications:** Evaluating improper integrals, solving initial value problems using Laplace transforms.	UNIT-II Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).
	UNIT - III: **Multiple integrals and Beta, Gamma functions:**	UNIT-III **Multiple Integrals:** Double integrals, Change of order of integration, Change

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	Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration, Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- **Applications:** Finding Areas and Volumes	of variables, Double integral in polar coordinates, Triple integrals, Finding Area and Volume as a double integral. **Special Functions:** Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Evaluation of improper integrals.
	UNIT - IV: **Vector Differentiation:** Gradient - Directional Derivatives - Divergence- Curl - Laplacian operator -Vector identities. **Applications:** Equation of continuity, potential surfaces	UNIT-IV Vector Differentiation: Introduction, Gradient of a scalar field, Directional Derivative, Divergence of a vector field, Curl of a vector field, Solenoidal and irrotational fields, Conservative force field, Scalar potential, Laplaceoperator, Vector identities.
	UNIT - V: **Vector Integration:** Line integral – Work done - Surface and volume integrals, Green's Theorem, Stokes Theorem and Gauss Divergence theorem (without proof) and related problems.	UNIT-V Vector Integration: Introduction, Line integral, Work done, Surface and volume integrals, Green's theorem, Stokes theorem and Gauss Divergence theorem (All theorems without proof) and related problems.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Electronic Devices and Circuits	Electronic Devices and Circuits
Course Code	171EC3T01	191EC3T01
Syllabus	**UNIT I** **Semi Conductor Physics:** Insulators, Semi conductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors and extrinsic semi conductors, drift and diffusion currents, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.	UNIT-I Junction Diode Characteristics: Review on semiconductor materials, Open circuited PN junction, energy band structure of open circuited PN junction, forward and reverse bias of PN junction, current components in PN junction diode, drift and diffusion currents, law of junction, diode current equation, Breakdown mechanisms, V-I Characteristics, temperature dependence of V-I characteristics, static and dynamic diode resistances, Diffusion and Transition capacitances. Special Semiconductor Diodes: Operation and characteristics of different diodes like Zener Diode, Zener diode applications, LED, Photo diode, Tunnel Diode, Varactor Diode and UJT.
	UNIT II **Junction Diode Characteristics:** Open circuited PN junction, Biased PN junction, current components in PN junction Diode, diode current equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.	UNIT-II Rectifiers: Block diagram and requirements of Linear mode power supply, Types of rectifiers and their operation, input and output waveforms, derivations of parameters of rectifiers. Filters: Inductor filter, Capacitor filter, L-section filter, π-section filter, multiple L-section and multiple π - section filters, comparison of various filter circuits in terms of ripple factor.

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	UNIT III **Rectifiers and Filters:** Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, operation, derivations of parameters of rectifiers, , input and output waveforms, Filters: Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors. **Special Semiconductor Diodes**: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Tunnel Diode, SCR, UJT. Their Construction, operation and characteristics.	UNIT-III Transistor Characteristics: BJT: Construction and operation of a transistor, transistor current components, transistor current equation, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/reach through, typical transistor junction voltage values. FET: Construction, operation, characteristics and parameters of JFET, depletion and enhancement mode MOSFETs, comparison between JFET and MOSFET.
	UNIT IV **Transistor Characteristics: BJT:** Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/reach through, Photo transistor, typical transistor junction voltage values. **FET:** JFET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET. .	UNIT-IV Transistor Biasing and Thermal Stabilization: Need for biasing, load line analysis, basic stability and stability factors(S, S', S''), BJT biasing methods, fixed bias, collector to base bias, selfbias, Stabilization against variations in VBE, Ic0 and β, Bias compensation, Thermal runaway, Thermal stability, FET Biasing methods and stabilization.
	UNIT V **Transistor Biasing and Thermal Stabilization:** Need for biasing, operating point, load line analysis, BJT biasing methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability,FET Biasing methods and stabilization	UNIT-V Small Signal Low Frequency Transistor Amplifier Models: BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. FET: Generalized analysis of small

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	Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of Laplace transforms, relation between LTs, and FT of a signal, Inverse Laplace transform, Laplace transform using waveform synthesis. **Z–Transforms:** Z-Transform of a discrete time signal, Distinction between Laplace, Fourier and Z-transforms, Region of convergence in Z-Transform, constraints on ROC for various classes of discrete signals, Properties of Z-transforms, properties of Z-transforms, Inverse Z-transform.	Laplace transforms, constraints on ROC for various classes of continuous time signals, Laplace transform of certain signals using waveform synthesis. Region of convergence in Z-Transform, constraints on ROC for various classes of discrete time signals, Stability of system based on ROC of transfer function. Sampling: Sampling, Sampling theorem – Graphical and analytical proof for Band Limited Signals, Nyquist rate, Nyquist duration, Impulse sampling, Natural sampling and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

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		Transform. Applications of Fourier Transforms.
	UNIT III **Convolution and Correlation of Signals:** Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution properties of Fourier transforms. Signal Comparison: Cross correlation and auto correlation of signals, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.	UNIT-III Convolution of Signals: Convolution and it's properties, Graphical representation of convolution, convolution of signals through transforms. Correlation of Signals: Cross correlation and auto correlation of signals, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation.
	UNIT IV Signal Transmission through LTI Systems: Classification of systems, Linear time invariant (LTI) system, Impulse response of LTI systems, Properties of LTI systems, Transfer function of an LTI system, Filter characteristics of linear systems, Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, relationship between bandwidth and rise time. Sampling: Sampling, Sampling theorem – Graphical and analytical proof for Band Limited Signals, effect of under sampling – Aliasing, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Sampling of Band Pass signals.	UNIT-IV Signal Transmission Through LTI Systems: Classification of Systems, Impulse response and step response of LTI systems, Transfer function of a LTI system. Filter characteristics of LTI systems. Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Signal bandwidth, system bandwidth, relationship between bandwidth and rise time. Signal Detection/Extraction from noisy system: Noise, Properties of noise, Detection of periodic signals in the presence of noise using correlation, Extraction of signal using filtering.
	UNIT V **Laplace Transforms:** Review of Laplace transform (LT), Existence of	UNIT-V Causality and Stability Criteria: Concept of region of convergence (ROC) for

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Signals and Systems	Signals and Systems
Course Code	171EC3T03	**191EC3T03**
Syllabus	**UNIT I** **Signals:** Introduction, Representation of signals, Elementary signals, Basic Operations on signals, Classification of Signals. **Signal Analysis:** Analogy between vectors and signals, Orthogonal vector space, Orthogonal signal space, Signal approximation by a set of mutual orthogonal signals, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.	UNIT-I Signals: Classification of Signals, Different deterministic signals: impulse, step, ramp, gate, signum, sinc, sinusoidal, exponential, complex exponential, operations on signals. Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal signals, Mean square error, Closed or complete set of orthogonal signals, Orthogonality in complex functions.
	UNIT II **Fourier Series:** Representation of periodic signals using Fourier series, Trigonometric Fourier series and Exponential Fourier series, properties of Fourier series, Complex Fourier spectrum. **Fourier Transforms**: Deriving Fourier transform(FT) from Fourier series, Existence of Fourier transform, Fourier transform of standard signals, properties of Fourier transforms, Fourier transform of periodic signals, Fourier transforms involving impulse signal and Signum signal.	UNIT-II Fourier Series: Representation of Fourier series for continuous time periodic signals, Trigonometric Fourier series and Exponential Fourier series, Convergence of Fourier series: Dirichlet's conditions, properties of Fourier series, Complex Fourier spectrum, Fourier series of signals with different symmetry. Fourier Transform: Deriving Fourier Transform (FT) from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Properties of Hilbert

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		signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

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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	171EC3L01	191EC3L01
Syllabus	**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	List of Experiments: 1.Determine static and dynamic resistances of P-N Junction Diode (Ge & Si). 2.Obtain cut in and breakdown voltages of Zener diode and Verify the operation of Zener Diode as a voltage regulator. 3.Calculate the Ripple factor and percentage Regulation of Half-wave Rectifier (i) without filter (ii) with capacitor filter(iii) with Pi-section filter 4.Calculate the Ripple factor and percentage Regulation of Full-wave bridge Rectifier (i) without filter (ii) with capacitor filter(iii) with Pi-section filter 5.Determine h-parameters of CE Configuration from Input and Output Characteristics. 6.Determine h-parameters of CB Configuration from Input and Output Characteristics. 7.Obtain the Drain and Transfer Characteristics of FET-CS Configuration also find μ,gm and rd. 8.Draw the V-I characteristics of UJT and Identify the negative resistance region. 9.Obtain the frequency response of BJT-CE Amplifier and verify the response using PSPICE. 10.Obtain the frequency response of

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	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 (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.	FET-CS Amplifier and verify the response using PSPICE. List of Augmented Experiments: (Any one Experiment) 11.Obtain the frequency response of Emitter Follower-CC Amplifier and verify the response using PSPICE. 12. Determine the Q point of given voltage divider bias circuit.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Control Systems	Control Systems
Course Code	171ES4T28	191ES4T17
Syllabus	**UNIT I** **Introduction to Control Systems:** System, Control System, Open Loop Control System, Closed loop Control System, Different Examples **Mathematical models of Physical Systems:** Differential equations of physical systems, Transfer functions, Block diagram Algebra, Signal flow graphs with illustrative examples. **Effects of Feedback:** Feedback Characteristics and its advantages, linearizing effect of feedback	**UNIT-I** **Mathematical Modeling of Control Systems:** Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.
	UNIT II **Controller Components:** DC Servomotor (Armature Controlled and Field Controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function, AC Tachometer, Potentiometer, Synchros, AC Position Control Systems Tuning of PID Controllers **Time Response Analysis:** Standard test Signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices	**UN1T-II** **Time Response Analysis:** Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.
	UNIT III **Concepts of Stability and Algebraic**	**UNIT-III** **Stability and Root locus Technique:**

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	Criteria: The concept of Stability, Necessary Conditions for Stability, Routh-Hurwitz Srability Criterion, Relative stability analysis, **The Root Locus Technique:** Introduction, The Root Locus concepts, Construction of Root Loci	The concept of stability – Routh's stability criterion-limitations of Routh's stability –Root locus concept - construction of root loci (Simple problems)
	UNIT IV **Frequency response analysis:** Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots,Nyquist Stability Criterion	UNIT-IV Frequency Response Analysis: Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion, Lag, Lead, Lag-Lead compensators.
	UNIT V **Introduction to Design:** The design problem, Preliminary consideration of classical design, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, **State Variable Analysis and Design:** Introduction, Concepts of State, State Variables and State models, State models for linear continuous-time systems, State variables and linear discrete-time systems, Solution of state equations and Concepts of Controllability and Observability.	**UNIT-V** **State Space Analysis of LTI systems:** Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization-Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**Electronic circuit analysis-lab**	Analog Electronic Circuits – Lab
Course Code	171EC4T05	191EC4L02
Syllabus	**List of Experiments to be performed using software:** Week 1. Introduction to OrCAD PSPICE Week 2. Obtain the frequency response of two stage RC coupled amplifier. Construct voltage series feedback amplifier and plot the frequency response. Week 3. Construct current shunt feedback amplifier and plot the frequency response. Obtain the frequency response of Darlington pair amplifier. Week 4. Observe the operation of class A power amplifier and find its efficiency. Determine frequency of RC phase shift oscillator using BJT. Week 5. Determine frequency of Colpitts oscillator using BJT. Obtain the frequency response of single tuned amplifier. **List of Experiments has to be performed using hardware:** Week 6. Obtain the frequency response of two stage RC coupled amplifier. Week 7. Construct voltage series feedback amplifier and plot the frequency response. Week 8. Construct current shunt	**List of Experiments has to be performed using software:** 1. Frequency response of two stage RC coupled amplifier. 2. Frequency response of voltage series feedback amplifier. 3. Frequency of RC phase shift oscillator using BJT. 4. Efficiency of class-A power amplifier. 5. Frequency response of single tuned amplifier. **List of Experiments has to be performed using hardware:** 1. Frequency response, output impedance and Q-point of two stage RC coupled amplifier. 2. Frequency response and output impedance of voltage series feedback amplifier. 3. Frequency of RC phase shift oscillator using BJT. 4. Efficiency and Q-point of class A power amplifier. 5. Frequency response of single tuned amplifier. List of Augmented Experiments (Any two of the following experiments can be performed) 1. Frequency response of three stage RC coupled amplifier and compare with two stage RC coupled amplifiers

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	feedback amplifier and plot the frequency response. Week 9. Obtain the frequency response of Darlington pair amplifier. Week 10. Observe the operation of class A power amplifier and find its efficiency. Week 11. Determine frequency of RC phase shift oscillator using BJT. Week 12. Obtain the frequency response of single tuned amplifier. **List of Augmented Experiments (Week 13 & 14)** **(Any two of the following experiments can be performed)** 1. Determination of unity gain frequency (fT) of a given transistor. 2. Obtain the frequency response of three stage RC coupled amplifier and compare with two stage RC coupled amplifiers 3. Calculate the Bandwidth of Boot strapped emitter follower. 4. Measure the voltage gain of a common sources amplifier and plot the frequency response. 5. Determine frequency of Colpitts oscillator using BJT.	2. Bandwidth of Darlington pair amplifier. 3. Frequency of Colpitt's oscillator using BJT. 4. Bandwidth of Bootstrapped emitter follower.

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

Syllabus Revision for the Academic Year 2020-2021				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential Equations and Linear algebra	0
3	I	201BS1T04	Engineering Chemistry	0
4	I	201ES1T02	Programming For Problem Solving Using C	0
5	I	201ES1I02	Computer Engineering Workshop	0
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L03	Engineering Chemistry Lab	0
8	I	201ES1L02	Programming for Problem Solving using C Lab	0
9	I	201MC1T01	Environmental Science	0
10	II	201BS2T07	Numerical Methods and Complex Variables	0
11	II	201BS2T09	Applied Physics	0
12	II	201ES2T11	Computer Organization	0
13	II	201ES2T04	Python Programming	0
14	II	201ES2T07	Data Structures through C	100
15	II	201BS2L04	Applied Physics Lab	0
16	II	201ES2L06	Data Structures through C Lab	0
17	II	201ES2L14	Python Programming Lab	0
18	II	201MC2L01	Professional Communication Skills Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T14	Discrete Mathematics	20
21	III	191ES3T13	Digital Logic Design	0
22	III	191HS3T02	Managerial Economics and Financial Analysis	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
23	III	191CS3T01	Software Engineering	0
24	III	191CS3T02	Object Oriented Programming through Java	100
25	III	191CS3T03	Advanced Data Structures	100
26	III	191CS3L01	Object Oriented Programming through Java Lab	0
27	III	191CS3L02	Advanced Data Structures Lab	20
28	III	191MC3A03	Employability Skills - I	0
29	III	191MC3A04	Essence of Indian Traditional Knowledge	100
30	IV	191BS4T18	Probability and Statistics	20
31	IV	191CS4T04	Formal Languages and Automata Theory	0
32	IV	191CS4T05	Python Programming	0
33	IV	191CS4T06	Design and Analysis of Algorithms	0
34	IV	191ES4T15	Internet of Things	0
35	IV	191CS4T07	Computer Organization	0
36	IV	191CS4L03	Python Programming Lab	0
37	IV	191ES4L17	Internet of Things Lab	0
38	IV	191MC4A05	Employability Skills - II	0
39	IV	191MC4A06	Biology for Engineers	100
40	V	171CS5T11	Compiler Design	0
41	V	171CS5T12	Python Programming	0
42	V	171CS5T13	Design & Analysis of Algorithms	0
43	V	171CS5T14	Operating Systems	0
44	V	171CS5E01	Unix and Shell Programming	0
45	V	171CS5E02	Advanced Computer Architecture	0
46	V	171CS5E03	Computer Graphics	0
47	V	171CS5E04	Software Testing Methodologies	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
48	V	171HS5T06	Employability Skills – III	0
49	V	171CS5L05	Operating System and Linux Lab	0
50	V	171CS5L06	Python Programming Lab	0
51	V	171CS5L07	Software Testing Lab	0
52	V	171CS5L08	Compiler Design Lab	0
53	V	171CS5S01	MOOCs – I	0
54	VI	171CS6T15	Computer Networks	0
55	VI	171CS6T16	Web Technologies	0
56	VI	171CS6T17	Data Ware Housing and Data Mining	0
57	VI	171CS6E05	Software Quality Assurance	0
58	VI	171CS6E06	Bio Informatics	0
59	VI	171CS6E07	Human Computer Interaction	0
60	VI	171CS6E08	Social Networks and Semantic Web	0
61	VI	171CS6E09	Pattern Recognition	0
62	VI	171CS6E10	Parallel Computing	0
63	VI	171CS6E11	Storage Area Networks	0
64	VI	171CS6E12	E - Commerce	0
65	VI	171HS6T07	Employability Skills – IV	0
66	VI	171CS6L09	Computer Networks Lab	0
67	VI	171CS6L10	Data Ware Housing and Data Mining Lab	0
68	VI	171CS6L11	Web Technologies Lab	0
69	VI	171CS6S02	MOOCs – II	0
70	VII	171CS7T18	Cryptography and Network Security	0
71	VII	171CS7T19	UML and Design Patterns	0
72	VII	171CS7T20	Cloud Computing	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
73	VII	171HS7T05	Management Science	0
74	VII	171CS7E13	Software Project Management	0
75	VII	171CS5E14	Big Data Analytics	0
76	VII	171CS7E15	Image Processing	100
77	VII	171CS7E16	Cyber Laws	100
78	VII	171CS7E17	Middleware Technologies	100
79	VII	171CS7E18	Artificial Intelligence and Machine Learning	100
80	VII	171CS7E19	Information Retrieval Systems	20
81	VII	171CS7E20	Mobile Computing	0
82	VII	171CS7L12	UML and Design Patterns Lab	0
83	VII	171CS7L13	Big Data Analytics Lab	0
84	VII	171CS7P01	Industry Oriented (Internship) Minor Project	0
85	VIII	171CS8E21	Agile Methodologies	100
86	VIII	171CS8E22	Cyber Security	0
87	VIII	171CS8E23	Distributed Databases	100
88	VIII	171CS8E24	Distributed Systems	40
89	VIII	171CS8O01	Microprocessor and Multi Core Systems	100
90	VIII	171CS8O02	Embedded Systems	20
91	VIII	171CS8O03	Soft Computing	100
92	VIII	171EE8O05	Robotics	0
93	VIII	171CS8O04	Operations Research	40
94	VIII	171CS8O05	Optical Communications	100
95	VIII	171EE8O07	Internet of Things	0
96	VIII	171EC8O02	Disaster Management	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
97	VIII	171CS8O06	Renewable Energy sources	100
98	VIII	171CS8O07	Nano Technology and its Applications	100
99	VIII	171CS8P02	Project Work	0

Total number of courses in the academic year 2020-2021	= 99
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021	= 23
Percentage of syllabus revision carried out in the academic year 2020-2021 = (23/99)*100	= 23.23%

K.S.P

Program Coordinator

A.N.N

Head of the Department

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential Equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T04	Engineering Chemistry	BSC	Theory	3	0	0	3	3
201ES1T02	Programming for Problem Solving using C	ESC	Theory	3	0	0	3	3
201ES1I02	Computer Engineering Workshop	ESC	Integrated	2	0	2	4	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L03	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES1L02	Programming for Problem Solving using C Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	16	0	11	27	19.5

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T07	Numerical Methods and Complex Variables	BSC	Theory	3	0	0	3	3
201BS2T09	Applied Physics	BSC	Theory	3	0	0	3	3
201ES2T11	Computer Organization	ESC	Theory	3	0	0	3	3
201ES2T04	Python Programming	ESC	Theory	3	0	0	3	3
201ES2T07	Data Structures through C	ESC	Theory	3	0	0	3	3
201BS2L04	Applied Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES2L06	Data Structures through C Lab	ESC	Lab	0	0	3	3	1.5
201ES2L14	Python Programming Lab	ESC	Lab	0	0	3	3	1.5
201MC2L01	Professional Communication Skills Lab	MC	Lab	0	0	3	3	0
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	15	0	16	31	19.5

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III SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits(C)
191BS3T14	Discrete Mathematics	BSC	3	0	0	3	3
191ES3T13	Digital Logic Design	ESC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	2	0	0	2	2
191CS3T01	Software Engineering	PCC	3	0	0	3	3
191CS3T02	Object Oriented Programming through Java	PCC	3	0	0	3	3
191CS3T03	Advanced Data Structures	PCC	3	0	0	3	3
191CS3L01	Object Oriented Programming through Java Lab	PCC	0	0	3	3	1.5
191CS3L02	Advanced Data Structures Lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills - I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	**19**	**0**	**8**	**27**	**20**

IV SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS4T18	Probability and Statistics	BSC	3	0	0	3	3
191CS4T04	Formal Languages and Automata Theory	PCC	3	0	0	3	3
191CS4T05	Python Programming	PCC	3	0	0	3	3
191CS4T06	Design and Analysis of Algorithms	PCC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191CS4T07	Computer Organization	PCC	3	0	0	3	3
191CS4L03	Python Programming Lab	PCC	0	0	3	3	1.5
191ES4L17	Internet of Things Lab	ESC	0	0	3	3	1.5
191MC4A05	Employability Skills - II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**8**	**28**	**21**

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V SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CS5T11	Compiler Design	PC	3	1	---	4	3
171CS5T12	Python Programming	PC	3	1	---	4	3
171CS5T13	Design & Analysis of Algorithms	PC	3	1	---	4	3
171CS5T14	Operating Systems	PC	3	1	---	4	3
---	**Professional Elective - I**	PE	3	1	---	4	3
171HS5T06	Employability Skills – III	HSS	2	---	---	2	1
171CS5L05	Operating System and Linux Lab	PC	---	---	3	3	2
171CS5L06	Python Programming Lab	PC	---	---	3	3	2
171CS5L07	Software Testing Lab	PC	---	---	3	3	2
171CS5L08	Compiler Design Lab	PC	---	---	3	3	2
171CS5S01	MOOCs – I	SS	---	---	---	--	---
		TOTAL	17	5	12	34	24

VI SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CS6T15	Computer Networks	PC	3	1	---	4	3
171CS6T16	Web Technologies	PC	3	1	---	4	3
171CS6T17	Data Ware Housing and Data Mining	PC	3	1	---	4	3
---	**Professional Elective - II**	PE	3	1	---	4	3
---	**Professional Elective - III**	PE	3	1	---	4	3
171HS6T07	Employability Skills – IV	HSS	2	---	---	2	1
171CS6L09	Computer Networks Lab	PC	---	---	3	3	2
171CS6L10	Data Ware Housing and Data Mining Lab	PC	---	---	3	3	2
171CS6L11	Web Technologies Lab	PC	---	---	3	3	2
171CS6S02	MOOCs – II	SS	---	---	---	--	---
		TOTAL	17	5	9	31	22

MOOCs – Massive Open Online Courses

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VII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171CS7T18	Cryptography and Network Security	PC	3	1	---	4	3
171CS7T19	UML and Design Patterns	PC	3	1	---	4	3
171CS7T20	Cloud Computing	PC	3	1	---	4	3
171HS7T05	Management Science	HSS	3	1	---	4	3
---	**Professional Elective - IV**	PE	3	1	---	4	3
---	**Professional Elective - V**	PE	3	1	---	4	3
171CS7L12	UML and Design Patterns Lab	PC	---	---	3	3	2
171CS7L13	Big Data Analytics Lab	PC	---	---	3	3	2
171CS7P01	Industry Oriented (Internship) Minor Project	PR	---	---	---	-	1
		TOTAL	18	6	6	30	23

VIII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	**Professional Elective - VI**	PE	3	1	---	4	3
---	**Open Elective**	OE	3	1	---	4	3
171CS8P02	**Project Work**	PR	----	----	---	--	14
		TOTAL	**6**	**2**	**0**	**8**	**20**

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Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171CS5E01	Unix and Shell Programming
2	171CS5E02	Advanced Computer Architecture
3	171CS5E03	Computer Graphics
4	171CS5E04	Software Testing Methodologies

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171CS6E05	Software Quality Assurance
2	171CS6E06	Bio Informatics
3	171CS6E07	Human Computer Interaction
4	171CS6E08	Social Networks and Semantic Web

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171CS6E09	Pattern Recognition
2	171CS6E10	Parallel Computing
3	171CS6E11	Storage Area Networks
4	171CS6E12	E - Commerce

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171CS7E13	Software Project Management
2	171CS7E14	Big Data Analytics
3	171CS7E15	Image Processing
4	171CS7E16	Cyber Laws

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171CS7E17	Middleware Technologies
2	171CS7E18	Artificial Intelligence and Machine Learning
3	171CS7E19	Information Retrieval Systems
4	171CS7E20	Mobile Computing

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171CS8E21	Agile Methodologies
2	171CS8E22	Cyber Security
3	171CS8E23	Distributed Databases
4	171CS8E24	Distributed Systems

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Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171CS8O01	Microprocessor and Multi Core Systems
2	171CS8O02	Embedded Systems
3	171CS8O03	Soft Computing
4	171EE8O05	Robotics
5	171CS8O04	Operations Research
6	171CS8O05	Optical Communications
7	171EE8O07	Internet of Things
8	171EC8O02	Disaster Management
9	171CS8O06	Renewable Energy sources
10	171CS8O07	Nano Technology and its Applications

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DISCRETE MATHEMATICS

(Common to CSE & IT)

III Semester	**L**	**T**	**P**	**C**
Course Code:191BS3T14	3	0	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: Solve recurrence relations using various methods.
CO4: Apply the concepts of graph theory to find euler paths, Hamiltonian paths.
CO5: Apply the concepts of graph theory to trees.

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	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

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, War shall Algorithm, Equivalence relation, R-Equivalence class, Partial Ordering Relation, Partially ordered sets, Hasse Diagrams.

Unit – III
Recurrence Relations: Recurrence Relations, Formation of Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots.

Unit – IV
Graph Theory: Basic Concepts of Graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix, Isomorphic Graphs, Paths and Circuits, Euler and Hamilton Graphs, Planar Graphs and Euler's Formula.

Unit – V
Trees: Trees-Properties, Spanning trees, BFS Algorithm, DFS Algorithm, Minimal Spanning Trees and Kruskal's Algorithm, Graph Colouring, Chromatic Number.

Text Books:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory.
2. K. H. Rosen, 7th Edition, Tata McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science

Reference Books:

1. Discrete Mathematical Structures, Bern and Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
2. Discrete Mathematics, S. K. Chakra borthy and B.K. Sarkar, Oxford, 2011

Web Links:

1. https://en.wikipedia.org/wiki/Discrete_mathematics
2. http://nptel.ac.in/courses/106106094/
3. http://mathworld.wolfram.com/classroom/classes/DiscreteMathematics.html
4. http://mathworld.wolfram.com/topics/GeneralLogic.html

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ADVANCED DATA STRUCTURES LAB

Common to CSE & IT

III Semester | | L | T | P | C
Course Code:191CS3L02 | | 0 | 0 | 3 | 1.5

	L	T	P	C
III Semester / **Course Code:**191CS3L02	0	0	3	1.5

Course Outcomes:

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

CO1: Identify the appropriate data structure for a given problem.
CO2: Implement Dictionary by using hashing techniques.
CO3: Analyze the efficiency of basic operations of AVL tree and B-Tree.
CO4: Build a Binary Heap using Priority queues.
CO5: Apply the concepts of graphs and pattern matching in real world 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	PO 11	PO 12
CO1	1	2	1	-	-	-	-	-	-	-	-	-
CO2	1	1	-	1	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-
CO4	-	1	-	1	-	-	-	-	-	-	-	-
CO5	2	2	1		-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

List of Experiments:

Week - 1
Develop a Program to implement Functions of Dictionary using Hashing (division method, digit folding and mid square method).

Week - 2
Develop a Program to implement Collision Resolution Tehniques (Linear Probing, Quardratic Probing and Double Hasing) in Hash Table.

Week - 3
Develop a Program to implement Binary Tree traversals.

Week - 4
Develop a Program to insert into and delete an element from Binary Search Tree.

Week - 5
Develop a Program to perform binary heap operations.

Week - 6
Develop a Program to perform AVL tree operations.

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Week - 7
Develop a Program to perform B-tree operations.

Week - 8
Develop a non recursive Program to implement Depth First Search.

Week – 9
Develop a non recursive Program to implement Breadth First Search.

Week - 10
Develop a Program to generate a min-cost spanning tree using Kruskal's algorithm.

Week - 11
Develop a Program to generate a min-cost spanning tree using Prim's algorithm

Week - 12
Develop a Program to implement Knuth-Morris-Pratt Algorithm for Pattern Matching.

List of Augmented Experiments:

13. Bheem promised all his friends that if he won the tournament so he will give ladoos. But he knew that he can afford only one ladoo per day. If he is unable to give ladoo to any of his friend he will loose his friendship with them (if more than one his friend demanded for ladoo on same day). As he has won the tournament now he has to give ladoos to his friends. Now your task is to tell how many friends he will be able to save. INPUT: The first line consists of number of friends of Bheem. The second line consists of an array A, which represents the which friend asked for ladoo on which day. Example: 5 3 3 1 2 4 OUTPUT: 4
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.
15. Write a program to design a priority queue which is maintained as a set of queue (assume a maximum of 3 queues). The elements are inserted based upon the given priority. The deletion of an element is to be done starting from the 1st queue, if it is not empty. If it is empty, the elements from the 2nd queue will be deleted & so on.
16. Write a program to count number of occurrences of a word in a given text.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. How to Solve it By Computer, R.G.Dromey, 1st edition Paperback – 2006, Pearson.
3. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
4. Advanced Data Structures: An Algorithmic Approach with C++, 1 st edition (English, Paperback, Ikvinderpal Singh).
5. Data structures and algorithms in C++, 3rd edition, Adam Drozdek, Cengage Learning, 2008

Web Links:

1. https://ocw.mit.edu/courses/...and.../6-006-introduction-to-algorithms-spring-2008/
2. https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/
3. https://www.cs.purdue.edu/cgvlab/courses/251/lectures/slides/04.03-PatternMatching And Tries.pdf
4. https://www.csie.ntu.edu.tw/~ds/ppt/ch5/chapter5.PPT
5. https://www.coursera.org/specializations/data-structures-algorithm
6. https://in.udacity.com/course/intro-to-algorithms--cs215

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PROBABILITY AND STATISTICS
(Common to CSE & IT)

IV Semester L T P C
Course Code:191BS4T18 3 0 0 3

Course Outcomes:

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

CO1: Compute mean, median, mode, standard deviation and variance.
CO2: Apply various Probability distributions for both discrete and continuous random variables.
CO3: Compute mean and variance of sample means with replacement and without replacement and estimating maximum errors.
CO4: Apply various tests to test the hypothesis concerning mean, Proportion, variance.
CO5: Apply the concepts of correlation and regression to the given statistical 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	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Descriptive statistics and methods for data science: Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance)

Unit – II
Probability and Distributions: Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

Unit – III
Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance – Central limit theorem (without proof)-Point and Interval estimations – Maximum error of estimate.

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 and two means (Large and Small samples) – Tests on proportions, c 2 and F distributions.

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Unit – V

Correlation and Regression: Method of least squares – Straight line - nonlinear curves– parabola -Exponential – Power curves-Correlation – Karl pearson's correlation coefficient – rank correlation – regression–- regression coefficients and properties (without proof) –regression lines.

Text Books:

1. Probability and Statistics for Engineers, Miller and Freund's, 7/e, Pearson,2008
2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K. Kapoor, 11/e, Sultan Chand & Sons Publications, 2012.
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chennai

Reference Books:

1. Probability, Statistics and Random processes, T.B. Veeraju, TMH
2. Probability and statistics by T.K.V. Iyengar, S. Chand publishers
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://en.wikipedia.org/wiki/Probability_and_statistics
2. http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html
3. http://nptel.ac.in/courses/111105041/1

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INFORMATION RETRIEVAL SYSTEMS
(Common to CSE & IT)

VII Semester
Course Code:171CS7E19

L	T	P	C
3	1	0	3

Course Outcomes:

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

CO1: Apply Information Retrieval principles to locate relevant information in large collections of data.
CO2: Summarize the functions in Information system.
CO3: Make use of Inverted file data structure in IR process.
CO4: Analyze the different signature based text retrieval methods.
CO5: Explain various algorithms for text searching in PAT tree.
CO6: Utilize different stemming algorithms in Information Retrieval, various techniques to create Thesaurus clusters.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit – II
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array.

Unit – III

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit – IV

PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.
Stemming Algorithms: Introduction, Types of Stemming Algorithms.

Unit – V

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

Text Books:

1. Information Retrieval Data Structures and Algorithms, William B.Frakes, Ricardo Baeza –Yates, 4th Edition, Pearson, 2008.
2. Information Retrieval Systems: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd Edition, Springer, 2013.

Reference Books:

1. Modern Information Retrieval, Yates, Pearson.
2. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.
3. Information retrieval Algorithms and Heuristics, 2nd Edition, Springer.

Web Links:

1. http://nlp.stanford.edu/IR-book/information-retrieval-book.html
2. http://www.cse.iitb.ac.in/~soumen/mining-the-web/
3. http://www.cs.bilkent.edu.tr/~canf/CS533/
4. http://www.inf.unibz.it/~ricci/ISR/
5. https://swayam.gov.in/course/4185-information-storage-and-retrieval

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DISTRIBUTED SYSTEMS
(Common to CSE & IT)

VIII Semester | **L T P C**
Course Code:171CS8E24 | 3 1 0 3

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

CO1: Demonstrate the basic concepts of distributed systems.
CO2: Analyze the Various System Models in distributed systems.
CO3: Illustrate the Inter process Communication used in TCP and UDP.
CO4: Apply RMI with RPC in the implementation of Remote Invocations.
CO5: Summarize Operating System support and Distributed File Systems.
CO6: Organize the processes to coordinate their actions and agree on shared values in distributed systems and relate the Transactions and Replications with real time examples.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges.
System Models: Introduction, Architectural models, Fundamental models.

Unit – II
Interprocess Communication: Introduction, The API for the Internet protocols, External data representation and marshalling, Client-server communication, Group communication.

Unit – III

Distributed Objects and Remote Invocation: Introduction, Communication between distributed objects, Remote procedure call, Events and notifications, Case Study: JAVA RMI

Unit – IV

Operating System Support: Introduction, The Operating system layer, Protection, Processes and threads.

Distributed File Systems: Introduction, File service architecture, Peer-to-Peer Systems-Introduction, Napster and its legacy, Peer-to-Peer Middleware, Routing overlays.

Unit – V

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Transactions & Replications:

Introduction, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery, Replication-Introduction, System Model and Group Communication, Fault-tolerant services.

Text Books:

1. Distributed Systems- Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, 4th Edition, Pearson Publication.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D Kshemkalyani, Mukesh Sighal, Cambridge, University Press, 2011.

Reference Books:

1. Distributed Computing – Principles and Applications, M.L. Liu, Addison-Wesley, Pearson Education, 2004.
2. Distributed Systems- Principles and Paradigms, Tanenbaum A.S., Van Steen M., Pearson Education, 2007.
3. Distributed Computing: Fundamentals, Simulations and Advanced Topics, Hagit Attiya and Jennifer Welch, Wiley, 2004.
4. Distributed Algorithms, Nancy A Lynch, Morgan Kaufman publishers, USA, 2003.

Web Links:

1. http://db.uwaterloo.ca/~tozsu/courses/cs454
2. http://cse.iitkgp.ac.in/~agupta/distsys/index.html
3. http://www.cis.upenn.edu/~lee/03cse380/lectures/ln19-ds-v3.4pp.pdf
4. http://www.cloudbus.org/652/LectureSlides.html
5. nptel.ac.in/courses/106106168/

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EMBEDDED SYSTEMS
(Open Elective)

VIII Semester | | L | T | P | C
---|---|---|---|---
Course Code:171CS8O02 | | 3 | 1 | 0 | 3

Course Outcomes:

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

CO1: Illustrate the basic concepts of an embedded systems with hardware components.
CO2: Categorize the microcontrollers required to design an embedded systems.
CO3: Identify the different RTOSs for various embedded and real time applications.
CO4: Examine the different issues RTOS objects in embedded systems.
CO5: Assess the embedded systems by various implementation and development tools.

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	1	2	3	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	3	-	-	-	-	-	-	-
CO4	1	3	-	-	1	-	-	-	-	-	-	-
CO5	1	2	-	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I

Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

Unit – II

8 Bit Microcontrollers Architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples, Introduction to ARM family of processor.

Unit – III

Real Time Operating System: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive,

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preemptive scheduling, Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets

Unit – IV

Objects of RTOS: Task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem, The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events.

Unit – V

Embedded system Development Environment: Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and firm ware

Text Books:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009
2. Embedded Software Primer, David Simon, Pearson

Reference Books:

1. The 8051 Microcontroller & Embedded Systems using Assembly and C, Ayala &Gadre, CENGAGE
2. Embedded Systems-Archetectures, Programming and Design-by Raj Kamal, Tata McGraw Hill Publications.
3. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson.

Web Links:

1. https://www.coursera.org/learn/embedded-operating-system
2. https://www.udemy.com/topic/embedded-systems/
3. https://www.online.colostate.edu/certificates/embedded-systems-certificate/
4. https://www.udemy.com/certificate-program-in-introduction-to-microprocessors/https://books.google.co.in/books?isbn=1425145078

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OPERATIONS RESEARCH

(Open Elective)
(Common to CSE & IT& Ag.E)

VIII Semester
Course Code:171CS8O04

L	T	P	C
3	1	0	3

Course Outcomes:

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

CO1: Apply mathematical modeling to formulate and solve real world problems involving decision making as linear programming problem using graphical and simplex methods.
CO2: Find the optimal parameters in transportation problem, assignment problem and replacement problem.
CO3: Find the optimal quantities in inventory control problem and job sequencing problem.
CO4: Apply game theory, queuing theory in decision making problems
CO5: Apply dynamic programming and simulation techniques in real world problems.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Introduction: Definition and Scope of Operations Research, Phases of Operations Research - Mathematical formulation of the problem, graphical solution.
Linear Programming Problem: Standard Form of LPP, Basic Feasible Solutions, Unrestricted Variables, Simplex Algorithm , Artificial Variables, Big M Method, Two Phase Simplex Method, Degeneracy, Alternative Optimal, Unbounded Solutions, Infeasible Solutions, Primal And Dual Problems And Their Relations, Dual Simplex Method.

Unit – II

Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model.

Assignment Problem: Hungarian method, optimal solution, unbalanced assignment matrix. Flight scheduling problems, Traveling salesman problem.

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 – III

Job Sequencing: Sequencing Problems, Johnson's method for N-Jobs 2-Machine Problem, N-Jobs K-Machines Problem, Two-Jobs M- Machines Problem.

Inventory Control: Inventory-Factors Effecting Inventory-EOQ, ABC & VED analysis, Inventory Problems with and without Shortages, Price Breakups, Multi Item Deterministic Problems. Probabilistic Inventory Problems.

Unit – IV

Queuing Theory: Queuing systems and their characteristics. M/M/1: FCFS/ / M/M/2: FCFS/, M/M/1: FCFS/ /N queuing models.

Theory of games: Introduction, Rectangular two person zero person games, solution of rectangular games in terms of mixed strategies , solution of 2x2 games without saddle points, concept of dominance to reduce the given matrix , graphical method for 2xn and nx2 games.

Unit – V

Dynamic Programming: Introduction – Bellman's principle of optimality – applications of DP- Capital budgeting problem – Shortest path problem.

Simulation: Definition and applications- Monte Carlo simulation- Random numbers and random number generation- Application problems in queuing and inventory.

Text Books:

1. Operations Research By S.D Sharma Kedarnath Ramnath& Co.
2. Operations Research, Kanti Swaroop, P.K. Gupta, Man Mohan, Sulthan Chand & Sons

Reference Books:

1. Operations Research P.K.Gupta and D.S.Hira, S.Chand & Co., 7th Edition.
2. Operations Research Panneer Selvam, Prentice Hall Of India.
3. Operations Research, Richard Bronson, Schaum Series
4. Operations Research – An Introduction, Handy A Taha – Pearson Education

Web Links:

1. http://www.mit.edu/~orc/
2. http://www.ieor.columbia.edu/
3. http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
4. http://www.wolfram.com/solutions/OperationsResearch/
5. http://www2.informs.org/Resources/

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Date: 18-08-2020

Department of Computer Science and Engineering

Syllabus revision Index 2020-2021

S.no.	Name of the course	Percentage of syllabus change
1	Discrete Mathematics	20%
2	Advanced Data Structures Lab	20%
3	Probability and Statistics	50%
4	Information Retrieval Systems	20%
5	Distributed Systems	40%
6	Embedded Systems	20%
7	Operations Research	40%

Program Coordinator

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Mathematical Foundations of Computer Science	Discrete Mathematics
Course Code	171BS3T08	191BS3T14
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. Predicate Calculus: Predicate 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: 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-II: Binary Relations and Properties:** Binary relations, Properties, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive, Closure, War shall Algorithm, Equivalence relation, REquivalence 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	**UNIT-III: Recurrence Relations:** Recurrence Relations, Formation of Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots.

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

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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	171CS3L02	191CS3L02
Syllabus	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 Techniques 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.	1. Develop a Program to implement Functions of Dictionary using Hashing (division method, digit folding and mid square method). 2. Develop a Program to implement Collision Resolution Tehniques (Linear Probing, Quardratic Probing and Double Hasing) in Hash Table. 3. Develop a Program to implement Binary Tree traversals. 4. Develop a Program to insert into and delete an element from Binary Search Tree. 5. Develop a Program to perform binary heap operations. 6. Develop a Program to perform AVL tree operations. 7. Develop a Program to perform B-tree operations. 8. Develop a non recursive Program to implement Depth First Search. 9. Develop a non recursive Program to implement Breadth First Search. 10. Develop a Program to generate a min-cost spanning tree using Kruskal's algorithm. 11. Develop a Program to generate a min-cost spanning tree using Prim's algorithm. 12. Develop a Program to implement Knuth-Morris-Pratt Algorithm for Pattern Matching.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Statistics with R Programming	Probability and Statistics
Course Code	171CS3T02	191BS4T18
Syllabus	**UNIT-I Random Variables and Introduction to R:** Random Variables- Discrete, Continuous variablesExpectation,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– I : Descriptive statistics and methods for data science:** Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance)
	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-II: Probability and Distributions:** Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal 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-III: Sampling Theory:** Introduction – Population and samples – Sampling distribution of Means and Variance – Central limit theorem (without proof)-Point and Interval estimations – Maximum error of estimate..
	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-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 and two means

		(Large and Small samples) – Tests on proportions, c 2 and F distributions.
	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-V: Correlation and Regression:** Method of least squares – Straight line - nonlinear curves– parabola -Exponential – Power curves-Correlation – Karl pearson's correlation coefficient – rank correlation – regression— regression coefficients and properties (without proof) –regression lines.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Information retrieval Systems	Information Retrieval Systems
Course Code	RT41056	171CS7E19
Syllabus	**UNIT-I:** Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms	**UNIT-I:** Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.
	UNIT-II: Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.	**UNIT-II:** Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities. Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array
	UNIT-III: Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.	**UNIT-III:** Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.
	UNIT-IV: New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.	**UNIT-IV:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays. Stemming Algorithms: Introduction, Types of Stemming Algorithms.

	UNIT-V: Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files	**UNIT-V:** Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.
	UNIT-VI: Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri	

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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	Distributed Systems	Distributed Systems
Course Code	RT42051	171CS8E24
Syllabus	**UNIT-I:** Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. System Models: Introduction, Architectural Models-Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models-Interaction Model, Failure Model, Security Model.	**UNIT-I:** Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges. System Models: Introduction, Architectural models, Fundamental models.
	UNIT-II: Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.	**UNIT-II:** Interprocess Communication: Introduction, The API for the Internet protocols, External data representation and marshalling, Client-server communication, Group communication.
	UNIT-III: Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote	**UNIT-III:** Distributed Objects and Remote Invocation: Introduction, Communication between distributed objects, Remote procedure call, Events and notifications, Case Study: JAVA RMI

	Procedure Call, Events and Notifications, Case Study: JAVA RMI	
	UNIT-IV: Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.	**UNIT-IV:** Operating System Support: Introduction, The Operating system layer, Protection, Processes and threads. Distributed File Systems: Introduction, File service architecture, Peer-to-Peer Systems- Introduction, Napster and its legacy, Peer-to-Peer Middleware, Routing overlays.
	UNIT-V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication. **UNIT-VI** Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication	**UNIT-V**: Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication. Transactions & Replications: Introduction, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery, Replication-Introduction, System Model and Group Communication, Fault-tolerant services.

Signature of the Course Coordinator

Signature of the HOD

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Department of CSE
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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	Embedded Systems	Embedded Systems
Course Code	R163205E	171CS8O02
Syllabus	**UNIT-I:** Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components	**UNIT-I:** Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.
	UNIT-II: 8—bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.	**UNIT-II:** 8 Bit Microcontrollers Architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples, Introduction to ARM family of processor.
	UNIT-III: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.	**UNIT-III:** Real Time Operating System: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling, Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets

	UNIT-IV: Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.	**UNIT-IV:** Objects of RTOS: Task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem, The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events.
	UNIT-V: The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware. **UNIT-VI** Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.	**UNIT-V:** Embedded system Development Environment: Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and firm ware .

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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	Operations Research	Operations Research
Course Code	R164205C	171CS8O04
Syllabus	**UNIT-I:** Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.	**UNIT-I:** Introduction: Definition and Scope of Operations Research, Phases of Operations Research - Mathematical formulation of the problem, graphical solution. Linear Programming Problem: Standard Form of LPP, Basic Feasible Solutions, Unrestricted Variables, Simplex Algorithm , Artificial Variables, Big M Method, Two Phase Simplex Method, Degeneracy, Alternative Optimal, Unbounded Solutions, Infeasible Solutions, Primal And Dual Problems And Their Relations, Dual Simplex Method.
	UNIT-II: Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method	**UNIT-II:** Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model. Assignment Problem: Hungarian method, optimal solution, unbalanced assignment matrix. Flight scheduling problems, Traveling salesman problem. 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-III: Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Traveling salesman problem and assignment problem Sequencing models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines	**UNIT-III:** Job Sequencing: Sequencing Problems, Johnson's method for N-Jobs 2-Machine Problem, N-Jobs K-Machines Problem, Two-Jobs M-Machines Problem. Inventory Control: Inventory-Factors Effecting Inventory-EOQ, ABC & VED analysis, Inventory Problems with and without Shortages, Price Breakups, Multi Item Deterministic Problems. Probabilistic Inventory Problems.
	UNIT-IV: Dynamic programming. Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games	**UNIT-IV:** Queuing Theory: Queuing systems and their characteristics. M/M/1: FCFS/ / M/M/2: FCFS/, M/M/1: FCFS/ /N queuing models. Theory of games: Introduction, Rectangular two person zero person games, solution of rectangular games in terms of mixed strategies , solution of 2x2 games without saddle points, concept of dominance to reduce the given matrix , graphical method for 2xn and nx2 games.
	UNIT-V: Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy **UNIT-VI:** Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.	**UNIT-V:** Dynamic Programming: Introduction – Bellman's principle of optimality – applications of DP- Capital budgeting problem – Shortest path problem. Simulation: Definition and applications- Monte Carlo simulation-Random numbers and random number generation- Application problems in queuing and inventory .

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Program Name : B.Tech. in Information Technology

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential Equations and Linear algebra	0
3	I	201BS1T04	Engineering Chemistry	0
4	I	201ES1T02	Programming for Problem Solving using C	0
5	I	201ES1I02	Computer Engineering Workshop	0
6	I	201HS1L01	Communicative English Lab	25
7	I	201BS1L03	Engineering Chemistry Lab	0
8	I	201ES1L02	Programming for Problem Solving using C Lab	0
9	I	201MC1T01	Environmental Science	0
10	I	201BS2T07	Numerical Methods and Complex Variables	0
11	II	201BS2T09	Applied Physics	0
12	II	201ES2T11	Computer Organization	0
13	II	201ES2T04	Python Programming	25
14	II	201ES2T07	Data Structures through C	100
15	II	201BS2L04	Applied Physics Lab	0
16	II	201ES2L06	Data Structures through C Lab	0
17	II	201ES2L14	Python Programming Lab	0
18	II	201MC2L01	Professional Communication Skills Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T14	Discrete Mathematics	20
21	III	191ES3T13	Digital Logic Design	0
22	III	191HS3T02	Managerial Economics and Financial Analysis	0
23	III	191CS3T01	Software Engineering	0
24	III	191CS3T02	Object Oriented Programming through Java	100
25	III	191CS3T03	Advanced Data Structures	100
26	III	191CS3L01	Object Oriented Programming through Java Lab	0
27	III	191CS3L02	Advanced Data Structures Lab	20
28	III	191MC3A03	Employability Skills - I	0
29	III	191MC3A04	Essence of Indian Traditional Knowledge	100
30	IV	191BS4T18	Probability and Statistics	20
31	IV	191IT4T01	Theory of Computation	100
32	IV	191CS4T05	Python Programming	0
33	IV	191CS4T06	Design and Analysis of Algorithms	0
34	IV	191ES4T15	Internet of Things	0
35	IV	191CS4T07	Computer Organization	0
36	IV	191CS4L03	Python Programming Lab	0
37	IV	191ES4L17	Internet of Things Lab	0
38	IV	191MC4A05	Employability Skills - II	0
39	IV		Biology for Engineers	100
40	V	171IT5T02	Computer Networks	65
41	V	171CS5T12	Python Programming	0
42	V	171IT5T03	Unix and Shell Programming	0
43	V	171CS5T14	Operating Systems	0
44	V	171IT5E01	Artificial Intelligence	0
45	V	171CS5E02	Advanced Computer Architecture	0
46	V	171CS5E03	Computer Graphics	0
47	V	171CS5E04	Software Testing Methodologies	0

48	V	171HS5T06	Employability Skills– III	0
49	V	171IT5L01	Operating Systems and Computer Networks Lab	60
50	V	171CS5L06	Python Programming Lab	0
51	V	171CS5L07	Software Testing Lab	0
52	V	171IT5L02	Unix and Shell Programming Lab	0
53	V	171IT5S01	MOOCs – I	0
54	VI	171IT6T04	Object Oriented Analysis and Design Using UML	0
55	VI	171CS6T16	Web Technologies	0
56	VI	171CS6T17	Data Warehousing and Data Mining	0
57	VI	171CS6E05	Software Quality Assurance	0
58	VI	171IT6E02	Neural Networks	20
59	VI	171CS6E08	Social Networks and Semantic Web	0
60	VI	171IT6E03	Design and Analysis of Algorithms	0
61	VI	171IT6E04	Advanced Computer Networks	0
62	VI	171CS6E10	Parallel Computing	0
63	VI	171IT6E05	Multimedia Programming	0
64	VI	171CS6E12	E – Commerce	0
65	VI	171HS6T07	Employability Skills– IV	0
66	VI	171IT6L03	Unified Modeling Language Lab	0
67	VI	171CS6L10	Data Warehousing and Data Mining Lab	0
68	VI	171CS6L11	Web Technologies Lab	100
69	VI	171IT6S02	MOOCs – II	0
70	VII	171CS7T18	Cryptography and Network Security	0
71	VII	171IT7T05	Big Data Analytics	35
72	VII	171CS7T20	Cloud Computing	0
73	VII	171IT7T06	Mobile Computing	0
74	VII	171CS7E13	Software Project Management	0
75	VII	171IT7E06	Machine Learning	20
76	VII	171CS7E15	Image Processing	0
77	VII	171CS7E16	Cyber Laws	0
78	VII	171CS7E19	Information Retrieval Systems	20
79	VII	171IT7E07	Human Computer Interaction	0
80	VII	171IT7E08	Distributed Systems	100
81	VII	171IT7E09	Decision Support System	0
82	VII	171IT7L04	Mobile Computing Lab	0
83	VII	171CS7L13	Big Data Analytics Lab	0
84	VII	171IT7P01	Industry Oriented (Internship) Minor Project	100
85	VIII	171CS8E21	Agile Methodologies	100
86	VIII	171CS8E22	Cyber Security	0
87	VIII	171CS8E23	Distributed Databases	100
88	VIII	171IT8E10	Pattern Recognition	100
89	VIII	171IT8O01	Management Information System	100
90	VIII	171CS8O01	Microprocessor and Multi Core Systems	0
91	VIII	171CS8O02	Embedded Systems	100
92	VIII	171IT8O02	Computer Vision	100
93	VIII	171EE8O05	Robotics	0
94	VIII	171CS8O04	Operations Research	0
95	VIII	171CS8O05	Optical Communications	0
96	VIII	171EE8O07	Internet of Things	0
97	VIII	171EC8O02	Disaster Management	0
98	VIII	171CS8O07	Nano Technology and its Applications	0
99	VIII	171IT8P02	Major Project	0
Total number of courses in the academic year 2020-2021				**= 99**
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				**= 24**
Percentage of syllabus revision carried out in the academic year 2020-2021 = (49/135)*100				**= 24.24%**

Program Coordinator **Head of the Department**

Head of the Department
Department of IT
Aditya Engineering College

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential Equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T04	Engineering Chemistry	BSC	Theory	3	0	0	3	3
201ES1T02	Programming for Problem Solving using C	ESC	Theory	3	0	0	3	3
201ES1I02	Computer Engineering Workshop	ESC	Integrated	2	0	2	4	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L03	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES1L02	Programming for Problem Solving using C Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	**16**	**0**	**11**	**27**	**19.5**

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
201BS2T07	Numerical Methods and Complex Variables	BSC	Theory	3	0	0	3	3
201BS2T09	Applied Physics	BSC	Theory	3	0	0	3	3
201ES2T11	Computer Organization	ESC	Theory	3	0	0	3	3
201ES2T04	Python Programming	ESC	Theory	3	0	0	3	3
201ES2T07	Data Structures through C	ESC	Theory	3	0	0	3	3
201BS2L04	Applied Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES2L06	Data Structures through C Lab	ESC	Lab	0	0	3	3	1.5
201ES2L14	Python Programming Lab	ESC	Lab	0	0	3	3	1.5
201MC2L01	Professional Communication Skills Lab	MC	Lab	0	0	3	3	0
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	**17**	**0**	**12**	**29**	**19.5**

III SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS3T14	Discrete Mathematics	BSC	3	0	0	3	3
191ES3T13	Digital Logic Design	ESC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	2	0	0	2	2
191CS3T01	Software Engineering	PCC	3	0	0	3	3
191CS3T02	Object Oriented Programming through Java	PCC	3	0	0	3	3
191CS3T03	Advanced Data Structures	PCC	3	0	0	3	3
191CS3L01	Object Oriented Programming through Java Lab	PCC	0	0	3	3	1.5
191CS3L02	Advanced Data Structures Lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills - I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	19	0	8	27	20

IV SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS4T18	Probability and Statistics	BSC	3	0	0	3	3
191IT4T01	Theory of Computation	PCC	3	0	0	3	3
191CS4T05	Python Programming	PCC	3	0	0	3	3
191CS4T06	Design and Analysis of Algorithms	PCC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191CS4T07	Computer Organization	PCC	3	0	0	3	3
191CS4L03	Python Programming Lab	PCC	0	0	3	3	1.5
191ES4L17	Internet of Things Lab	ESC	0	0	3	3	1.5
191MC4A05	Employability Skills - II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	20	0	8	28	21

V SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191CS5T08	Compiler Design	PCC	3	0	0	3	3
191CS5T09	Computer Networks	PCC	3	0	0	3	3
191CS5T10	Database Management Systems	PCC	3	0	0	3	3
191CS5T11	Operating Systems	PCC	3	0	0	3	3
----	Professional Elective -I	PEC	3	0	0	3	3
----	Open Elective -I	OEC	3	0	0	3	3
191CS5L04	Operating Systems and Computer Networks Lab	PCC	0	0	3	3	1.5
191CS5L05	Database Management Systems Lab	PCC	0	0	2	2	1
191HS5T06	Employability Skills - III	HSMC	0	0	2	2	1
191PR5P02	Socially Relevant Project	PROJ	0	0	0	0	1
191MC5A08	Intellectual Property Rights and	MC	2	0	0	2	0

V SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171IT5T02	Computer Networks	PC	3	1	---	4	3
171CS5T12	Python Programming	PC	3	1	---	4	3
171IT5T03	Unix and Shell Programming	PC	3	1	---	4	3
171CS5T14	Operating Systems	PC	3	1	---	4	3
---	**Professional Elective – I**	PE	3	1	---	4	3
171HS5T06	Employability Skills – III	HSS	2	---	---	2	1
171IT5L01	Operating Systems and Computer Networks Lab	PC	---	---	3	3	2
171CS5L06	Python Programming Lab	PC	---	---	3	3	2
171CS5L07	Software Testing Lab	PC	---	---	3	3	2
171IT5L02	Unix and Shell Programming Lab	PC	---	---	3	3	2
171IT5S01	MOOCs – I	SS	---	---	---	0	0
		Total	**17**	**5**	**12**	**34**	**24**

VI SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171IT6T04	Object Oriented Analysis and Design Using UML	PC	3	1	---	4	3
171CS6T16	Web Technologies	PC	3	1	---	4	3
171CS6T17	Data Warehousing and Data Mining	PC	3	1	---	4	3
---	**Professional Elective – II**	PE	3	1	---	4	3
---	**Professional Elective – III**	PE	3	1	---	4	3
171HS6T07	Employability Skills – IV	HSS	2	---	---	2	1
171IT6L03	Unified Modeling Language Lab	PC	---	---	3	3	2
171CS6L10	Data Warehousing and Data Mining Lab	PC	---	---	3	3	2
171CS6L11	Web Technologies Lab	PC	---	---	3	3	2
171IT6S02	MOOCs – II	SS	---	---	---	0	0
		Total	**17**	**5**	**9**	**31**	**22**

MOOCs – Massive Open Online Courses

VII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
171CS7T18	Cryptography and Network Security	PC	3	1	---	4	3
171IT7T05	Big Data Analytics	PC	3	1	---	4	3
171CS7T20	Cloud Computing	PC	3	1	---	4	3
171IT7T06	Mobile Computing	PC	3	1	---	4	3
---	**Professional Elective – IV**	PE	3	1	---	4	3
---	**Professional Elective – V**	PE	3	1	---	4	3
171IT7L04	Mobile Computing Lab	PC	---	---	3	3	2
171CS7L13	Big Data Analytics Lab	PC	---	---	3	3	2
171IT7P01	Industry Oriented (Internship) Minor Project	PR	---	---	---	0	1
		Total	**18**	**6**	**6**	**30**	**23**

VIII SEMESTER

Course Code	Course Title	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
---	**Professional Elective – VI**	PE	3	1	---	4	3
---	**Open Elective**	OE	3	1	---	4	3
171IT8P02	**Major Project**	PR	---	---	---	0	14
		Total	**6**	**2**	**0**	**8**	**20**

DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE III

S. No	Agenda Item No.	Stakeholders Recommended	Action Taken
1	6.12	Students need to have an insight into emerging technologies of Industry so that they will become competitive enough in getting the placement	Computer Engineering Workshop Course is included in the I semester which gives an introduction and insight to Industry technologies like IoT, Cybersecurity, and Machine Learning.
2	6.14	Effective Soft-skill training to be provided	Industry Oriented exclusive Soft-skill trainer is going to be appointed as a trainer. Communicative English Lab & Professional Communications Skill Lab will also be included in the Syllabus. The students are encouraged to present a seminar session.
3	6.12	Include Emerging technologies in the syllabus	In the future Syllabus, Open Elective I will be introduced, and all the emerging technologies like Cybersecurity, AR/VR, Computer Vision, and Robotics will be included.
4	6.12	Some trendy courses should be introduced in the early bird stage itself so that the student can focus on basics as well as the advancements made in that technology.	Python Programming and Python Programming Lab courses are going to be introduced in the 2nd semester.
5	6.8	Elective Courses should have a blend of courses which have a focus on employability and domain knowledge	Suggestions will be taken into consideration and in future semesters, in each professional elective course 2 subjects will be focused on employability and 2 subjects will be focused on providing domain knowledge.

6	6.12	Effective Soft-skill training to be provided	Industry Oriented exclusive Soft-skill trainer is going to be appointed as a trainer. Personality Development through Life Enlightenment Skills & Soft Skills will also be included in the Syllabus. The students are encouraged to present a seminar session.
7	6.12	Suggested to Include some courses that will make the students able to work on developing prototypes that will be useful for societal needs	A socially Relevant Project course will be introduced.
8	6.8	Suggested to Include more courses as professional electives as students will have a good number of options to choose	5 professional elective courses in each semester will be introduced from the Vth semester.
9	6.3	Suggested to include more labs for real-time practice	As per suggestion, Data Structures through C Lab and Internet of Things Lab will be introduced.
10	6.12	Please design the curriculum in such a way that the students come across department-related courses in the early semester itself. This helps the students in having an insight into GATE and other competitive exams as well as placements.	The computer Organization course is included in the curriculum in the 2nd semester
11	6.3	Suggested to prescribe textbooks that have global acceptance	As per the suggestion given all the prescribed textbooks for all courses were in accordance with global acceptance.
12	6.12	Suggested to Include some courses that will make the students able to work on developing prototypes that will be useful for societal needs	A socially Relevant Project course named Industry Oriented (Internship) Minor Project will be introduced.

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DISCRETE MATHEMATICS

(Common to CSE & IT)

III Semester
Course Code:191BS3T14

L	T	P	C
3	0	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: Solve recurrence relations using various methods.
CO4: Apply the concepts of graph theory to find euler paths, Hamiltonian paths.
CO5: Apply the concepts of graph theory to trees.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	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:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

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, War shall Algorithm, Equivalence relation, R-Equivalence class, Partial Ordering Relation, Partially ordered sets, Hasse Diagrams.

Unit – III
Recurrence Relations: Recurrence Relations, Formation of Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots.

Unit – IV
Graph Theory: Basic Concepts of Graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix, Isomorphic Graphs, Paths and Circuits, Euler and Hamilton Graphs, Planar Graphs and Euler's Formula.

Unit – V
Trees: Trees-Properties, Spanning trees, BFS Algorithm, DFS Algorithm, Minimal Spanning Trees and Kruskal's Algorithm, Graph Colouring, Chromatic Number.

g

Text Books:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory.
2. K. H. Rosen, 7th Edition, Tata McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science

Reference Books:

1. Discrete Mathematical Structures, Bern and Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
2. Discrete Mathematical Structures, Bern and Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakra borthy and B.K. Sarkar, Oxford, 2011

Web Links:

1. https://en.wikipedia.org/wiki/Discrete_mathematics
2. http://nptel.ac.in/courses/106106094/
3. http://mathworld.wolfram.com/classroom/classes/DiscreteMathematics.html
4. http://mathworld.wolfram.com/topics/GeneralLogic.html

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PROBABILITY AND STATISTICS
(Common to CSE & IT)

IV Semester
Course Code:191BS4T18

L	T	P	C
3	0	0	3

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

CO1: Compute mean, median, mode, standard deviation and variance.
CO2: Apply various Probability distributions for both discrete and continuous random variables.
CO3: Compute mean and variance of sample means with replacement and without replacement and estimating maximum errors.
CO4: Apply various tests to test the hypothesis concerning mean, Proportion, variance.
CO5: Apply the concepts of correlation and regression to the given statistical data.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	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:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

Unit - I
Descriptive statistics and methods for data science: Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance)

Unit – II
Probability and Distributions: Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

Unit – III
Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance – Central limit theorem (without proof)-Point and Interval estimations – Maximum error of estimate.

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 and two means (Large and Small samples) – Tests on proportions, c 2 and F distributions.

Unit – V
Correlation and Regression: Method of least squares – Straight line - nonlinear curves– parabola -Exponential – Power curves-Correlation – Karl pearson's correlation coefficient – rank correlation – regression–- regression coefficients and properties (without proof) –regression lines.

Text Books:

1. Probability and Statistics for Engineers, Miller and Freund's, 7/e, Pearson,2008
2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K. Kapoor, 11/e, Sultan Chand & Sons Publications, 2012.
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chennai

Reference Books:

1. Probability, Statistics and Random processes, T.B. Veeraju, TMH
2. Probability and statistics by T.K.V. Iyengar, S. Chand publishers
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://en.wikipedia.org/wiki/Probability_and_statistics
2. http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html
3. http://nptel.ac.in/courses/111105041/1

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ADVANCED DATA STRUCTURES LAB
Common to CSE & IT

III Semester	**L**	**T**	**P**	**C**
Course Code:191CS3L02	0	0	3	1.5

Course Outcomes:

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

CO1: Identify the appropriate data structure for a given problem.
CO2: Implement Dictionary by using hashing techniques.
CO3: Analyze the efficiency of basic operations of AVL tree and B-Tree.
CO4: Build a Binary Heap using Priority queues.
CO5: Apply the concepts of graphs and pattern matching in real world applications.

Mapping of Course Outcomes with Program Outcomes:

	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	2	1	-	-	-	-	-	-	-	-	-
CO2	1	1	-	1	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-
CO4	-	1	-	1	-	-	-	-	-	-	-	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	1	-
CO3	-	-
CO4	2	-
CO5	-	-

List of Experiments:

Week - 1
Develop a Program to implement Functions of Dictionary using Hashing (division method, digit folding and mid square method).

Week - 2
Develop a Program to implement Collision Resolution Tehniques (Linear Probing, Quardratic Probing and Double Hasing) in Hash Table.

Week - 3
Develop a Program to implement Binary Tree traversals.

Week - 4
Develop a Program to insert into and delete an element from Binary Search Tree.

Week - 5
Develop a Program to perform binary heap operations.

Week - 6
Develop a Program to perform AVL tree operations.

Week - 7
Develop a Program to perform B-tree operations.

Week - 8
Develop a non recursive Program to implement Depth First Search.

Week – 9
Develop a non recursive Program to implement Breadth First Search.

Week - 10
Develop a Program to generate a min-cost spanning tree using Kruskal's algorithm.

Week - 11
Develop a Program to generate a min-cost spanning tree using Prim's algorithm

Week - 12
Develop a Program to implement Knuth-Morris-Pratt Algorithm for Pattern Matching.

List of Augmented Experiments:

13. Bheem promised all his friends that if he won the tournament so he will give ladoos. But he knew that he can afford only one ladoo per day. If he is unable to give ladoo to any of his friend he will loose his friendship with them (if more than one his friend demanded for ladoo on same day). As he has won the tournament now he has to give ladoos to his friends. Now your task is to tell how many friends he will be able to save. INPUT: The first line consists of number of friends of Bheem. The second line consists of an array A, which represents the which friend asked for ladoo on which day. Example: 5 3 3 1 2 4 OUTPUT: 4
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.
15. Write a program to design a priority queue which is maintained as a set of queue (assume a maximum of 3 queues). The elements are inserted based upon the given priority. The deletion of an element is to be done starting from the 1st queue, if it is not empty. If it is empty, the elements from the 2nd queue will be deleted & so on.
16. Write a program to count number of occurrences of a word in a given text.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. How to Solve it By Computer, R.G.Dromey, 1st edition Paperback – 2006, Pearson.
3. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
4. Advanced Data Structures: An Algorithmic Approach with C++, 1 st edition (English, Paperback, Ikvinderpal Singh).
5. Data structures and algorithms in C++, 3rd edition, Adam Drozdek, Cengage Learning, 2008

Web Links:

1. https://ocw.mit.edu/courses/...and.../6-006-introduction-to-algorithms-spring-2008/
2. https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/
3. https://www.cs.purdue.edu/cgvlab/courses/251/lectures/slides/04.03-PatternMatching And Tries.pdf
4. https://www.csie.ntu.edu.tw/~ds/ppt/ch5/chapter5.PPT
5. https://www.coursera.org/specializations/data-structures-algorithm
6. https://in.udacity.com/course/intro-to-algorithms--cs215

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COMPUTER NETWORKS

V Semester	L	T	P	C
Course Code: 171IT5T02	3	1	0	3

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

CO1: Explain the computer network fundamentals and various topologies.
CO2: Compare the OSI with TCP/IP reference model.
CO3: Summarize the concepts of physical layer and switching techniques.
CO4: Discuss the design issues of data link layer services.
CO5: Demonstrate the concept of MAC and Channelization.
CO6: Apply various routing algorithms and Congestion control techniques and describe services provided by the transport layer and application layer.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit – I

Introduction: Applications of Computer Network, Reference Models: OSI overview and TCP , Example Networks-The Internet, Network Topologies, LAN, WAN MAN,ARPANET, Novel Netware

Physical Layer: Fourier Analysis-Bandwidth Limited Signals – The Maximum Data Rate of a Channel – Guided Transmission Media, Wireless Transmission, Digital Modulation and Multiplexing:
Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, and Switching: Circuit switched Network, Datagram Network, and Virtual Circuit Networks.

Unit – II

Data Link Layer: Data Link Layer Design Issues-Services Provided to the Network Layer-Framing-Error Control-Flow Control, Error Detection and Correction-Error Correcting Codes-Error Detecting Codes, CRC, Checksum, Elementary Data Link protocols, Sliding Window protocols, Data Link Layer in HDLC.

Unit – III

Medium Access Control Sublayer: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA), IEEE Standards: Standard Ethernet, Fast Ethernet. IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

Unit – IV

Network Layer: Virtual circuit and Datagram subnet-Network Layer Design Issues, Routing Algorithms: Static routing algorithms-Shortest Path Algorithm-Flooding-Dynamic Routing Algorithms-Distance Vector Routing-Hierarchical Routing-Broadcast Routing-Multicast Routing, Congestion Control Algorithms-General Principles of Congestion prevention policies, Quality of services, Internetworking, Network Layer in the Internet.

Unit – V

Transport Layer: Elements of Transport Protocols, Internet Transport Protocols: UDP, TCP.

Application Layer: Network Security, DNS, HTTP, SNMP, E-Mail, WWW, Multi Media.

Text Books:

1. Computer Networks — Andrew S Tanenbaum and David J Wetherall, 5th Edition, Pearson Education, 2011.
2. Data Communications and Networking – Behrouz A.Forouzan, 5th Edition, McGraw Hill Education, 2012.

Reference Books:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, W.A. Shay, Thomson, 3rd Edition.
3. Computer Networks - A Systems Approach, Larry L. Peterson and Bruce S. Davie, 5th Edition, Morgan Kaufmann/ Elsevier.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 6th Edition, Pearson Education, 2013.
5. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press, 2013.

Web Links:

1. http://nptel.ac.in/courses/106105081/1.
2. https://www.coursera.org/learn/fundamentals-network-communications.
3. http://www.tutorialspoint.com/data_communication_computer_network/.
4. http://www.scribd.com/doc/58478622/Computer-Networks-Forouzan.
5. https://in.udacity.com/course/computer-networking--ud436

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INFORMATION RETRIEVAL SYSTEMS

(Professional Elective-V)
(Common to CSE & IT)

VII Semester	**L**	**T**	**P**	**C**
Course Code:171CS7E19	**3**	**1**	**0**	**3**

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

CO1: Apply Information Retrieval principles to locate relevant information in large collections of data.
CO2: Summarize the functions in Information system.
CO3: Make use of Inverted file data structure in IR process.
CO4: Analyze the different signature based text retrieval methods.
CO5: Explain various algorithms for text searching in PAT tree.
CO6: Utilize different stemming algorithms in Information Retrieval, various techniques to create Thesaurus clusters.

apping of Course Outcomes with Program Outcomes:

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

apping of Course Outcomes with Program Specific Outcomes:

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

Unit – I

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit – II

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array.

Unit – III

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit – IV

PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

Stemming Algorithms: Introduction, Types of Stemming Algorithms.

Unit – V

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

Text Books:

1. Information Retrieval Data Structures and Algorithms, William B.Frakes, Ricardo Baeza –Yates, 4th Edition, Pearson, 2008.
2. Information Retrieval Systems: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd Edition, Springer, 2013.

Reference Books:

1. Modern Information Retrieval, Yates, Pearson.
2. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.
3. Information retrieval Algorithms and Heuristics, 2nd Edition, Springer.

Web Links:

1. http://nlp.stanford.edu/IR-book/information-retrieval-book.html
2. http://www.cse.iitb.ac.in/~soumen/mining-the-web/
3. http://www.cs.bilkent.edu.tr/~canf/CS533/
4. http://www.inf.unibz.it/~ricci/ISR/
5. https://swayam.gov.in/course/4185-information-storage-and-retrieval

OPERATING SYSTEMS AND COMPUTER NETWORKS LAB

V Semester **L T P C**
Course Code: 171IT5L01 **0 0 3 2**

Course Outcomes:
At the end of this course the student will be able to:

CO 1: Make use of Unix utilities and perform basic shell control operations on the Unix utilities.
CO 2: Simulate various process scheduling algorithms.
CO 3: Demonstrate the working of various system calls, dead locks avoidance and memory management algorithms.
CO 4: Make use of a programming platform to design services that control a network behavior.
CO 5: Develop data link layer services of dynamic framing.
CO 6: Demonstrate the working of various routing algorithms, error detection and correctiontechniques.

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	-	-	-	-	-	-	-	-	-
CO2	-	2	1	1	3	-	-	-	-	-	-	-
CO3	-	1	-	-	3	-	-	-	-	-	-	-
CO4	-	2	3	-	-	-	-	-	-	-	-	-
CO5	-	2	1	1	3	-	-	-	-	-	-	-
CO6	-	1	3	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

List of Experiments:
OPERATING SYSTEMS

1) CPU schedulingalgorithms
1.1) Simulate the FCFS CPU scheduling algorithm.
1.2) Simulate the SJF CPU schedulingalgorithm.
1.3) Simulate the Priority CPU schedulingalgorithm.
1.4) Simulate the Round Robin CPU schedulingalgorithm.

2) System calls
2.1) Implementation of fork (), wait (), exec(), and exit (), Systemcalls.
2.2) Implementation of cp command with the use of open(), read(), write() systemcalls.
2.3) Simulate Bankers Algorithm for Dead LockAvoidance

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3) Page ReplacementAlgorithms

3.1) Simulate the FIFO page replacement algorithm.
3.2) Simulate the LRU page replacement algorithm.
3.3) Simulate the LFU page replacement algorithm.

4) Multiprogramming

4.1) Simulate the Multiprogramming with a fixed number of tasks (MFT).
4.2) Simulate the Multiprogramming with a variable number of tasks (MVT).

5) FileAllocation

5.1) Simulate the Sequenced File allocation strategies.
5.2) Simulate the Indexed File allocation strategies.
5.3) Simulate the Linked File allocation strategies.

COMPUTER NETWORKS

6) Data Link LayerFraming

6.1) Implement data link layer framing method of Character stuffing
6.2) Implement data link layer framing method of Bit stuffing

7) ErrorDetection

7.1) On a data set of characters, implement CRC12
7.2) On a data set of characters, implement CRC16
7.3) On a data set of characters, implement CRCCCIP

8) Implement Dijkstra's algorithm to compute the shortest path through agraph
9) On a weighted subnet graph, obtain routing table at each node using distance vector routingalgorithm
10) On a subnet of hosts, obtain broadcasttree.
11) Generate the Subnet Address for the given IP Address

List of Augmented Experiments:
(Any 2 of the following experiments can be performed)

1) Simulate Best-Fit contiguous memory allocationtechnique.
2) Simulate First-Fit contiguous memory allocationtechnique.
3) Simulate Sliding Window Protocol for Go – BackN
4) Simulate Sliding Window Protocol for SelectiveRepeat

Reference Books:

1. Operating Systems: A Modern Perspective, Gary J. Nutt.
2. Operating Systems: Design and Implementation, Andrew S. Tanenbaum,Albert S. Woodhu, 2ndEdition.
3. Computer Networking: A Top-Down Approach, James F. Kurose,5thEdition.
4. Computer Networks – A system's approach, Larry L Peterson, Bruce S Davie, 5thEdition, Elsevier,2011.

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NEURAL NETWORKS
(Professional Elective – II)

VI Semester **L T P C**
Course Code: 171IT6E02 **3 1 0 3**

Course Outcomes:
At the end of this course the student will be able to:

- CO 1: Interpret the basic structure of Artificial Neural Networks (ANN).
- CO 2: Compare different learning techniques.
- CO 3: Demonstrate the perceptron and pattern classifier.
- CO 4: Analyze various mechanisms of multi-layer feed forward network.
- CO 5: Make use of Radial Basis Functiŏn(RBF) in ANN.
- CO 6: Discuss the issues related to designing of RBF.

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	-	-	3	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-
CO3	2	1	-	-	3	-	-	-	-	-	-	-
CO4	3	1	2	-	2	-	-	-	-	-	-	-
CO5	3	2	1	-	2	-	-	-	-	-	-	-
CO6	2	1	-	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Introduction and ANN Structure: Introduction of Neural Network, Biological neurons and artificial neurons, Models of a neuron, Activation functions used in ANNs, Typical classes of network architectures.

UNIT-II

Learning Mechanisms: Introduction, Error-correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann Learning, Learning with a teacher, Learning without a Teacher, Learning Tasks.

UNIT-III

Single Layer Perceptrons: Structure and learning of perceptrons, Perceptron convergence, Pattern classifier – introduction and Bayes' classifiers. Perceptron as a pattern classifier, Limitations of a perceptrons.

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UNIT-IV

Feed forward ANN: Structures of Multi-layer feed forward networks, Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation, Practical and design issues of back propagation learning.

UNIT-V

Radial Basis Function Networks: Pattern separability and interpolation, Regularization Theory, Regularization and RBF networks, RBF network design and training, Approximation properties of RBF.

Text Books:

1. Neural Networks A comprehensive foundation, Simon Haykin, 2nd Edition, Pearson Education Asia,2001.
2. Neural Networks A classroom approach, Satish Kumar, 2nd Edition, Tata McGraw Hill, 2004.

Reference Books:

1. Artificial Neural Networks, Robert J. Schalkoff, McGraw-Hill International Editions, 1997.
2. Artificial Neural Networks, B. Yagna Narayana,PHI.
3. Fundamentals of Neural Networks, Laurene Fausett, Pearson Education,2004.

Web Links:

1. http://ai.iit.nrc.ca/subjects/Neural.html
2. http://nptel.ac.in/courses/106105079/27
3. lcn.epfl.ch/tutorial/english/weblinks.html
4. www.infoweblinks.com/content/expertsystem%20neuralnetwork.html
5. https://github.com/neuroph/neuroph/blob/master/NeurophStudio/.../WebLinks.html

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IV Year - I Semester

L	T	P	C
4	0	0	3

BIG DATA ANALYTICS

(Elective - 1)

OBJECTIVES:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT – I:

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT – II:

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT – III:

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT – IV:

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT – V:

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

UNIT – VI:

Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

OUTCOMES:

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

SOFTWARE LINKS:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

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MACHINE LEARNING

OBJECTIVES:

- Familiarity with a set of well-known supervised, unsupervised and semi-supervised
- learning algorithms.
- The ability to implement some basic machine learning algorithms
- Understanding of how machine learning algorithms are evaluated

UNIT- I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT- IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

UNIT- VI: Dimensionality Reduction: Principal Component Analysis (PCA), Implementation and demonstration. **Artificial Neural Networks:** Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation algorithm.

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OUTCOMES:

- Recognize the characteristics of machine learning that make it useful to real-world
- Problems.
- Characterize machine learning algorithms as supervised, semi-supervised, and
- Unsupervised.
- Have heard of a few machine learning toolboxes.
- Be able to use support vector machines.
- Be able to use regularized regression algorithms.
- Understand the concept behind neural networks for learning non-linear functions.

TEXT BOOKS:

1) Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2) Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1) Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2) Machine Learning in Action, Peter Harington, 2012, Cengage.

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Department of Information Technology

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	171CS3L02	191CS3L02
Syllabus	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 Techniques 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.	1. Develop a Program to implement Functions of Dictionary using Hashing (division method, digit folding and mid square method). 2. Develop a Program to implement Collision Resolution Tehniques (Linear Probing, Quardratic Probing and Double Hasing) in Hash Table. 3. Develop a Program to implement Binary Tree traversals. 4. Develop a Program to insert into and delete an element from Binary Search Tree. 5. Develop a Program to perform binary heap operations. 6. Develop a Program to perform AVL tree operations. 7. Develop a Program to perform B-tree operations. 8. Develop a non recursive Program to implement Depth First Search. 9. Develop a non recursive Program to implement Breadth First Search. 10. Develop a Program to generate a min-cost spanning tree using Kruskal's algorithm. 11. Develop a Program to generate a min-cost spanning tree using Prim's algorithm. 12. Develop a Program to implement Knuth-Morris-Pratt Algorithm for Pattern Matching.

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Signature of the Course Coordinator **Signature of the HOD**

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Department of Information Technology

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Information retrieval Systems	Information Retrieval Systems
Course Code	RT41056	171CS7E19
Syllabus	**UNIT-I:** Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms	**UNIT-I:** Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.
	UNIT-II: Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.	**UNIT-II:** Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities. Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array
	UNIT-III: Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.	**UNIT-III:** Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.
	UNIT-IV: New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.	**UNIT-IV:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays. Stemming Algorithms: Introduction, Types of Stemming Algorithms.

	UNIT-V: Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files .	**UNIT**-V: Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters. .
	UNIT-VI: Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri	

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Program Name : B.Tech. in Petroleum Technology

Syllabus Revision for the Academic Year 2020-2021				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential equations and Linear algebra	0
3	I	201BS1T02	Engineering Physics	0
4	I	201ES1T03	Essential Electrical and Electronics Engineering	0
5	I	201ES1T05	Engineering Graphics	80
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L01	Engineering Physics Lab	0
8	I	201ES1L03	Essential Electrical and Electronics Engineering Lab	0
9	I	201MC1T01	Environmental Science	0
10	II	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	II	201BS2T08	Chemistry of Materials	0
12	II	201ES2T06	Engineering Mechanics	0
13	II	201ES2T08	Programming for Problem Solving Using C	0
14	II	201ES2L07	Engineering Workshop	0
15	II	201ES2L12	Computer Aided Drafting Lab	100
16	II	201HS2L02	Professional Communications Skills Lab	0
17	II	201BS2L05	Engineering Chemistry Lab	0
18	II	201ES2L10	Programming for Problem Solving Using C Lab	0
19	II	201MC2T02	Constitution of India	0
20	III	191PT3T01	Petroleum Exploration	0
21	III	191PT3T02	Geology and Sedimentology	0
22	III	191PT3T03	Chemical Process Calculations	0
23	III	191PT3T04	Mechanical and Materials Science and Engineering	80
24	III	191PT3L01	Mechanical and Material Science Lab	0
25	III	191PT3L02	Geology Lab	100
26	III	191BS3T15	Numerical Methods and Integral Transforms	0
27	III	191MC3A03	Employability Skills – I	0
28	IV	191PT4T06	Momentum Transfer	0
29	IV	191PT4T07	Petroleum Geology	0
30	IV	191PT4T05	Process Heat Transfer	0
31	IV	191HS3T02	Managerial Economics and Financial Analysis	0
32	IV	191HS4T03	Management Science	0
33	IV	191ES4T15	Internet of Things	0
34	IV	191MC4A05	Employability Skills – II	0
35	IV	191BS4T19	Complex Variables and Statistical Methods	95
36	IV	191PT4L03	Process Heat Transfer Lab	0
37	IV	191PT4L04	Momentum Transfer Lab	0
38	V	171PT5T06	Process Dynamics and Control	0
39	V	171PT5T07	Petroleum Exploration	0
40	V	171PT5T08	Process Instrumentation	0
41	V	171PT5T09	Well Logging and Formation Evaluation	0
42	V	171PT5T10	Drilling Technology	0
43	V	171PT5E01	Well Engineering and Design	0
44	V	171PT5E02	Fundamentals of Liquefied Natural Gas	0
45	V	171PT5E03	Pipeline Engineering	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
46	V	171PT5L03	Instrumentation, Process Dynamics and Control Lab	0
47	V	171PT5L04	Drilling Fluids Lab	0
48	V	171HS5T06	Employability Skills - III	0
49	V	171PT5S01	MOOCs – I	0
50	VI	171PT6T11	Well Completions, Testing and Services	0
51	VI	171PT6T12	Petroleum Production Engineering	0
52	VI	171PT6T13	Petroleum Reservoir Engineering - I	0
53	VI	171PT6T14	Surface Production Operations	0
54	VI	171PT6E04	Petroleum Refining and Petrochemical Engineering	0
55	VI	171PT6E05	Storage and Transportation of Crude Oil and Natural Gas.	0
56	VI	171PT6E06	Reservoir Stimulation	0
57	VI	171PT6E07	Natural Gas Hydrates	0
58	VI	171PT6E08	Natural Gas Engineering	0
59	VI	171PT6E09	Horizontal Well Technology	0
60	VI	171PT6L05	Petroleum Analysis Lab	0
61	VI	171PT6L06	Petroleum Réservoir Simulation Lab	0
62	VI	171HS6T07	Employability skills - IV	0
63	VI	171PT5S02	MOOCs – II	0
64	VII	171PT7T15	Integrated Asset Management and Petroleum Economics	40
65	VII	171PT7T16	Petroleum Reservoir Engineering - II	0
66	VII	171PT7T17	IOR and EOR Techniques	0
67	VII	171PT7T18	Oil and Gas Processing Plant Design	0
68	VII	171PT7E10	Coal Bed Methane	0
69	VII	171PT7E11	Offshore Engineering	0
70	VII	171PT7E12	Petroleum Corrosion Technology	100
71	VII	171PT7E13	Shale Gas Reservoir Engineering	0
72	VII	171PT7E14	Subsea Engineering	0
73	VII	171PT7E15	Reservoir Modeling and Simulation	0
74	VII	171PT7L07	Petroleum Equipment Design and Simulation Lab	0
75	VII	171PT7L08	Petroleum Reservoir Engineering Lab	0
76	VII	171HS7A04	Managerial Economics and Financial Analysis	0
77	VII	171PT7P01	Industry Oriented (Internship) Minor Project	0
78	VIII	171PT8E16	HSE and FE in Petroleum Industry	0
79	VIII	171PT8E17	Reliability and Risk Management in Petroleum Operations	100
80	VIII	171PT8E18	Deep Sea Production Systems	100
81	VIII	171PT8O01	Green Technologies	0
82	VIII	171PT8O02	Non-Conventional Sources of Energy	0
83	VIII	171PT8O03	Alternative Energy Sources for Automobiles	0
84	VIII	171PT8O04	Waste Water Treatment	0
85	VIII	171PT8O05	Computational Fluid Dynamics	0
86	VIII	171PT8O06	Process Intensification in Petroleum Industry	100
87	VIII	171EC8O02	Disaster Management	100
88	VIII	171PT8P02	Major Project	0

Total number of courses in the academic year 2020-2021	= 88
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021	= 11
Percentage of syllabus revision carried out in the academic year 2020-2021 = (11/88)*100	= 13.63%

Program Coordinator

Head of the Department

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20-21

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T02	Engineering Physics	BSC	Theory	3	0	0	3	3
201ES1T03	Essential Electrical and Electronics Engineering	ESC	Theory	3	0	0	3	3
201ES1T05	Engineering Graphics	ESC	Theory	1	0	4	5	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L01	Engineering Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L03	Essential Electrical and Electronics Engineering Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	15	0	13	28	19.5

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T08	Chemistry of Materials	BSC	Theory	3	0	0	3	3
201ES2T06	Engineering Mechanics	ESC	Theory	3	0	0	3	3
201ES2T08	Programming for Problem Solving Using C	ESC	Theory	3	0	0	3	3
201ES2L07	Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201ES2L12	Computer Aided Drafting Lab	BSC	Lab	0	0	3	3	1.5
201HS2L02	Professional Communications Skills Lab	HSMC	Lab	0	0	3	3	1.5
201BS2L05	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES2L10	Programming for Problem Solving Using C Lab	ESC	Lab	0	0	3	3	1.5
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	14	0	15	29	19.5

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III SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS3T15	Numerical Methods and Integral Transforms	BSC	3	0	0	3	3
191PT3T01	Petroleum Exploration	PCC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	3	0	0	3	3
191PT3T02	Geology and Sedimentology	PCC	3	0	0	3	3
191PT3T03	Chemical Process Calculations	PCC	3	0	0	3	3
191PT3T04	Mechanical and Materials Science and Engineering	PCC	3	0	0	3	3
191PT3L01	Mechanical and Material Science Lab	PCC	0	0	4	4	2
191PT3L02	Geology Lab	PCC	0	0	4	4	2
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**10**	**30**	**22**

IV SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS4T19	Complex Variables and Statistical Methods	BSC	3	0	0	3	3
191HS4T03	Management Science	HSMC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191PT4T05	Process Heat Transfer	PCC	3	0	0	3	3
191PT4T06	Momentum Transfer	PCC	3	0	0	3	3
191PT4T07	Petroleum Geology	PCC	3	0	0	3	3
191PT4L03	Process Heat Transfer Lab	PCC	0	0	4	4	2
191PT4L04	Momentum Transfer Lab	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**9**	**31**	**21.5**

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V SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171PT5T06	Process Dynamics and Control	PC	3	1	0	4	3
171PT5T07	Petroleum Exploration	PC	3	1	0	4	3
171PT5T08	Process Instrumentation	PC	3	1	0	4	3
171PT5T09	Well Logging and Formation Evaluation	PC	3	1	0	4	3
171PT5T10	Drilling Technology	PC	3	1	0	4	3
---	**Professional Elective – I**	PE	3	1	0	4	3
171HS5T06	Employability Skills – III	HSS	2	0	0	2	1
171PT5L03	Instrumentation, Process Dynamics and Control Lab	PC	0	0	3	3	2
171PT5L04	Drilling Fluids Lab	PC	0	0	3	3	2
171PT5S01	MOOCs – I	SS	0	0	0	0	0
		TOTAL	18	6	8	32	23

VI SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171PT6T11	Well Completions, Testing and Services	PC	3	1	0	4	3
171PT6T12	Petroleum Production Engineering	PC	3	1	0	4	3
171PT6T13	Petroleum Reservoir Engineering – I	PC	3	1	0	4	3
171PT6T14	Surface Production Operations	PC	3	1	0	4	3
---	**Professional Elective – II**	PE	3	1	0	4	3
---	**Professional Elective – III**	PE	3	1	0	4	3
171HS6T07	Employability skills – IV,	HSS	2	0	0	2	1
171PT6L05	Petroleum Analysis Lab	PC	0	0	3	3	2
171PT6L06	Petroleum Reservoir Simulation Lab	PC	0	0	3	3	2
171PT6S02	MOOCs – II	SS	0	0	0	0	0
		TOTAL	18	6	8	32	23

MOOCs – Massive Open Online Courses

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VII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171PT7T15	Integrated Asset Management and Petroleum Economics	PC	3	1	0	4	3
171PT7T16	Petroleum Reservoir Engineering - II	PC	3	1	0	4	3
171PT7T17	IOR and EOR Techniques	PC	3	1	0	4	3
171PT7T18	Oil and Gas Processing Plant Design	PC	3	1	0	4	3
---	**Professional Elective - IV**	PE	3	1	0	4	3
---	**Professional Elective - V**	PE	3	1	0	4	3
171PT7L07	Petroleum Equipment Design and Simulation Lab	PC	0	0	3	3	2
171PT7L08	Petroleum Reservoir Engineering Lab	PC	0	0	3	3	2
171HS7A04	Managerial Economics and Financial Analysis	HSS	2	0	0	2	0
171PT7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	1
		TOTAL	20	6	6	32	23

VIII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	**Professional Elective - VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171PT8P02	**Major Project**	PR	0	0	0	0	14
		TOTAL	6	2	0	8	20

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Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
	171PT5E01	Well Engineering and Design
2	171PT5E02	Fundamentals of Liquefied Natural Gas
3	171PT5E03	Pipeline Engineering

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171PT6E04	Petroleum Refining and Petrochemical Engineering
2	171PT6E05	Storage and Transportation of Crude Oil and Natural Gas.
3	171PT6E06	Reservoir Stimulation

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171PT6E07	Natural Gas Hydrates
2	171PT6E08	Natural Gas Engineering
3	171PT6E09	Horizontal Well Technology

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171PT7E10	Coal Bed Methane
2	171PT7E11	Offshore Engineering
3	171PT7E12	Petroleum Corrosion Technology

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171PT7E13	Shale Gas Reservoir Engineering
2	171PT7E14	Subsea Engineering
3	171PT7E15	Reservoir Modeling and Simulation

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171PT8E16	HSE and FE in Petroleum Industry
2	171PT8E17	Reliability and Risk Management in Petroleum Operations
3	171PT8E18	Deep Sea Production Systems

Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171PT8O01	Green Technologies
2	171PT8O02	Non-Conventional Sources of Energy
3	171PT8O03	Alternative Energy Sources for Automobiles
4	171PT8O04	Waste Water Treatment
5	171PT8O05	Computational Fluid Dynamics
6	171PT8O06	Process Intensification in Petroleum Industry
7	171EC8O02	Disaster Management

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ENGINEEING GRAPHICS
(Common to CE, ME, Min.E, PT & Ag.E)

	L	T	P	C
I Semester				
Course Code: 201ES1I05	1	0	4	3

Course Outcomes:

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

CO1: Sketch the polygons, conics and scales by using the principles of drawing

CO2: Draw Orthographic projections of points and lines..

CO3: Draw Orthographic projections of planes in various positions

CO4: Draw Orthographic projections of solids in various positions.

CO5: Construct isometric scale and isometric projections

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	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I

Introduction to Engineering Drawing:Lettering, Dimensioning, Types of lines.
Conic Sections:Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.
Scales:Plain Scale, Diagonal Scale and Vernier Scales.

Unit – II

Orthographic Projections:Introduction to orthographic projections, Projections of Points, Projections of Lines.

Unit – III

Projections of Planes:Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.

Unit – IV

Projections of Solids:Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

Unit – V

Isometric Projections:Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

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Text Books:

1. Engineering Drawing by N.D.Bhatt, Charotar Publishers
2. Engineering Drawing by K.L.Narayana and P. Kannaiah. Scitech Publishers.

Reference Books:

1. Engineering Drawing by K. Venugopal, New Age Publications
2. Engineering Drawing by M. B. shah & B.C. Rana., Pearson's Publishers.
3. Engineering Drawing by B. Agrawal & C.M. Agrawal, Tata Mcgraw Hill Publishers

Web Links:

1. http://nptel.ac.in/courses/112103019
2. http://freevideolectures.com/Course/3420/Engineering-Drawing
3. http://engineeringdrawing.org
4. http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html

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NUMERICAL METHODS AND INTEGRAL TRANSFORMS
(Common to Min.E & PT)

III Semester	**L**	**T**	**P**	**C**
Course Code: 201BS3T14	**3**	**0**	**0**	**3**

Course Outcomes:

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

CO1: Apply numerical methods to solve equations and interpolation of polynomials.

CO2: Apply numerical methods to solve initial value problems and problems involving integration.

CO3: Compute Fourier series of a function

CO4: Compute the Fourier transform of a function.

CO5: Apply Laplace transform to solve initial value problems.

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	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

Unit - I

Solution of Algebraic and Transcendental Equations: Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton - Raphson method.

Unit – II

Numerical Integration and Solution of Ordinary Differential equations:Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).

Unit – III

Fourier Series:Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

Unit – IV

Fourier Transforms:Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

Unit – V

Laplace Transforms:Laplace transforms of standard functions, first and second shifting theorems, change of scale property, multiplication with t, division by t, Transforms of derivatives and integrals.Inverse Laplace transforms, Convolution theorem (without proof), Application of Laplace transform to initial value problems.

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Text Books:

1. Advanced Engineering Mathematics, R. K. Jain, S.R. K. Iyengar, 4th Edition, Alpha Science Publications
2. Principles of Physical Geology, David Duff, Homes, Nelson Thornes Ltd; 4th Revised edition, 1992.
3. Higher Engineering Mathematics, B. S. Grewal, 43rdEdition, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er., S. Chand Co. Pvt. Ltd, Delhi.
3. Higher Engineering Mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://swayam.gov.in/nd1_noc19_ma21/preview
2. https://swayam.gov.in/nd1_noc19_ma19/preview

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MECHANICAL AND MATERIALS SCIENCE AND ENGINEERING

III Semester **L T P C**
Course Code: 191PT3T04 **3 0 0 3**

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

CO 1: Calculate the design parameters stress, strain, elastic constants and strain energy of different materials under different loading conditions.
CO 2: Calculate Shear force and bending moment for beams under various loading conditions and interpret as Shear force diagram & Bending moment diagram.
CO 3: Compare the behavior of materials by means of phase diagrams.
CO 4: Explain the mechanical behavior of materials by dislocation theory.
CO 5: Select the suitable material for petroleum engineering 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	2	1	3	-	-	-	3	-	-	-	-	-
CO2	3	3	2	-	-	-	1	-	-	-	-	-
CO3	2	1	-	-	-	-	3	2	-	2	-	-
CO4	2	1	-	-	-	-	3	2	-	2	-	-
CO5	3	2	1	1	-	-	3	3	-	2	-	-

Mapping of course outcomes with program Specific Outcomes:

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

UNIT-I:
Elasticity and plasticity – Types of stresses & strains– Hooke's law– Stress & Strain relationship and diagrams for different materials (metals, non-metals, rubbers and plastics and polymers. Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli and their relationship – Bars of varying section – composite bars – Temperature stresses.

UNIT-II:
Shear Force and Bending Moment Diagrams:
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported subjected to point load & uniformly distributed load– Point of contra flexure –Theory of simple bending-Introduction to Torsion.

UNIT-III:
Phase Diagrams:
Solid –liquid and solid-solid equilibria for metals and alloys, Phase rule, Phase diagram for pure metals (single component system),alloys (binary systems), Micro structural changes during cooling, Lever rule and its applications, Typical phase diagrams

Homogeneous and heterogeneous systems, formation of Eutectic, Eutectoid mixtures, Non-equilibrium cooling, Binary Systems(phase diagrams) for study: Cu-Ni/Bi-Cd/Pb-Sn/ Fe-C /Al-Cu.

UNIT-IV:

Dislocation Theory:

Elastic and plastic deformation-Slip-stress required to move a dislocation; Multiplication of dislocations – Dislocation reactions, Effect on mechanical behavior of materials, Strain hardening/work hardening –Dynamic recovery, recrystallization grain growth. Ductile-Brittle transition.

UNIT-V:

Material Selection:

Materials for chemical and petrochemical industrial process equipment, Effect of alloying on mechanical and chemical behavior of materials, Applications of heat treatment methods for strengthening of engineering materials. Composite structures and their advantages over conventional materials, Matrix-reinforcement properties and evaluation of strength properties with different orientation of reinforcement, Applications.

Text Books:

1. Mechanics of Materials, B. C. Punmia, Laxmi Publications.
2. Materials Science and Engineering, Raghavan, V., 5th Edition, PHI, New Delhi.

Reference Books:

1. Strength of Materials, U C Jindal, Umesh Publications. 3rd Edition.
2. Mechanical metallurgy, George E. Dieter, McGraw Hill Education; Third edition.
3. Corrosion Engineering, Mars G. Fontana, Tata-McGraw Hill.
4. Material Science and Engineering, Ravi Prakash, William F. Smith and Javed Hashemi, 4th Edition, Tata-McGraw Hill.

Web Links:

1. http://nptel.ac.in/courses/113106032/
2. https://www.phase-trans.msm.cam.ac.uk/2012/Manna/Part1.pdf
3. https://abmpk.files.wordpress.com/2014/02/book_maretial-science-callister.pdf....
4. http://onlinelibrary.wiley.com/doi/10.1002/crat.2170230211

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COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to PT & Min.E)

IV Semester
Course Code: 191BS4T19

L	T	P	C
3	0	0	3

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

- CO 1: Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic and find the differentiation and integration of complex functions used in engineering problems.
- CO 2: Make use of the Cauchy residue theorem to evaluate certain integrals.
- CO 3: Apply discrete and continuous probability distributions.
- CO 4: Design the components of a classical hypothesis test.
- CO 5: Infer the statistical inferential methods based on small and large sampling tests.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO 1	PSO 2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO 5	-	-

UNIT I:

Functions of a complex variable and Complex integration:

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).

UNIT II:

Series expansions and Residue Theorem:

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem (without proof) – Evaluation of real integral of the type –Integration around the unit circle $\int_0^{2\pi} f(sin\theta, cos\theta)d\theta$ - Integration around a small semi-circle $\int_{-\infty}^{\infty} f(x)dx$ – Integration around rectangular contours- Indenting the contours having pole on real axis.

UNIT III:

Probability and Distributions:

Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

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UNIT - IV:

Sampling Theory:

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, χ^2 and F-distributions – Point and Interval estimations – Maximum error of estimate.

UNIT- V:

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 and two means (Large and Small samples) – Tests on proportions.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 43^{rd} Edition, Khanna Publishers.
2. Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 10^{th} Edition, Wiley-India.
2. Higher Engineering Mathematics, B.V. Ramana, 17^{th}Edition, Tata Mc Graw Hill.
3. Shorn L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
4. Sheldon, M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

Web links:

1. https://en.wikipedia.org/wiki/Complex_analysis
2. http://www.nptel.ac.in/courses/111103070/
3. https://en.wikipedia.org/wiki/Probability_and_statistics
4. http://nptel.ac.in/courses/111105041/1

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INTEGRATED ASSET MANAGEMENT AND PETROLEUM ECONOMICS

Semester VII	**L**	**T**	**P**	**C**
Course Code: 171PT7T15	**3**	**1**	**0**	**3**

Course Outcomes:

At the end of the course, the student will be able to:

CO 1: Understand the working principles of an oil and gas asset management.
CO 2: Optimize functions of each segment of an asset.
CO 3: Understand the concepts & terminology and develop an interdisciplinary approach for solving everyday problems
CO 4: Recognize inter-relations between Oil industry petroleum sector and its impact on national and global economy.
CO 5: Understand and apply the regulatory framework and related to petroleum industry in the area of licensing and exploration, OALP

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
CO2	2	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	2	2
CO4	3	-	-	-	-	-	-	-	-	-	2	2
CO5	2	-	-	-	-	-	-	-	-	-	2	2

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I:

Asset Management: The corporate dimension – Data gathering – Interpreting the main data. Developing a decision-making framework for the corporate asset management plan.

UNIT-II:

Reservoir management concepts – Reservoir management process – Data acquisition, analysis and management.

UNIT-III:

Reservoir performance analysis and forecast – Reservoir management economics – Reservoir management case studies.

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UNIT-IV:

Macro-Economic Approach of Petroleum Industry: Political environment related to petroleum industry and issues related to government and corporate interests, Need for understanding petroleum economics required to make investment decisions; Introduction, Role and value of Oil & Gas, Evolution of national oil companies, Organization of petroleum exporting countries.

UNIT-V:

Petroleum or Oil & Gas Policies and Regulations: Petroleum and Oil & Gas rules and regulations in India, The Oil fields regulations and development Act, New Exploration Licensing Policy (NELP), Open Acreage License Policy(OALP) Functions of directorate general of hydrocarbons, Petroleum and Natural Gas Regulatory Board.

Text Books:

1. A guide to Asset Management and Capital Planning in Local authorities, CIPFA, 2008.
2. Integrated Petroleum Reservoir Management, A team approach, Abdus Satter and Ganesh C. Thakur, Pennwell Books, Tulsa, 1994.
3. Integrated Reservoir Asset Management: Principles and Best Practices: Fanchi John.

Reference Books:

1. Petroleum Economics and Engineering, Third Edition, Hussein K. Abdel-Aal, Mohammed A. Alsahlawi, CRC Press, 2013. (ISBN: ISBN; 1466506660, 9781466506664).
2. The Global Oil & Gas Industry: Management, Strategy and Finance, Andrew Inkpen &Michael H. Moffett, 2011. (ISBN-10: 1593702396, ISBN-13: 978-1593702397).

Web Links:

1. https://en.wikipedia.org/wiki/Asset_management
2. https://www.skillsyouneed.com/ips/decision-making2.html
3. https://petrowiki.org/Reservoir_management
4. https://www.fiixsoftware.com/models-for-asset-management/
5. https://en.wikipedia.org/wiki/OPEX

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Syllabus revision Index 2020-2021

S.No	Name of the course	Percentage of syllabus change
1	Complex Variables And Statistical Methods	95%
2	Engineering Graphics And Design	80%
3	Integrated Asset Management And Petroleum Economics	40%
4	Mechanical And Materials Science And Engineering	80%

Signature of the course coordinator

Signature of the HOD

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2020-21

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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	Probability & Statistics	Complex Variables and Statistical Methods
Course Code	171BS3T10	191BS4T19
Syllabus	UNIT-I: Random variables and Distributions: Random variables- Discrete and Continuous Random variable- Distribution functionExpectation,Variance,Moment Generating function –Discrete Distrinbutions- Binomial, Poisson Continuous Distributions -Normal distribution.	UNIT I: Functions of a complex variable and Complex integration: Introduction – Continuity – Differentiability – Analyticity – Properties – CauchyRiemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).
	UNIT-II: Sampling Theory: Introduction - Population and samples- Sampling distribution of means (σknownand σunknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.	UNIT II: Series expansions and Residue Theorem: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem (without proof) – Evaluation of real integral of the type –Integration around the unit circle ∫ $f(sin\theta, cos\theta)d\theta$ 2π 0 - Integration around a small semi-circle ∫ $f(x)dx$ ∞ −∞ – Integration around rectangular contours- Indenting the contours having pole on real axis.
	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.	UNIT III: Probability and Distributions: Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

	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 - IV: Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance χ(definition only) – Central limit theorem (without proof) – Introduction to t, 2 and F distributions – Point and Interval estimations – Maximum error of estimate.
	UNIT-V: Statistical Quality Control Methods: Introduction - Methods for preparing control charts Problems using x-bar, p, R charts and attribute charts.	UNIT- V: 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 and two means (Large and Small samples) – Tests on proportions.

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Signature of the HOD

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Department of H & BS
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Department of Petroleum Technology

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	ENGINEERING DRAWING	ENGINEERING GRAPHICS AND DESIGN
Course Code	171ES2T03	191ES2T02
Syllabus	. UNIT-I: **Introduction to Engineering Drawing: Lettering, Dimensioning, Types of lines.** **Geometrical Constructions:** **Construction of regular polygons by general method and inscribing circle method. Special methods for pentagon and hexagon.**	UNIT-I **Introduction To Engineering Graphics:** **Principles of Engineering Graphics and their significance- conventions in drawing- lettering – BIS Conventions- - Conic sections -Cycloid, epicycloids and hypocycloid-Involutes**
	UNIT-II: **Orthographic Projections:** Introduction to orthographic projections, Projections of Points, Projections of Lines.	UNIT-II **Projection Of Points, Lines And Planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.
	UNIT-III: **Projections of Planes:** Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.	UNIT-III **Projections Of Solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.
	UNIT-IV: **Projections of Solids:** Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes.	UNIT-IV **Introduction To Computer Aided Drafting:** **Basic drawing and editing commands- Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections**
	UNIT-V: **Isometric Projections** Isometric Scale, Isometric Projections, Conversion of Isometric views into Orthographic projections.	UNIT-V **Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	MATERIALS SCIENCE AND ENGINEERING	MECHANICAL AND MATERIALS SCIENCE AND ENGINEERING
Course Code	171ES3T16	191PT3T04
Syllabus	UNIT-I Crystal Structures: Classification of engineering materials, Levels of Structure, Structure-Property relationships in materials, Crystal Geometry and non-crystalline (amorphous) states; Lattice – Bravais lattices, Crystal systems with examples; Lattice co-ordinates, Miller and Miller- Bravais Indices for directions and places: ionic, covalent and metallic solids; Packing factors and packing efficiency, Ligancy and coordination number; Structure determination by Brag's X- ray diffraction method. Crystal Imperfections-Classification-point defects-Estimation of point defects-Dislocations classification (edge and screw)-Surface Defects-Dislocation motion and its relevance to mechanical and chemical properties	UNIT-I: Elasticity and plasticity – Types of stresses & strains– Hooke's law– Stress & Strain relationship and diagrams for different materials (metals, non-metals, rubbers and plastics and polymers. Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli and their relationship – Bars of varying section – composite bars – Temperature stresses.
	UNIT-II Phase Diagrams: Solid –liquid and solid-solid equilibria for metals and alloys, Phase rule, Phase diagram for pure metals (single component system),alloys (binary systems), Micro structural changes during cooling, Lever rule and its applications, Typical phase diagrams Homogeneous and heterogeneous systems, formation of Eutectic, Eutectoid mixtures, Non-equilibrium cooling, Binary Systems(phase diagrams) for study: Cu-Ni/Bi-Cd/Pb-Sn/ Fe-C /Al-Cu.	UNIT-II: Shear Force and Bending Moment Diagrams: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported subjected to point load & uniformly distributed load– Point of contra flexure –Theory of simple bending-Introduction to Torsion.
	UNIT-III Mechanics of Materials:	UNIT-III: Phase Diagrams:

	Stress & Strain relationship and diagrams for different materials (metals, non-metals, rubbers and plastics and polymers)-Elastic and plastic deformation-Slip -stress required to move a dislocation; Multiplication of dislocations – Dislocation reactions, Effect on mechanical behavior of materials, Strain hardening/work hardening –Dynamic recovery, recrystallization grain growth. Ductile-Brittle transition.	Solid –liquid and solid-solid equilibria for metals and alloys, Phase rule, Phase diagram for pure metals (single component system),alloys (binary systems), Micro structural changes during cooling, Lever rule and its applications, Typical phase diagrams Homogeneous and heterogeneous systems, formation of Eutectic, Eutectoid mixtures, Non-equilibrium cooling, Binary Systems(phase diagrams) for study: Cu-Ni/Bi-Cd/Pb-Sn/ Fe-C /Al-Cu.
	UNIT-IV Material Selection: Materials for chemical and petrochemical industrial process equipment, Effect of alloying on mechanical and chemical behavior of materials, Applications of heat treatment methods for strengthening of engineering materials. Composite structures and their advantages over conventional materials, Matrix-reinforcement properties and evaluation of strength properties with different orientation of reinforcement, Applications.	UNIT-IV: Dislocation Theory: Elastic and plastic deformation-Slip-stress required to move a dislocation; Multiplication of dislocations – Dislocation reactions, Effect on mechanical behavior of materials, Strain hardening/work hardening – Dynamic recovery, recrystallization grain growth. Ductile-Brittle transition.
	UNIT-V Corrosion: Stability criteria of materials in chemical/petrochemical industrial environments; Corrosion and Oxidation of materials; Basic mechanisms-types of corrosion; Corrosion testing and evaluation; Prevailing methods to combat corrosion; Coatings –metallic non-metallic, passivity, cathodic protection	UNIT-V: Material Selection: Materials for chemical and petrochemical industrial process equipment, Effect of alloying on mechanical and chemical behavior of materials, Applications of heat treatment methods for strengthening of engineering materials. Composite structures and their advantages over conventional materials, Matrix-reinforcement properties and evaluation of strength properties with different orientation of reinforcement, Applications

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	INTEGRATED ASSET MANAGEMENT	INTEGRATED ASSET MANAGEMENT AND PETROLEUM ECONOMICS
Course Code	R1641271	171PT7T15
Syllabus	UNIT-IV: Reservoir performance analysis and forecast – Reservoir management economics – Reservoir management case studies.	UNIT-IV: Macro-Economic Approach of Petroleum Industry: Political environment related to petroleum industry and issues related to government and corporate interests, Need for understanding petroleum economics required to make investment decisions; Introduction, Role and value of Oil & Gas, Evolution of national oil companies, Organization of petroleum exporting countries.
	UNIT-V: Industrial asset management strategies for the oil and gas sector: Over view of Onshore and Offshore assets – Integration and optimization methodology – A case study in OPEX of the assets – Evaluation of asset performance.	UNIT-V: Petroleum or Oil & Gas Policies and Regulations: Petroleum and Oil & Gas rules and regulations in India, The Oil fields regulations and development Act, New Exploration Licensing Policy (NELP), Open Acreage License Policy(OALP) Functions of directorate general of hydrocarbons, Petroleum and Natural Gas Regulatory Board.

Signature of the course coordinator

Signature of the HOD

Head of the Department
Department of Petroleum Technology
Aditya Engineering College (A)
SURAMPALEM-5 437

Program Name : B.Tech. in Mining Engineering

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	1	201HS1T01	Communicative English	0
2	1	201BS1T01	Differential equations and Linear algebra	0
3	1	201BS1T02	Engineering Physics	0
4	1	201ES1T03	Essential Electrical and Electronics Engineering	0
5	1	201ES1T05	Engineering Graphics	30
6	1	201HS1L01	Communicative English Lab	0
7	1	201BS1L01	Engineering Physics Lab	0
8	1	201ES1L03	Essential Electrical and Electronics Engineering Lab	0
9	1	201MC1T01	Environmental Science	0
10	2	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	2	201BS2T08	Chemistry of Materials	0
12	2	201ES2T06	Engineering Mechanics	0
13	2	201ES2T08	Programming for Problem Solving Using C	0

14	2	201ES2L07	Engineering Workshop	0
15	2	201ES2L12	Computer Aided Drafting Lab	100
16	2	201HS2L02	Professional Communications Skills Lab	0
17	2	201BS2L05	Engineering Chemistry Lab	0
18	2	201ES2L10	Programming for Problem Solving Using C Lab	0
19	2	201MC2T02	Constitution of India	0
20	3	191BS3T15	Numerical Methods and Integral Transforms	20
21	3	191ES3T10	Internet of Things	100
22	3	191ES3T14	Basic Mechanical Engineering	0
23	3	191MI3T01	Mining Geology	15
24	3	191MI3T02	Mine Surveying-I	0
25	3	191MI3T03	Development of Mineral Deposits	40
26	3	191MI3L01	Geology Lab	20
27	3	191MI3L02	Basic Mechanical Engineering Lab	0
28	3	191MC3A03	Employability Skills – I	0
29	3	191MC3A04	Essence of Indian Traditional Knowledge	100
30	4	191BS4T19	Complex Variables and Statistical Methods	45

31	4	191MI4T04	Mine Surveying-II	0
32	4	191MI4T05	Surface Mining	0
33	4	191MI4T06	Underground Coal Mining Technology	0
34	4	191MI4T07	Fundamentals of Rock Mechanics	0
35	4	191MI4T08	Geo-statistics	100
36	4	191MI4L03	Rock Mechanics Lab	0
37	4	191ES4L18	Mine Surveying Lab	0
38	4	191MC4A05	Employability Skills – II	0
39	4	191MC4A06	Biology for Engineers	100
40	5	171MI5T09	Under Ground Coal Mining Technology	0
41	5	171MI5T10	Mine Environment Engineering - I	0
42	5	171MI5T11	Basic Geo Mechanics	0
43	5	171MI5T12	Mine Surveying - II	0
44	5	171HS5T04	Managerial Economics and Financial Analysis	0
45	5	171MI5E01	Maintenance and Reliability Engineering	0
46	5	171MI5E02	Mine Construction and Management	0
47	5	171MI5E03	Industrial Management and Labor Relations	0

48	5	171HS5T06	Employability Skills – III	0
49	5	171MI5L03	Rock Mechanics Lab	0
50	5	171MI5S01	MOOCs-I	0
51	5	171MI5L04	Mine Surveying Lab	0
52	6	171MI6T13	Under Ground Metal MiningTechnology	0
53	6	171MI6T14	Mineral Processing Technology	0
54	6	171MI6T15	Mine Environment Engineering - II	0
55	6	171MI6T16	Mining Machinery	0
56	6	171MI6E04	Advanced Geo Mechanics	0
57	6	171MI6E05	Mine Fire and Spontaneous	0
58	6	171MI6E06	Mineral Exploration	0
59	6	171MI6E07	Advance Surveying Technology	0
60	6	171MI6E08	Mine Subsidence Engineering	0
61	6	171MI6E09	Rock Fragmentation Engineering	0
62	6	171HS6T07	Employability Skills - IV	0
63	6	171MI6L05	Mineral Processing Technology Lab	0
64	6	171MI6L06	Environmental Engineering Lab	0

65	6	171MI6S02	MOOcs II	0
66	7	171MI7T17	Mine Economics	20
67	7	171MI7T18	Mine Health and Safety Engineering	20
68	7	171MI7T19	Mine Legislation and General Safety	0
69	7	171MI7T20	Mine Management	100
70	7	171MI7E10	Planning of UGMM Project	0
71	7	171MI7E11	Planning of UGCM Project	0
72	7	171MI7E12	Planning of Surface Mining Project	0
73	7	171MI7E13	Mine mechanization	0
74	7	171MI7E14	Advance Underground Coal Mining Technology	100
75	7	171MI7E15	Mine Blasting operation	10
76	7	171MI7L07	Mine Planning and Design Lab	0
77	7	171ES7L16	Mechanical Engineering Lab	100
78	7	171MI7P01	Industry Oriented (Internship) Minor Project	100
79	8	171MI8E16	Mine Systems Engineering	100
80	8	171MI8E17	Advance Surface Mining Technology	100
81	8	171MI8E18	Advanced Underground Metal Mining Technology	100

82	8	171EE8O05	Robotics	100
83	8	171MI8O01	Environmental Impact Assessment	100
84	8	171MI8O02	Mine Closure and Reclamation	100
85	8	171MI8O03	Fundamentals of Communication	100
86	8	171MI8O04	Remote Sensing and GIS	100
87	8	171MI8O05	Quantitative Decision Making	100
88	8	171MI8P02	Major Project	0
Total number of courses in the academic year 2020-2021				88
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				25
Percentage of syllabus revision carried out in the academic year 2020-2021 = (25/88)*100				28.41

Program Coordinator

Head of the Department

Head of the Department
DEPARTMENT OF MINING ENGINEERING
ADITYA ENGINEERING COLLEGE (A9)

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T02	Engineering Physics	BSC	Theory	3	0	0	3	3
201ES1T03	Essential Electrical and Electronics Engineering	ESC	Theory	3	0	0	3	3
201ES1T05	Engineering Graphics	ESC	Theory	1	0	4	5	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L01	Engineering Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L03	Essential Electrical and Electronics Engineering Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	**15**	**0**	**13**	**28**	**19.5**

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T08	Chemistry of Materials	BSC	Theory	3	0	0	3	3
201ES2T06	Engineering Mechanics	ESC	Theory	3	0	0	3	3
201ES2T08	Programming for Problem Solving Using C	ESC	Theory	3	0	0	3	3
201ES2L07	Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201ES2L12	Computer Aided Drafting Lab	ESC	Lab	0	0	3	3	1.5
201HS2L02	Professional Communications Skills Lab	HSMC	Lab	0	0	3	3	1.5
201BS2L05	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES2L10	Programming for Problem Solving Using C Lab	ESC	Lab	0	0	3	3	1.5
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	**14**	**0**	**15**	**29**	**19.5**

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III SEMESTER

Course Code	Course Title	Course Component	Course Type	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
				Total Number of contact hours				
201BS3T14	Numerical Methods and Integral Transforms	BSC	Theory	3	0	0	3	3
201ES3T17	Basic Mechanical Engineering	ESC	Theory	3	0	0	3	3
201MI3T01	Mining Geology	PCC	Theory	3	0	0	3	3
201MI3T02	Mine Surveying	PCC	Theory	3	0	0	3	3
201MI3T03	Development of Mineral Deposits	PCC	Theory	3	0	0	3	3
201MI3L01	Geology Lab	PCC	Lab	0	0	3	3	1.5
201MI3L02	Basic Mechanical Engineering Lab	PCC	Lab	0	0	3	3	1.5
201MI3L03	Mine Surveying Lab -I	PCC	Lab	0	0	3	3	1.5
201SC3L09	**Skill Oriented Course-I** Geo-Statistics through SURPAC	SC	Proj	1	0	2	3	2
201MC3T03	Biology for Engineers	MC	Theory	2	0	0	2	0
			TOTAL	**18**	**0**	**13**	**31**	**21.5**

IV SEMESTER

Course Code	Course Title	Course Component	Course Type	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits (C)
				Total Number of contact hours				
201BS4T17	Complex Variables and Statistical Methods	BSC		3	0	0	3	3
201MI4T04	Fundamentals of Rock Mechanics	PCC		3	0	0	3	3
201MI4T05	Surface Mining	PCC		3	0	0	3	3
201MI4T06	Underground Coal Mining Technology	PCC		3	0	0	3	3
201BS4T18	Managerial Economics and Financial Accountancy	BSC		3	0	0	3	3
201MI4L04	Rock Mechanics Lab	PCC		0	0	4	4	2
201MI4L05	Mine Surveying Lab -II	PCC		0	0	3	3	2
201SC4L20	**Skill Oriented Course-II** Data Analytics for Mining using Python	SC	Proj	1	0	2	3	2
201MC4T04	Essence of Indian Traditional Knowledge	MC		2	0	0	2	0
			TOTAL	**18**	**0**	**9**	**27**	**21**

BSC: Basic Sciences Courses; HSMC: Humanities and Social Sciences including Management Courses; ESC: Engineering Sciences Courses; PCC: Professional Core Courses; SC: Skill Oriented Course; PEC: Professional Elective Courses; OEC: Open Elective Courses; MC: Mandatory Courses; PROJ: Project.

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III SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS3T15	Numerical Methods and Integral Transforms	BSC	3	0	0	3	3
191ES3T10	Internet Of Things	ESC	3	0	0	3	3
191ES3T14	Basic Mechanical Engineering	ESC	3	0	0	3	3
191MI3T01	Mining Geology	PCC	3	0	0	3	3
191MI3T02	Mine Surveying-I	PCC	3	0	0	3	3
191MI3T03	Development of Mineral Deposits	PCC	3	0	0	3	3
191MI3L01	Geology Lab	PCC	0	0	4	4	2
191MI3L02	Basic Mechanical Engineering Lab	PCC	0	0	4	4	2
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
		TOTAL	**20**	**2**	**8**	**30**	**22**

IV SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS4T19	Complex Variables and Statistical Methods	BSC	3	0	0	3	3
191MI4T04	Mine Surveying-II		3	0	0	3	3
191MI4T05	Surface Mining	PCC	3	0	0	3	3
191MI4T06	Underground Coal Mining Technology	PCC	3	0	0	3	3
191MI4T07	Fundamentals of Rock Mechanics	PCC	3	0	0	3	3
191MI4T08	Geo-statistics	PCC	2	0	0	2	2
191MI4L03	Rock Mechanics Lab	PCC	0	0	4	4	2
191ES4L18	Mine Surveying Lab	ESC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	3	0	0	3	0
		TOTAL	**20**	**0**	**9**	**29**	**20.5**

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191HS1T01	Communicative English	HSMC	3	0	0	3	3
191BS1T01	Differential Equations and Linear Algebra	BSC	3	0	0	3	3
191BS1T02	Engineering Physics	BSC	3	0	0	3	3
191ES1T01	Programming for Problem Solving Using C	ESC	3	0	0	3	3
191HS1L01	Communicative English Lab-I	HSMC	0	0	3	3	1.5
191BS1L01	Engineering Physics Lab	BSC	0	0	3	3	1.5
191ES1L01	Programming for Problem Solving Using C Lab	ESC	0	0	3	3	1.5
191ES1L02	Basic Engineering Workshop	ESC	0	0	3	3	1.5
191MC1A01	Environmental Science	MC	2	0	0	2	0
191MC1A02	Constitution of India	MC	2	0	0	2	0
		TOTAL	**16**	**0**	**12**	**28**	**18**

II SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS2T05	Partial Differential Equations and Vector Calculus	BSC	3	0	0	3	3
191BS2T06	Chemistry of Materials	BSC	3	0	0	3	3
191ES2T02	Engineering Graphics and Design	ESC	1	0	3	4	2.5
191ES2T03	Essential Electrical and Electronics Engineering	ESC	3	0	0	3	3
191ES2T04	Engineering Mechanics	ESC	3	0	0	3	3
191HS2L02	Communicative English Lab-II	HSMC	0	0	2	2	1
191BS2L04	Engineering Chemistry Lab	BSC	0	0	3	3	1.5
191ES2L03	Essential Electrical and Electronics Engineering Lab	ESC	0	0	3	3	1.5
191ES2L12	Mining Engineering Workshop	ESC	0	0	3	3	1.5
191PR2P01	Engineering Exploration Project	PROJ	0	0	2	2	1
		TOTAL	**13**	**0**	**16**	**29**	**21**

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V SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171MI5T09	Under Ground Coal Mining Technology	PC	3	1	0	4	3
171MI5T10	Mine Environment Engineering - I	PC	3	1	0	4	3
171MI5T11	Basic Geo Mechanics	PC	3	1	0	4	3
171MI5T12	Mine Surveying - II	PC	3	1	0	4	3
171HS5T04	Managerial Economics and Financial Analysis	HSS	3	1	0	4	3
---	**Professional Elective – I**	PE	3	1	0	4	3
171HS5T06	Employability Skills – III	HSS	0	0	2	2	1
171MI5L03	Rock Mechanics Lab	PC	0	0	3	3	2
171MI5L04	Mine Surveying Lab	PC	0	0	3	3	2
171MI5S01	MOOCs - I	SS	0	0	0	0	0
TOTAL			**18**	**6**	**8**	**32**	**23**

VI SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171MI6T13	Under Ground Metal Mining Technology	PC	3	1	0	4	3
171MI6T14	Mineral Processing Technology	PC	3	1	0	4	3
171MI6T15	Mine Environment Engineering - II	PC	3	1	0	4	3
171MI6T16	Mining Machinery	PC	3	1	0	4	3
---	**Professional Elective – II**	PE	3	1	0	4	3
---	**Professional Elective - III**	PE	3	1	0	4	3
171HS6T07	Employability Skills - IV	HSS	0	0	2	2	1
171MI6L05	Mineral Processing Technology Lab	PC	0	0	3	3	2
171MI6L06	Environmental Engineering Lab	PC	0	0	3	3	2
171MI6S02	MOOCs - II	SS	0	0	0	0	0
TOTAL			**18**	**6**	**8**	**32**	**23**

MOOCs – Massive Open Online Courses

VII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
171MI7T17	Mine Economics	PC	3	1	0	4	3
171MI7T18	Mine Health and Safety Engineering	PC	3	1	0	4	3
171MI7T19	Mine Legislation and General Safety	PC	3	1	0	4	3
171MI7T20	Mine Management	PC	3	1	0	4	3
---	**Professional Elective - IV**	PE	3	1	0	4	3
---	**Professional Elective - V**	PE	3	1	0	4	3
171MI7L07	Mine Planning and Design Lab	PC	0	0	3	3	2
171ES7L16	Mechanical Engineering Lab	ES	0	0	3	3	2
171MI7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	1
TOTAL			**18**	**6**	**6**	**30**	**23**

VIII SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	**Professional Elective - VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171MI8P02	**Major Project**	PR	0	0	0	0	14
TOTAL			**6**	**2**	**0**	**8**	**20**

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Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171MI5E01	Maintenance and Reliability Engineering
2	171MI5E02	Mine Construction and Management
3	171MI5E03	Industrial Management and Labor Relations

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171MI6E04	Advanced Geo Mechanics
2	171MI6E05	Mine Fire and Spontaneous Heating
3	171MI6E06	Mineral Exploration

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171MI6E07	Advance Surveying Technology
2	171MI6E08	Mine Subsidence Engineering
3	171MI6E09	Rock Fragmentation Engineering

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171MI7E10	Planning of UGMM Project
2	171MI7E11	Planning of UGCM Project
3	171MI7E12	Planning of Surface Mining Project

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171MI7E13	Mine mechanization
2	171MI7E14	Advance Underground Coal Mining Technology
3	171MI7E15	Mine Blasting operation

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171MI8E16	Mine Systems Engineering
2	171MI8E17	Advance Surface Mining Technology
3	171MI8E18	Advanced Underground Metal Mining Technology

Open Elective (VIII Semester)

S.No	Course Code	Name of the Course
1	171EE8O05	Robotics
2	171MI8O01	Environmental Impact Assessment
3	171MI8O02	Mine Closure and Reclamation
4	171MI8O03	Fundamentals of Communication
5	171MI8O04	Remote Sensing and GIS
6	171MI8O05	Quantitative Decision Making

ENGINEEING GRAPHICS
(Common to CE, ME, Min.E, PT & Ag.E)

I Semester
Course Code: 201ES1I05

L	T	P	C
1	0	4	3

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

CO1: Sketch the polygons, conics and scales by using the principles of drawing
CO2: Draw Orthographic projections of points and lines..
CO3: Draw Orthographic projections of planes in various positions
CO4: Draw Orthographic projections of solids in various positions.
CO5: Construct isometric scale and isometric projections

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	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit - I
Introduction to Engineering Drawing:
Lettering, Dimensioning, Types of lines.
Conic Sections:
Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.
Scales:
Plain Scale, Diagonal Scale and Vernier Scales.

Unit – II
Orthographic Projections:
Introduction to orthographic projections, Projections of Points, Projections of Lines.

Unit – III
Projections of Planes:
Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.

Unit – IV
Projections of Solids:
Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).

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Unit – V

Isometric Projections:

Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

Text Books:

1. Engineering Drawing by N.D.Bhatt, Charotar Publishers
2. Engineering Drawing by K.L.Narayana and P. Kannaiah. Scitech Publishers.

Reference Books:

1. Engineering Drawing by K. Venugopal, New Age Publications
2. Engineering Drawing by M. B. shah & B.C. Rana., Pearson's Publishers.
3. Engineering Drawing by B. Agrawal & C.M. Agrawal, Tata Mcgraw Hill Publishers

Web Links:

1. http://nptel.ac.in/courses/112103019
2. http://freevideolectures.com/Course/3420/Engineering-Drawing
3. http://engineeringdrawing.org
4. http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html

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NUMERICAL METHODS AND INTEGRAL TRANSFORMS
(Common to Min.E and PT)

III Semester **L T P C**
Course Code: 191BS3T15 **3 0 0 3**

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

- CO 1 : Apply numerical methods to solve equations and interpolation ofpolynomials.
- CO 2 : Apply numerical methods to solve initial value problems and problems involving integration.
- CO 3 : Compute Fourier series of a function
- CO 4 : Compute the Fourier transform ofa function.
- CO 5 : Apply Laplace transform to solve initial value problems.

Mapping of course outcomes with Program Outcomes:

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

UNIT-I:
Solution of Algebraic and Transcendental Equations:
Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton – Raphs on method.
Interpolation:
Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Central difference, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.

UNIT-II:
Numerical Integration and solution of Ordinary Differential equations:
Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).

UNIT-III:
Fourier series:
Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

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UNIT-IV:

Fourier Transforms:

Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

UNIT-V:

Laplace Transforms:

Laplace transforms of standard functions, first and second shifting theorems, change of scale property, multiplication with t, division by t, Transforms of derivatives and integrals. Inverse Laplace transforms, Convolution theorem (without proof), Application of Laplace transform to initial valueproblems.

Not to beexamined

(MATLAB Exercise: Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems)

Text Books:

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyengar, 4th Edition, Alpha Science Publications.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 10thEdition, Wiley-India.
3. Higher Engineering Mathematics, B.S.Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced engineering mathematics with MATLAB, Dean G. Duffy, CRC Press.
2. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er.,S. Chand Co. Pvt. Ltd, Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://swayam.gov.in/nd1_noc19_ma21/preview
2. https://swayam.gov.in/nd1_noc19_ma19/preview

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DEVELOPMENT OF MINERAL DEPOSITS

III Semester
Course Code: 191MI3T03

L	T	P	C
3	0	0	3

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

CO 1 : Summarize different stages in the life of a mine.
CO 2 : Choose a suitable location for opening to a deposit.
CO 3 : Explain Exploratory and Production Drilling.
CO 4 : Categorize the use of explosives and blasting.
CO 5 : Summarize material handling and transportation in mining

Mapping of course outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	1	3	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	3	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	2	2	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-

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:
Introduction to mining:
Mining terminologies, Stages in the life of the mines- Prospecting, Exploration, Development, Exploitation, Reclamation, Brief overview of Surface & Underground Mining Methods.

UNIT-II:
Access to mineral Deposits:
Adits, shafts, incline - location, shape and size; Drilling, blasting and removal of debris. Methods of shaft sinking –conventional, mechanized and special methods; opening up of surface deposits.

UNIT-III:
Exploratory and Production Drilling:
Principles of drilling, Types of drill, Drill rods and drill bits – types and applications, Exploratory drilling - Drilling fluid; Production drilling – Rotary, Percussive, Rotary-percussive, pneumatic; Drill patterns,

UNIT-IV:
Explosives and Blasting:
Types of explosives, Properties of explosives, Detonators. Detonating cords, and detonating fuse and nonel detonator. Storage and transport of explosives, Mechanics of blasting, Primary and secondary blasting, Blast geometry and design, electrical and non electrical methods, delay blasting techniques, handlingmisfires.

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UNIT-V:
Material Handling and Transportation in Mines:
LHD, SDL, shuttle car, AFC and belt conveyors; Raises, winzes, ore passes, ore chutes;shovels, dumpers, silo, bin, CHP, tippler.

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, multi fields, 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 KaAyojan (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
4. stabdards/afghanistan/AMAS_07.04_Storage_Transportation_Handling_of_Explosives.pdf

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GEOLOGY LAB

III Semester **L T P C**
Course Code: 191MI3L01 **0 0 4 2**

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

CO 1 : Study and identify different minerals.
CO 2 : Study and identify different rocks.
CO 3 : Construct strike and dip of outcrops.
CO 4 : Prepare the geological map.
CO 5 : Study and identify the rocks and structures in the field.
CO 6 : Construct crystal models.

Mapping of course outcomes with program outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	1	1	-	1
CO2	3	2	-	-	-	-	-	-	1	1	-	1
CO3	3	-	-	-	-	-	-	-	1	1	-	1
CO4	3	2	-	-	-	-	-	-	1	1	-	1
CO5	3	2	-	-	-	-	-	-	1	1	-	1
CO6	3	2	-	-	-	-	-	-	1	1	-	1

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	-	-
CO6	3	-	-

List of Experiments:
1. Study of different Physical properties of minerals and their identification.
2. Determination of hardness of minerals using Mohr's scale of hardness.
3. Study of different Physical properties of igneous rocks.
4. Study of different Physical properties of sedimentary rocks.
5. Study of different Physical properties of metamorphic rocks.
6. Study of geological map and identification of folds, faults and unconformities.
7. Measurement of the strike of various outcrops in the field.
8. Measurement of the dip of various outcrops in the field.
9. Study of different rocks, draw the strike lines, measure the dip of the beds andpreparing the geological map and its profile.
10. Field visit to mines and preparation of geological map of an area.
11. Study of different Physical properties of minerals and their identification.
12. Determination of hardness of minerals using Mohr's scale of hardness.

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List of Augmented experiments:

(Any two of the following experiment can be performed)

13. To calculate true Thickness of the beds.
14. To calculate true Thickness of the beds.
15. To study the different models of the crystals.
16. To study the different models of the crystals.

Text Books:

1. 'Engineering Geology' by N. Chenn Kesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
2. 'Engineering Geology' by Subinoy Gangopadhay, Oxford University press.
3. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.

Reference Books:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy
2. 'Foundations of Engineering Geology' by Tony Waltham

Web Links:

1. https://www.imwa.info/docs/imwa_1988/IMWA1988_Cripps_077.pdf

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COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to PT & Min.E)

IV Semester
Course Code: 191BS4T19

L	T	P	C
3	0	0	3

Course Outcomes:

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

- CO 1: Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic and find the differentiation and integration of complex functions used in engineering problems.
- CO 2: Make use of the Cauchy residue theorem to evaluate certain integrals.
- CO 3: Apply discrete and continuous probability distributions.
- CO 4: Design the components of a classical hypothesis test.
- CO 5: Infer the statistical inferential methods based on small and large sampling tests.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO 1	PSO 2	PSO 3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO 5	-	-	-

UNIT I:

Functions of a complex variable and Complex integration:

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).

UNIT II:

Series expansions and Residue Theorem:

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem (without proof) – Evaluation of real integral of the type –Integration around the unit circle $\int_0^{2\pi} f(sin\theta, cos\theta)d\theta$ - Integration around a small semi-circle $\int_{-\infty}^{\infty} f(x)dx$ – Integration around rectangular contours- Indenting the contours having pole on real axis.

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UNIT III:
Probability and Distributions:
Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT - IV:
Sampling Theory:
Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, χ^2 and F-distributions – Point and Interval estimations – Maximum error of estimate.

UNIT- V:
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 and two means (Large and Small samples) – Tests on proportions.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 43^{rd} Edition, Khanna Publishers.
2. Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 10^{th} Edition, Wiley-India.
2. Higher Engineering Mathematics, B.V. Ramana, 17^{th}Edition, Tata Mc Graw Hill.
3. Shorn L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
4. Sheldon, M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

Web links:

1. https://en.wikipedia.org/wiki/Complex_analysis
2. http://www.nptel.ac.in/courses/111103070/
3. https://en.wikipedia.org/wiki/Probability_and_statistics
4. http://nptel.ac.in/courses/111105041/1

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MINE ECONOMICS

VII Semester L T P C

Course Code: 171MI7T17 3 1 0 3

Course Outcomes:

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

- CO 1: Describe importance of strategic minerals.
- CO 2: Classify grading and pricing of minerals.
- CO 3: Estimate total reserve of minerals using sampling methods..
- CO 4: Compare investment alternatives using by NPV and IRR methods.
- CO 5: Explain wage systems and cost accounting in organizations.

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	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	3	1	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	1	-	-	-	-	-	-	-
CO5	2	3	2	-	-	-	-	-	-	-	-	-

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:

Introduction:

Special features of mineral and mining industry, statistics of important and strategic minerals of India. National mineral resources.

UNIT-II:

Grading and pricing of coal, limestone, and bauxite, iron ore. Pricing of metals, concentrates and ores. Conservation of minerals. National mineral policy. Global mineral marketing. Royalty and subsidies

UNIT-III:

Sampling and Estimation of Reserves:

Methods of sampling during exploration, mining and dispatch. Records and analysis of core sampling data. Tenor, grade and specification. .Classification of reserves. Estimation of reserves.

UNIT-IV:

Economic Evaluation:

Break-even analysis. Economic appraisal of capital investments by NPV and IRR methods. Comparison of investment alternatives Development of technical studies. Critical variables, price forecasting and sensitivity analysis.

UNIT-V:

Organizational and Financial Management:

Forms of business organizations. Sources of finance. Wage systems and incentives. Cost accounting and budgetary control.

TextBooks:

1. AlwynE.Annels, minerals deposit evaluation: A practical approach, Chapman hall,1991.
2. Deshmukh R.T. Mine and mineral economics, Emdee publishers,1986.

Reference Books:

1. O.P.Khanna, Industrial engineering and management, Dhanpat Rai Delhi,1973.
2. R.N.P. Arogyaswamy, courses in mining geology, Oxford and IBH pub. 2nd Edition, 1973.

Web Links:

1. https://www3.nd.edu/~cneal/planetearth/Chapt-15-Marshak.pdf
2. http://www.crirsco.com/nmrestonpaper.pdf
3. http://dels.nas.edu/resources/static-assets/besr/miscellaneous/PriceHitzman.pdf
4. https://pubs.usgs.gov/circ/1953/0231/report.pdf
5. https://www.min.int/impact/whatis.shtml

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MINE HEALTH AND SAFETY ENGINEERING

	L	T	P	C
VII Semester				
Course Code: 171MI7T18	3	1	0	3

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

CO 1: Explain the different health hazards and its prevention in mining industries.

CO 2: Distinguish the mine accidents occurring in surface and underground mining area.

CO 3: Illustrate the various approaches towards safety risk assessment.

CO 4: Discuss the safety planning and safety management systems

CO 5: Analyze the innovations in mine safety engineering.

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	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	1	-	-	-	-	-	-	-	-
CO4	2	-	2	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-

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:
Occupational health hazards in mines: Pneumoconiosis, Gas Poisoning, Radiation, NIHL, Cyanide Poisoning, Nystagmus, Metal Toxicity, Ergonomics& Mine Safety. OHS Structure for different mining companies. Prevention of health Hazards in Mines.

UNIT II:
Mine accidents: Classification, Genesis, Analysis & Prevention in Surface & Underground mines.

UNIT III:
Safety Risk Assessment: Qualitative & Quantitative Approaches.

UNIT IV:
Planning for safety: Safety analysis, Behaviors Based Safety & Safety Culture.

UNIT V:
Safety management System, safety audits, Innovations in Mine Safety Engineering.

TextBooks:

1. Ridley .J& C Channing; Safety at work; Butter worth,Oxford, 2001.
2. Rodgers. W.P; Introduction of system safety engineering: John Wiley &Sons Inc, NewYork, 1971.

Reference Books:

1. Howard L. Hartman, Jan M. Mutmansky; Introductory Mining Engineering, Hardcover, Oct 2002.
2. Greem A. R; Safety in Mines Research: A, R. Balkena, Rotterdam, 1985.

Web Links:

1. https://arlweb.msha.gov/Fatals/AccidentClassifications.asp
2. https://www.hsa.ie/eng/Topics/Managing_Health_and_Safety/Safety_Statement_and_Risk_Assessment/

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Department of Mining Engineering
Syllabus revision Index
Academic Year 2020-2021

S.No	Name of the course	Percentage of syllabus change
1	Engineering Graphics	30
2	Numerical Methods and Integral Transforms	20
3	Development of Mineral Deposits	40
4	Geology Lab	20
5	Complex Variables and Statistical Methods	45
6	Mine Economics	20
7	Mine Health and Safety Engineering	20

Signature of the course coordinator

Signature of the HOD

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1.1.2. Table-Prior/Post revision of syllabus

Academic Year 2020-2021

Regulation	Pre-Revision	Post-Revision
Course Title	Engineering Graphics and Design	Engineering Graphics
Course Code	191ES2T02	201ES1I05
Syllabus	**UNIT-I** Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance- conventions in drawing-lettering – BIS Conventions- - Conic sections - Cycloid, epicycloids and hypocycloid-Involutes	**Unit - I** Introduction to Engineering Drawing: Lettering, Dimensioning, Types of lines. Conic Sections: Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods. Scales: Plain Scale, Diagonal Scale and Vernier Scales
	UNIT-II Projection Of Points, Lines and Planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.	**Unit – II** Orthographic Projections: Introduction to orthographic projections, Projections of Points, Projections of Lines.
	UNIT-III Projections Of Solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.	**Unit – III** Projections of Planes: Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.
	UNIT-IV Introduction To Computer Aided Drafting: Basic drawing and editing commands Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections.	**Unit – IV** Projections of Solids: Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes. Development of surfaces (Simple cases).
	UNIT-V Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids	**Unit – V** Isometric Projections: Isometric Scale, Isometric Projections, Conversion of Orthographic views to Isometric views- Conversion of Isometric views into Ortho graphic projections.

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Regulation	Pre-Revision	Post-Revision
Course Title	Mathematics II	Numerical Methods and Integral Transforms
Course Code	171BS2T02	191BS3T15
Syllabus	**UNIT I**: Solution of Algebraic and Transcendental Equations and Interpolation: Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method. Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Relation between operators - Differences of a polynomial Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	**UNIT-I:** Solution of Algebraic and Transcendental Equations: Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton – Raphs on method. Interpolation: Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Central difference, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations- Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	**UNIT-II**: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	**UNIT-III**: Fourier series: Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.
	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms	**UNIT-IV**: Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT V: Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-	**UNIT-V**: Laplace Transforms: Laplace transforms of standard functions, first and second shifting theorems, change of scale property, multiplication with t, division by t, Transforms of

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	dimensional Laplace equation.	derivatives and integrals. Inverse Laplace transforms, Convolution theorem (without proof), Application of Laplace transform to initial value problems.

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Regulation	Pre-Revision	Post-Revision
Course Title	Introduction To Mining Technology	Development of Mineral Deposits
Course Code	171MI3T01	191MI3T03
Syllabus	**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 I**: Introduction to mining: 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-II**: Access to mineral Deposits: Adits, shafts, incline - location, shape and size; Drilling, blasting and removal of debris. Methods of shaft sinking –conventional, mechanized and special methods; opening up of surface deposits.
	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-III:** Exploratory and Production Drilling: Principles of drilling, Types of drill, Drill rods and drill bits – types and applications, Exploratory drilling - Drilling fluid; Production drilling – Rotary, Percussive, Rotary percussive, pneumatic; Drill patterns
	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.	**UNIT-IV:** Explosives and Blasting: Types of explosives, Properties of explosives, Detonators. Detonating cords, and detonating fuse and nonel detonator. Storage and transport of explosives, Mechanics of blasting, Primary and secondary blasting, Blast geometry and design, electrical and non electrical methods, delay blasting techniques, handling misfires.
	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-V**: Material Handling and Transportation in Mines: LHD, SDL, shuttle car, AFC and belt conveyors; Raises, winzes, ore passes, ore chutes; shovels, dumpers, silo, bin, CHP, tippler.

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Regulation	Pre-Revision	Post-Revision
Course Title	Geology Lab	Geology Lab
Course Code	171MI4L01	191MI3L01
	List of Experiments: Week 1. 1.To Study megascopically different Physical properties minerals and identify them. Week 2. 2.To study the different rocks and draw the strike lines measure the dip of the beds and finally prepare the geological map and its profile. Week 3. 3. To take different Field trips and observe and locate different outcrops of the field area. Week 4. 4.To Study megascopically different Physical properties of igneous rocks. Week 5. 5.To Study megascopically different Physical properties of Sedimentary rocks. Week 6. 6.To Study megascopically different Physical properties of metamorphic rocks. Week7. 7.To study the geological map and find out the Recognition of folds, faults, unconformities from maps. Week 8. 8.To Measure the strike of various outcrops in the field. Week 9. 9.To Measure the dip of various outcrops in the field. Week10. 10.To Study megascopically different Physical properties of important economic minerals and identify them. Week 11. 11.To Study and measure the hardness of minerals from Mohs hardness scale. Week 12. 12.To conduct mining Field visit and preparation of geological map of an area. **List of Augmented experiments** 13. To calculate true Thickness of the beds-I	**List of Experiments**: 1. Study of different Physical properties of minerals and their identification. 2. Determination of hardness of minerals using Mohr's scale of hardness. 3. Study of different Physical properties of igneous rocks. 4. Study of different Physical properties of sedimentary rocks. 5. Study of different Physical properties of metamorphic rocks. 6. Study of geological map and identification of folds, faults and unconformities. 7. Measurement of the strike of various outcrops in the field. 8. Measurement of the dip of various outcrops in the field. 9. Study of different rocks, draw the strike lines, measure the dip of the beds and preparing the geological map and its profile. 10. Field visit to mines and preparation of geological map of an area. 11. Study of different Physical properties of minerals and their identification. 12. Determination of hardness of minerals using Mohr's scale of hardness. List of Augmented experiments: 13. To calculate true Thickness of the beds. 14. To calculate true Thickness of the beds. 15. To study the different models of the crystals. 16. To study the different models of the crystals

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	14. To calculate true Thickness of the beds - II 15. To study the different models of the crystals-I systems and identify them. 16. To study the different models of the crystals-II systems and identify them	

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Regulation	Pre-Revision	Post-Revision
Course Title	Probability & Statistics	Complex Variables and Statistical Methods
Course Code	171BS3T10	191BS4T19
Syllabus	UNIT-I: Random variables and Distributions: Random variables- Discrete and Continuous Random variable-Distribution function Expectation, Variance, Moment Generating function –Discrete Distributions- Binomial, Poisson Continuous Distributions -Normal distribution.	UNIT I: Functions of a complex variable and Complex integration: Introduction – Continuity – Differentiability – Analyticity – Properties – CauchyRiemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).
	UNIT-II: Sampling Theory: Introduction - Population and samples- Sampling distribution of means (σ known and σ unknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.	UNIT II: Series expansions and Residue Theorem: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem (without proof) – Evaluation of real integral of the type –Integration around the unit circle $\int f(sin\theta, cos\theta)d\theta$ 2π 0 - Integration around a small semi-circle $\int f(x)dx$ ∞ $-\infty$ – Integration around rectangular contours-Indenting the contours having pole on real axis.
	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.	UNIT III: Probability and Distributions: Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.
	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 - IV: Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance χ(definition only) – Central limit theorem (without proof) – Introduction to t, 2 and F distributions – Point and Interval estimations – Maximum error of estimate.
	UNIT-V: Statistical Quality Control Methods:	UNIT- V: Tests of Hypothesis: Introduction –

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	Introduction - Methods for preparing control charts Problems using x-bar, p, R charts and attribute charts.	Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions.

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Regulation	Pre-Revision	Post-Revision
Course Title	Mine Economics & Investment	Mine Economics
Course Code	R1642261	171MI7T17
Syllabus	**UNIT I** INTRODUCTION Mineral industry and its role in national economy; world and national mineral resources; Mining - A unique investment environment; special risk factors in mine investment and evaluation; national mineral policy.	**UNIT-I**: Introduction: Special features of mineral and mining industry, statistics of important and strategic minerals of India. National mineral resources.
	UNIT II ORE RESERVE ESTIMATION Methods of sampling, sampling frequency; analysis of sampling data, estimation of reserves, introduction to geo-statistical methods, classification of reserves.	**UNIT-II**: Grading and pricing of coal, limestone, and bauxite, iron ore. Pricing of metals, concentrates and ores. Conservation of minerals. National mineral policy. Global mineral marketing. Royalty and subsidies
	UNIT III MINE VALUATION Time value of money; annuity; redemption of capital, net present value; depletion allowance; depreciation; inflation; escalation; rates of return; Hoskold's Two rate method.	**UNIT-III**: Sampling and Estimation of Reserves: Methods of sampling during exploration, mining and dispatch. Records and analysis of core sampling data. Tenor, grade and specification. Classification of reserves. Estimation of reserves
	UNIT IV ECONOMIC EVAULATION capital and operating cost including wages, incentives, material, etc.; assets; liabilities; cash flows and discounted cash flow; profitability index – their implications in mine economic evaluation.	**UNIT-IV**: Economic Evaluation: Break-even analysis. Economic appraisal of capital investments by NPV and IRR methods. Comparison of investment alternatives Development of technical studies. Critical variables, price forecasting and sensitivity analysis.
	UNIT V PROJECT APPRAISAL Methods of project evaluation – pay back, annual value, benefit/cost ratio, ERR and IRR, etc., evaluation of exploratory mining areas and operating mines; mine project financing, its risks and constraints; mine taxation; critical impact of depreciation, depletion, type of funding, reserves, life, etc. on mine profitability.	**UNIT-V**: Organizational and Financial Management: Forms of business organizations. Sources of finance. Wage systems and incentives. Cost accounting and budgetary control.
	UNIT VI FINANCE AND ACCOUNTING Sources of mine funds – shares, debentures, fixed	

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	deposit, sinking fund, capital gearing, P & L account, balance sheet, typical case studies of mine feasibility. Cost estimation of individual mining operations and overall mining cost, cost control methods.	

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Regulation	Pre-Revision	Post-Revision
Course Title	Mine Health and Safety Engineering	Mine Health and Safety Engineering
Course Code	R1642262	171MI7T18
Syllabus	**UNIT I** Mine accidents, types of accidents, roof fall accidents.	**UNIT I**: Occupational health hazards in mines: Pneumoconiosis, Gas Poisoning, Radiation, NIHL, Cyanide Poisoning, Nystagmus, Metal Toxicity, Ergonomics& Mine Safety. OHS Structure for different mining companies. Prevention of health Hazards in Mines.
	UNIT II Planning for safety, Safety analysis, Safety prevention and precautions.	**UNIT II**: Mine accidents: Classification, Genesis, Analysis & Prevention in Surface & Underground mines.
	UNIT III Information system and safety audits.	**UNIT III**: Safety Risk Assessment: Qualitative & Quantitative Approaches.
	UNIT IV Hazard control- engineering approach, systems approach, Hazard analysis.	**UNIT IV**: Planning for safety: Safety analysis, Behaviors Based Safety & Safety Culture
	UNIT V Safety management, Economics of safety and cost- effectiveness.	**UNIT V**: Safety management System, safety audits, Innovations in Mine Safety Engineering
	UNIT VI Occupational hygiene, occupational diseases, Occupational hazards in mines.	

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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 Humanities and Basic Sciences

Syllabus revision Index (2020-21)

S.No	Name of the course	Course code	Percentage of syllabus change
1	Integral transforms and applications of Partial Differential Equations	191BS3T11	40%
2	Transform Techniques	191BS3T12	60%
3	Numerical Methods & Vector Calculus	191BS3T13	40%
4	Numerical methods & Complex Variables (EXCEPT EEE)	191BS4T17	60%
5	Numerical methods & Complex Variables (EEE)	191BS4T17	100%
6	Numerical Methods and Integral Transforms	191BS3T15	20%
7	Complex Variables and Statistical Methods	191BS4T19	45%
8	Discrete Mathematics	191BS3T14	20%
9.	Probability and Statistics	191BS4T18	50%
10	Numerical methods & Statistical Techniques	191BS4T16	50%
11	Numerical methods & Statistical Techniques (MECH,AGRI)	191BS4T16	100%

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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	Mathematics-II	Numerical Methods and Integral Transforms
Course Code	171BS2T02	191BS3T15
Syllabus	UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation: Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method.Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Relation between operators - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	UNIT-I: Solution of Algebraic and Transcendental Equations: Introduction, Bisection method, Secant method, Method of false position, Iteration method, Newton – Raphs on method. Interpolation: Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Central difference, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations- Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	UNIT-II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge-Kutta method (fourth order).
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	UNIT-III: Fourier series: Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.
	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.	UNIT-IV: Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT V: Applications of Partial Differential	UNIT-V: Laplace Transforms: Laplace

	Equations: Classification of Higher order P.D.E - Method of separation of Variables-Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.	transforms of standard functions, first and second shifting theorems, change of scale property, multiplication with t, division by t, Transforms of derivatives and integrals. Inverse Laplace transforms, Convolution theorem (without proof), Application of Laplace transform to initial valueproblems. **Not to beexamined** (MATLAB Exercise: Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems)

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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	Probability & Statistics	Complex Variables and Statistical Methods
Course Code	171BS3T10	191BS4T19
Syllabus	UNIT-I: Random variables and Distributions: Random variables- Discrete and Continuous Random variable- Distribution functionExpectation,Variance,Moment Generating function –Discrete Distrinbutions- Binomial, Poisson Continuous Distributions -Normal distribution.	UNIT I: Functions of a complex variable and Complex integration: Introduction – Continuity – Differentiability – Analyticity – Properties – CauchyRiemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).
	UNIT-II: Sampling Theory: Introduction - Population and samples- Sampling distribution of means (σknownand σunknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.	UNIT II: Series expansions and Residue Theorem: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem (without proof) – Evaluation of real integral of the type –Integration around the unit circle $\int f(sin\theta, cos\theta)d\theta$ 2π 0 - Integration around a small semi-circle $\int f(x)dx$ ∞ $-\infty$ – Integration around rectangular contours- Indenting the contours having pole on real axis.
	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.	UNIT III: Probability and Distributions: Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

	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 - IV: Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance χ(definition only) – Central limit theorem (without proof) – Introduction to t, 2 and F distributions – Point and Interval estimations – Maximum error of estimate.
	UNIT-V: Statistical Quality Control Methods: Introduction - Methods for preparing control charts Problems using x-bar, p, R charts and attribute charts.	UNIT- V: 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 and two means (Large and Small samples) – Tests on proportions.

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Department of H & S
Engineering College

Program Name : B.Tech. in Agricultural Engineering

Syllabus Revision for the Academic Year 2020-2021				
S.No	**Semester**	**Course Code**	**Course Name**	**% of content revised for the existing year**
1	I	201HS1T01	Communicative English	0
2	I	201BS1T01	Differential equations and Linear algebra	0
3	I	201BS1T02	Engineering Physics	0
4	I	201ES1T04	Principles of Agronomy and Soil Science	5
5	I	201ES1T05	Engineering Graphics	10
6	I	201HS1L01	Communicative English Lab	0
7	I	201BS1L01	Engineering Physics Lab	0
8	I	201ES1L04	Soil Science and Agronomy Field Lab	20
9	I	201MC1T01	Environmental Science	0
10	I	201BS2T05	Partial Differential Equations and Vector Calculus	0
11	II	201BS2T08	Chemistry of Materials	0
12	II	201ES2T06	Engineering Mechanics	0
13	II	201ES2T08	Programming for Problem Solving Using C	0
14	II	201ES2L07	Engineering Workshop	0
15	II	201ES2L12	Computer Aided Drafting Lab	100
16	II	201HS2L02	Professional communications skills Lab	0
17	II	201BS2L05	Engineering Chemistry Lab	0

18	II	201ES2L10	Programming for Problem Solving Using C	0
19	II	201MC2T02	Constitution of India	0
20	III	191BS3T11	Integral Transforms and Applications of Partial Differential Equations	40
21	III	191ES3T10	Internet of Things	100
22	III	191HS3T02	Managerial Economics and Financial Analysis	0
23	III	191AG3T01	Principles of Agronomy and Soil Science	10
24	III	191AG3T02	Fluid Mechanics and Open Channel Hydraulics	0
25	III	191AG3T03	Surveying and Leveling	0
26	III	191AG3L01	Principles of Agronomy and Soil Science Lab	20
27	III	191AG3L02	Fluid Mechanics and Open Channel Hydraulics Lab	10
28	III	191AG3L03	Surveying and Leveling Lab	0
29	III	191MC3A03	Employability Skills – I	0
30	III	191MC3A04	Essence of Indian Traditional Knowledge	100
31	IV	191BS4T16	Numerical Methods & Statistical Techniques	100
32	IV	191AG4T04	Thermodynamics and Refrigeration System	15
33	IV	191AG4T05	Farm Power and Tractor Systems	15
34	IV	191AG4T06	Ground Water Hydrology	5
35	IV	191AG4T07	Heat and Mass Transfer	10
36	IV	191AG4T08	Surface Water Hydrology	0
37	IV	191AG4L04	Ground Water Hydrology Lab	100
38	IV	191AG4L05	Farm Power and Tractor Systems Lab	50
39	IV	191AG4L06	Heat and Mass Transfer lab	100
40	IV	191MC4A05	Employability Skills – II	0
41	IV	191MC4A06	Biology for Engineers	100

42	V	171AG5T09	Theory of Structures	0
43	V	171AG5T10	Irrigation and Drainage Engineering	0
44	V	171AG5T11	Agricultural Process Engineering	0
45	V	171AG5T12	Agricultural Extension Techniques and Business Management	0
46	V	171AG5T13	Farm Power and Tractor Systems	0
47	V	171AG5E01	Agro Industries and Bi-Product Utilization	0
48	V	171HS5E01	Managerial Economics and Financial Analysis	0
49	V	171AG5E02	Rural Water Supply, Sanitation and Environmental Engineering	0
50	V	171HS5T06	Employability Skills - III	0
51	V	171AG5L02	Agricultural Process Engineering Lab	0
52	V	171AG5L03	Field Operation and Maintenance of Tractors Lab	0
53	V	171AG5S01	MOOCs – I	0
54	VI	171AG6T14	Soil and Water Conservation Engineering	0
55	VI	171AG6T15	Farm Machinery and Equipment – I	0
56	VI	171AG6T16	Design of Soil, Water Conservation and Farm Structures	0
57	VI	171AG6T17	Post Harvest Engineering for Horticulture Produce	0
58	VI	171AG6E03	GIS and Remote Sensing	0
59	VI	171AG6E04	Human Engineering and Safety	0
60	VI	171AG6E05	Production Technology of Agricultural Machinery	0
61	VI	171AG6E06	Green House / Poly House Technology	0
62	VI	171AG6E07	Optimization, Operations Research and Systems Engineering	0
63	VI	171AG6E08	Industrial Engineering and Management	0
64	VI	171HS6T07	Employability Skills - IV	0
65	VI	171AG6L04	Farm Machinery Lab - I	0

66	VI	171AG6L05	Soil and Water Engineering Lab	0
67	VI	171AG6S02	MOOCs – II	0
68	VII	171AG7T18	Micro Irrigation Engineering	0
69	VII	171AG7T19	Farm Machinery and Equipment – II	20
70	VII	171AG7T20	Dairy and Food Engineering	0
71	VII	171ES7T26	Mechanical Measurements and Instrumentation	0
72	VII	171AG7E09	Seed Processing and Storage Engineering	20
73	VII	171AG7E10	Food Processing Plant Design and Layout	0
74	VII	171AG7E11	Food Packaging Technology	20
75	VII	171AG7E12	Aqua Cultural Engineering	100
76	VII	171AG7E13	Soil Dynamics in Tillage and Traction	100
77	VII	171AG7E14	Computational Fluid Dynamics	100
78	VII	171AG7L06	Farm Machinery Lab – II	20
79	VII	171AG7L07	Dairy and Food Engineering Lab	20
80	VII	171AG7P01	Industry Oriented (Internship) Minor Project	100
81	VIII	171AG8E15	Hydraulic Devices and Control	100
82	VIII	171AG8E16	Watershed Management	0
83	VIII	171AG8E17	Design of Agricultural Machinery	20
84	VIII	171AG8O01	Digital Control systems	0
85	VIII	171AG8O02	Industrial Pollution Control Engineering	20
86	VIII	171AG8O03	Mechatronics	100
87	VIII	171AG8O04	Water Resources Systems Planning and Management	0
88	VIII	171CS8O04	Operations Research	20
89	VIII	171AG8O05	Image Processing Techniques	100

90	VIII	171AG8P02	Major Project	0
Total number of courses in the academic year 2020-2021				90
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				26
Percentage of syllabus revision carried out in the academic year 2020-2021 = (25/88)*100				28.88

Program Coordinator

N.V. Good

Head of the Department

Head of the Department
Department of Agricultural Engineering
ADITYA ENGINEERING COLLEGE (A9)

PROGRAM STRUCTURE

I SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201HS1T01	Communicative English	HSMC	Theory	3	0	0	3	3
201BS1T01	Differential equations and Linear algebra	BSC	Theory	3	0	0	3	3
201BS1T02	Engineering Physics	BSC	Theory	3	0	0	3	3
201ES1T04	Principles of Agronomy and Soil Science	ESC	Theory	3	0	0	3	3
201ES1T05	Engineering Graphics	ESC	Theory	1	0	4	5	3
201HS1L01	Communicative English Lab	HSMC	Lab	0	0	3	3	1.5
201BS1L01	Engineering Physics Lab	BSC	Lab	0	0	3	3	1.5
201ES1L04	Soil Science and Agronomy Field Lab	ESC	Lab	0	0	3	3	1.5
201MC1T01	Environmental Science	MC	Theory	2	0	0	2	0
			TOTAL	**15**	**0**	**13**	**28**	**19.5**

II SEMESTER

Course Code	Course Title	Course Component	Course Type	Total Number of contact hours				Credits (C)
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
201BS2T05	Partial Differential Equations and Vector Calculus	BSC	Theory	3	0	0	3	3
201BS2T08	Chemistry of Materials	BSC	Theory	3	0	0	3	3
201ES2T06	Engineering Mechanics	ESC	Theory	3	0	0	3	3
201ES2T08	Programming for Problem Solving Using C	ESC	Theory	3	0	0	3	3
201ES2L07	Engineering Workshop	ESC	Lab	0	0	3	3	1.5
201ES2L12	Computer Aided Drafting Lab	ESC	Lab	0	0	3	3	1.5
201HS2L02	Professional communications skills Lab	HSMC	Lab	0	0	3	3	1.5
201BS2L05	Engineering Chemistry Lab	BSC	Lab	0	0	3	3	1.5
201ES2L10	Programming for Problem Solving Using C Lab	ESC	Lab	0	0	3	3	1.5
201MC2T02	Constitution of India	MC	Theory	2	0	0	2	0
			TOTAL	**14**	**0**	**15**	**29**	**19.5**

III SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS3T11	Integral Transforms and Applications of Partial Differential Equations	BSC	3	0	0	3	3
191ES3T10	Internet of Things	ESC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	3	0	0	3	3
191AG3T01	Principles of Agronomy and Soil Science	PCC	3	0	0	3	3
191AG3T02	Fluid Mechanics and Open Channel Hydraulics	PCC	3	0	0	3	3
191AG3T03	Surveying and Leveling	PCC	3	0	0	3	3
191AG3L01	Principles of Agronomy and Soil Science Lab	PCC	0	0	3	3	1.5
191AG3L02	Fluid Mechanics and Open Channel Hydraulics Lab	PCC	0	0	3	3	1.5
191AG3L03	Surveying and Leveling Lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills – I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
TOTAL			**20**	**0**	**11**	**31**	**22.5**

IV SEMESTER

Course Code	Name of the Course	Course Component	Periods/Week Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
191BS4T16	Numerical Methods & Statistical Techniques	BSC	3	0	0	3	3
191AG4T04	Thermodynamics and Refrigeration System	PCC	3	0	0	3	3
191AG4T05	Farm Power and Tractor Systems	PCC	3	0	0	3	3
191AG4T06	Ground Water Hydrology	PCC	3	0	0	3	3
191AG4T07	Heat and Mass Transfer	PCC	3	0	0	3	3
191AG4T08	Surface Water Hydrology	PCC	3	0	0	3	3
191AG4L04	Ground Water Hydrology Lab	PCC	0	0	3	3	1.5
191AG4L05	Farm Power and Tractor Systems Lab	PCC	0	0	3	3	1.5
191AG4L06	Heat and Mass Transfer lab	PCC	0	0	3	3	1.5
191MC4A05	Employability Skills – II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
		TOTAL	**20**	**0**	**11**	**31**	**22.5**

Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171AG5E01	Agro Industries and Bi-Product Utilization
2	171HS5E01	Managerial Economics and Financial Analysis
3	171AG5E02	Rural Water Supply, Sanitation and Environmental Engineering

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171AG6E03	GIS and Remote Sensing
2	171AG6E04	Human Engineering and Safety
3	171AG6E05	Production Technology of Agricultural Machinery

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171AG6E06	Green House / Poly House Technology
2	171AG6E07	Optimization, Operations Research and Systems Engineering
3	171AG6E08	Industrial Engineering and Management

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171AG7E09	Seed Processing and Storage Engineering
2	171AG7E10	Food Processing Plant Design and Layout
3	171AG7E11	Food Packaging Technology

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171AG7E12	Aqua Cultural Engineering
2	171AG7E13	Soil Dynamics in Tillage and Traction
3	171AG7E14	Computational Fluid Dynamics

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171AG8E15	Hydraulic Devices and Control
2	171AG8E16	Watershed Management
3	171AG8E17	Design of Agricultural Machinery

Open Elective (VIII Semester)

S.No	CourseCode	Name of the Course
1	171AG8O01	Digital Control systems
2	171AG8O02	Industrial Pollution Control Engineering
3	171AG8O03	Mechatronics
4	171AG8O04	Water Resources Systems Planning and Management
5	171CS8O04	Operations Research
6	171AG8O05	Image Processing Techniques

VII SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total hours	Credits (C)
171AG7T18	Micro Irrigation Engineering	PC	3	1	0	4	3
171AG7T19	Farm Machinery and Equipment – II	PC	3	1	0	4	3
171AG7T20	Dairy and Food Engineering	PC	3	1	0	4	3
171ES7T26	Mechanical Measurements and Instrumentation	ES	3	1	0	4	3
---	**Professional Elective – IV**	PE	3	1	0	4	3
---	**Professional Elective – V**	PE	3	1	0	4	3
171AG7L06	Farm Machinery Lab – II	PC	0	0	3	3	2
171AG7L07	Dairy and Food EngineeringLab	PC	0	0	3	3	2
171AG7P01	Industry Oriented (Internship) Minor Project	PR	0	0	0	0	1
		TOTAL	**18**	**6**	**6**	**30**	**23**

VIII SEMESTER

Course Code	Name of the Course	Category	Total number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total hours	Credits (C)
---	**Professional Elective - VI**	PE	3	1	0	4	3
---	**Open Elective**	OE	3	1	0	4	3
171AG8P02	**Major Project**	PR	0	0	0	0	14
		TOTAL	**6**	**2**	**0**	**8**	**20**

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.

SOIL SCIENCE AND AGRONOMY FIELD LAB

I Semester **L T P C**
Course Code: 201ES1L04 **0 0 3 1.5**

Course Objectives:

COB 1: To enable the students, to determine soil physical and chemical properties.
COB 2: To train the students on different types of tillage operations and seed bed preparation
COB 3: To impart skills on practices of sowing, weeding, fertilizer application.
COB 4: To make the students, to identify crop nutrient deficiencies and measurement of infiltration, evaporation rate in soil
COB 5: To make the students, to'identify different types of crops, manures and fertilizers.

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

CO 1: Describe soil profile and collection of soil samples.
CO 2: Determine pH and EC using standard methods.
CO 3: Make use of different implements for practicing ploughing, seed bed preparation, sowing, weeding and fertilizer application.
CO 4: Identify different nutrient deficiency symptoms in the crops.
CO 5: Measure infiltration and evaporation rate in soil using standard procedure.
CO 6: Classify different crops, manures and fertilizers.

Mapping of course outcomes with program outcomes:

CO/ POs	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K1)	1	-	-	-	1	-	-	-	-	-	-	-
CO2 (K5)	3	3	-	3	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 5(K5)	3	3	-	3	3	-	-	-	-	-	-	-
CO 6 (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 (K1)	1	-	-
CO2 (K5)	3	3	3
CO3 (K3)	3	3	2
CO4 (K3)	3	3	2
CO5 (K5)	3	3	3
CO6 (K4)	3	3	3

LIST OF EXPERIMENTS:
1. To study the soil profile and collection of soil samples.
2. To determine pH and EC of soils using pH meter and EC meter.
3. To study tillage practices.
4. To prepare seed bed for sowing.
5. To practice sowing operations.
6. To practice weeding operations.
7. To identify manures and fertilizers
8. To identify nutrient deficiency symptoms of crops in field.

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9. To practice fertilizer application.
10. To determine the bulk density and particle density of soil.
11. To determine infiltration rate of soil using double ring infiltrometer.
12. To measure rainfall and evaporation.

LIST OF AUGMENTED EXPERIMENTS

(Any two of the following experiments can be performed)

13. To estimate the value of K and Na in the given sample.
14. To practice harvesting operation.
15. To study various meteorological instrumentation.
16. To determine the soil colour.

Reference Books:

1. A Text book of Agronomy. Chandrasekaran, B., Annadurai, K. and Somasundaram, E. New Age International Publishers. 2010.
2. Introduction to Soil Science. Mahendra Sharma. Agrotech Publishing Academy. 2018.
3. Principles of Agronomy, Yellamanda Reddy, T. and SankaraReddi, G. H, Kalyani Publishers, Ludhiana. 4th Edition, 2010.
4. Fundamentals of Soil Science, Indian Society of Soil Science, IARI, Jain publications New Delhi, 1998.
5. Introductory Soil Science, Das, D. K, Kalyani Publishers, New Delhi, 4th Edition, 2010.

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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INTEGRAL TRANSFORMS AND APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

(Common to CE, ME, Ag.E)

III Semester
Course Code: 191BS3T11

L	T	P	C
3	0	0	3

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
COB 2: To help the students acquire problem analysis and problem solving skills.

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

CO 1: Compute the Fourier series of a given function.
CO 2: Compute the Fourier transforms of various certain functions.
CO 3: Compute Laplace transform of various functions.
CO 4: Apply Laplace transform to solve initial value problems.
CO 5: Solve one dimensional heat equation, wave equation and two dimensional Laplace equation.

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)
CO 1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 4 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K4)
CO 1 (K3)	3	3	2
CO 2 (K3)	3	3	2
CO 3 (K3)	3	3	2
CO 4 (K3)	3	3	2
CO 5 (K3)	3	3	2

UNIT-I:
Fourier series:
Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.

UNIT-II:
Fourier Transforms:
Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.

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UNIT-III:
Laplace Transforms:
Laplace transforms of standard functions, first and Second Shifting theorems, Change of scale property, Multiplication with t, Division by t, Transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, Evaluating improper integrals by using Laplace Transform.

UNIT-IV:
Inverse Laplace Transforms:
Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, Solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise: Computing Laplace transform of f(t) using symbolic toolbox, Solving initial value problems).

UNIT-V:
Application of PDE:
Classification of Higher order P.D.E - Method of separation of Variables- Solution of One-dimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Text Books:

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyenkar, Alpha Science Publications.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
3. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers

Reference Books:

1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited, 2006.

Web Links:

1. https://nptel.ac.in/courses/111105123/
2. https://nptel.ac.in/courses/111105093/
3. https://www.khanacademy.org

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PRINCIPLES OF AGRONOMY AND SOIL SCIENCE LAB

III Semester **L T P C**
Course Code: 191AG3L01 **0 0 3 1.5**

Course Objectives:

COB 1: To enable the students to determine soil physical and chemical properties.
COB 2: To train the students on different types of tillage operations and seed bed preparation
COB 3: To impart skills on practices of sowing, weeding, fertilizer application.
COB 4: To make the students to identify crop nutrient deficiencies and measurement of infiltration, evaporation rate in soil
COB 5: To make the students to identify different types of crops, manures and fertilizers.

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

CO 1: Describe soil profile and collection of soil samples.
CO 2: Determine pH and EC using standard methods.
CO 3: Make use of different implements for practicing ploughing, seed bed preparation, sowing, weeding and fertilizer application.
CO 4: Identify different nutrient deficiency symptoms in the crops
CO 5: Measure infiltration and evaporation rate in soil using standard procedure.
CO 6: Classify different crops, manures and fertilizers

Mapping of course outcomes with program outcomes:

CO/ POs	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K1)	1	-	-	-	1	-	-	-	-	-	-	-
CO2 (K5)	3	3	-	3	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 5(K5)	3	3	-	3	3	-	-	-	-	-	-	-
CO 6 (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 (K1)	1	-	-
CO2 (K5)	3	3	3
CO3 (K3)	3	3	2
CO4 (K3)	3	3	2
CO5 (K5)	3	3	3
CO6 (K4)	3	3	3

List of Experiments:
1. To study the soil profile and collection of soil samples.
2. To determine pH and EC of soils using pH meter and EC meter.
3. To study tillage practices.
4. To prepare seed bed for sowing.
5. To practice sowing operations.
6. To practice weeding operations.
7. To identify manures and fertilizers

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8. To identify nutrient deficiency symptoms of crops in field.
9. To practice fertilizer application.
10. To determine the bulk density and particle density of soil.
11. To determine infiltration rate of soil using double ring infiltrometer.
12. To measure rainfall and evaporation.

List of Augmented experiments
(Any two of the following experiments can be performed)

13. To estimate the value of K and Na in the given sample.
14. To practice harvesting operation
15. To study various meteorological instrumentation
16. To determine the soil colour
17. To study the classification of different filed crops

Text Books:

1. Surveying (Vol No.1, 2 &3), B.C.Punmia, Ashok Kumar Jain and Arun KumarJain, Laxmi Publications (P)ltd, 2016.
2. Surveying and leveling, R. Subramanian, Oxford University press, 2nd edition, 2012.

Reference Books:

1. Principles of Agronomy, Yellamanda Reddy, T. and Sankara Reddi, G. H, Kalyani Publishers, Ludhiana. 4th Edition, 2010.
2. Fundamentals of Soil Science, Indian Society of Soil Science, IARI, Jain publications New Delhi, 1998.
3. Introductory Soil Science, Das, D. K, Kalyani Publishers, New Delhi, 4th Edition, 2010.
4. Principles of Agronomy, S.R.Reddy, Kalyani Publishers, Ludhiana, 2016.

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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FARM POWER AND TRACTOR SYSTEMS LAB

IV Semester **L T P C**
Course Code: 191AG4L05 **0 0 2 1**

Course Objectives:

- COB 1: To make the students familiarize with different models of tractors, power tillers and their controls.
- COB 2: To enable the students learn about tractor driving rules and driving in different gears.
- COB 3: To impart the knowledge on pertaining to maintenance of tractors and their systems.
- COB 4: To enable the students learn about trouble shooting of all tractor systems and remedial measures.

Course Outcomes:

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

- CO 1: Demonstrates various makes and models of 4-wheel and 2-wheel drive tractors with their controls.
- CO 2: Apply tractor driving rules in practice of tractor driving.
- CO 3: Explain maintenance of various tractors and their systems.
- CO 4: Identify troubles in all systems of tractors and also their remedial measures.
- CO 5: Measure the power required to operate an implement.

Mapping of course outcomes with program outcomes:

CO's/ PO's	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	-	-	-	-	-	-	-	1	1	-	2
CO2 (K3)	3	-	-	-	-	-	-	-	-	-	-	1
CO3 (K5)	3	3	3	3	3	-	-	-	-	-	3	3
CO4 (K3)	3	2	1	1	3	-	-	-	-	3	-	3
CO5 (K4)	3	3	2	3	3	-	-	-	-	-	2	2

Mapping of course outcomes with program Specific Outcomes:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	1
CO2 (K3)	3	-	2
CO3 (K5)	3	3	3
CO4 (K3)	3	3	2
CO5 (K4)	3	3	3

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List of Experiments:

1. To study the constructional details of tractors and power tillers of various make and to measure the chassis parameters.
2. To familiarize with tractor controls and to practice the driving of tractor in forward and reverse gears – driving safety rules.
3. To study constructional details of engine components- Assembling and dismantling.
4. To measure PTO or Engine power by using dynamometer.
5. To study the maintenance of air fuel system – cleaning of air – Process to remove air lock in the diesel engine – Precautions in handling diesel fuels in diesel engine.
6. To study the maintenance of lubrication and cooling system– Troubles and remedies – Care and maintenance of lubrication and cooling system.
7. To study the maintenance of transmission system – General maintenance – Differential trouble shooting – Frequent troubles and Remedies.
8. To study the maintenance of electrical system – Ignition system in petrol engine and starting system of diesel engine tractors –working – care and maintenance.
9. To study the maintenance of clutch and brakes – principle operation –frequent troubles and remedies – care and maintenance.
10. To study the maintenance of steering system – principle of operation – troubleshooting of steering system – care and maintenance of steering system.
11. To study the maintenance of hydraulic system – Working principle – Basic components of hydraulic system – Position and Draft controls – Frequent troubles and Remedies – Repairs and maintenance of hydraulic system– Precautions of hydraulic system.
12. To study hitching and unhitching of an implement to a tractor.

List of Augmented experiments
(Any two of the following experiments can be performed)

13. To study the emission of smoke – Over heating of engines.
14. To study the components and working of 2 stroke engine and 4 stroke engine.
15. To study tractor testing procedure – types of tests – test at main power take off – test at varying speed at full load – Test at varying load – Belt or pulley shaft test.
16. Visit to tractor repairing workshop or tractor industrial visit.

Reference Books:

1. Farm tractor systems – maintenance and operation. Segun, R. B., ISBN-13:978-148- 102- 292-7., DPS Dominion publishing services, Create space US.
2. Tractors and their Power units. Liledahi J.B. Carleton W.M. Turnquist P.K. and Smith D.W., AVI Publishing Co., Inc., Westport, Connecticut.
3. Farm Machines and their Equipment. Nakra C.P., Dhanpet Rai and Sons. NaiSarak, New Delhi.
4. Principles of Agricultural Engineering. Ojha, T. P., Michel, A. M. Jain Brothers, New Delhi.
5. Farm Tractor Maintenance and Repair. Jain S.C. and Roy C.R. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

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Web Links:

1. http://www.hillagric.ac.in/edu/coa/agengg/lecture/243/agriengg-243.htm
2. https://www.unaab.edu.ng/opencourseware/Farm%20Power%20II.pdf
3. http://www.academia.edu/3848891/Farm_Tractor_Systems
4. https://www.researchgate.net/275642331-farm-tractor-systems
5. https://www.osha.gov.grant_materials.pdf

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FARM MACHINERY AND EQUIPMENT-II

	L	T	P	C
VII Semester	L	T	P	C
Course Code: 171AG7T19	3	1	0	3

Course objectives:

COB 1: To equip the students with technical knowledge and skills required for the operation, maintenance of harvesting, threshing and other crops machinery needed for agricultural farms.

COB 2: To develop the skills required to develop and modification of harvesting machines/methods as per the need of the farm area.

COB 3: To give a brief introductory idea on importance of testing of agricultural machines and tractors.

Course outcomes:

At the end of the course, student will be able to:

CO 1: Demonstrate different crop harvesting and windrowing methods and machineries.

CO 2: Explain working principles and construction details of forage harvesting and threshing machinery.

CO 3: Evaluate performance of crop harvesters and threshers

CO 4: Explain working principles and construction details of combine harvester, corn harvester and sugarcane harvester.

CO 5: Explain working principles and construction details of root crop harvesting equipment.

CO 6: Demonstrate about different cotton and fruit harvesters.

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	-	-	-	-	-	-	-	-	-	2	-
CO2 (K2)	3	3		-	-	-	-	-	-	-	3	-
CO3 (K5)	3	3	3	3	-	-	-	-	-	-	-	3
CO4 (K2)	3	3	3	3	-	-	-	-	-	-	-	3
CO5 (K2)	2	-	-	-	-	-	-	-	-	-	2	-
CO6 (K2)	2	1	-	-	-	-	-	-	-	-	-	-

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	-	-
CO2 (K2)	3	-	3
CO3 (K5)	3	3	3
CO4 (K2)	3	3	3
CO5 (K2)	-	2	-
CO6 (K2)	-	-	1

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UNIT – I

Harvesting: Definition, methods of harvesting – traditional and mechanical methods, requirements for mechanical harvesting. Principles and types of cutting mechanisms.

Mowers: Classification of mowers based on power source and hitching. Components of conventional mower. Cutter bar assembly: Guards, ledger plates, wearing plates, knife clips and grass board. Adjustments of mowers: Alignment and registration of cutter bar. Care and maintenance of mowers.

Windrowing: Methods of windrowing, Self-propelled windrowers, effects of self-propelled windrowers upon yield and quality.

Reapers: Types: Animal drawn reaper, tractor mounted vertical conveyer reaper and power operated vertical conveyer reapers. Reaper binders. Care and maintenance of reapers.

UNIT – II

Forage harvesting equipment: Types of row crop forage harvesting equipment. Row binder and ensilage cutter, field harvester and blowers. Types of field forage/silage·harvesters. Field chopper harvesters and field flail forage harvesters. Methods of handling chopped hay and forage crops. Forage wagons and boxes, silo forage blowers and silo unloaders.

Threshing: Principal of threshing, construction and working of threshing units. Threshing methods: manual, animal and mechanical. Power thresher- classification and components. Types of threshing cylinders and their characteristics. Factors affecting performance of thresher, cylinder adjustments and permissible limits of performance parameters. Threshers-multi crop threshers and high capacity (hadamba) threshers. Threshers for specific crops. Performance parameters of power thresher, efficiencies, determination of corrected output capacity and power consumption. Safety during threshing operation.

UNIT – III

Combine harvesters: Types of combines – Tractor drawn and self-propelled combines. Components of combine. Functions of a combine - cutting, threshing, separating, cleaning and storage. Advantages and disadvantages of combines. Performance of combine harvester, grain losses and factors affecting the combine harvester performance.

Corn harvesting equipment: Introduction, classification, types of corn pickers-snappers, picker husker, picker sheller. Power transmission, gathering and snapping mechanism, conveying and elevating mechanism. Husking and shelling mechanism, factors affecting performance of corn pickers, safety rules for operating corn pickers.

Sugar cane harvesters: Introduction, methods of sugarcane harvesting, self-propelled sugar cane harvester, cleaning and special sugar canewagon.

UNIT-IV

Root crop harvesting equipment: Introduction and classification.

Groundnut harvesters: Harvesters, diggers and shakers, groundnut threshers and strippers, groundnut combines, different units. Its operation and adjustments.

Potato harvesters: Harvesting methods and equipment, digging and soil separation, vine removal, separation of stones and clods.

UNIT-V

Cotton harvesting equipment: Introduction, types of cotton harvesting equipment-cotton stripper and pickers. Types of cotton strippers- brush type and finger type. Factors affecting the performance of the cotton strippers. Cotton pickers – types of pickers. Adjustments in cotton pickers, conveying systems- working and factors affecting the performance.

Fruit harvesters: Principles of fruit harvesting, tools and machines, harvesting methods-manual and mechanical fruit harvesters. Robotics in fruit harvesting.

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Text books:

1. Engineering principles of Agricultural machines, Ajith k Srivatsava, Carro lE. Goering, Roger P. Rohrbach, ASAE Publishers, 1993.
2. Principals of Farm Machinery, Kepner R A, Bainer R and Barger E L, CBS Publishers and Distributors, Delhi, 1987.
3. Elements of Agricultural Engineering, Jagadeshwar Sahay Agro BookAgency, Patna, 1992.

Reference books:

1. Farm Machinery, Stone A.A, John wiley and sons, New York, 1958.
2. Farm Machinery and Equipment. Smith H.P, Tata McGraw-Hills Publishing Co. Ltd., New Delhi,1971.
3. Principals of Agricultural Engineering, Michael A M and OJha T P Vol.I,Jain Brothers, New Delhi, 1985.
4. Testing and Evaluation of Agricultural Machinery, Mehta M.L., Verma S.R. Misra S.K. and Sharma V.K. Daya Publishing House, NewDelhi.
5. Farm Machinery and Equipment, Smith H P. Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1971.

Web Links:

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=2262
1. https://nptel.ac.in/courses/126105009/
2. http://www.hillagric.ac.in/edu/coa/agengg/lecture/243/agriengg-243.htm
3. http://www.agrimoon.com/farm-power-and-machinery-icar-ecourse-pdf-book/
4. http://www.dbskkv.org/pdf/Faculty/Engineering/Farm%20Power%20and%20Machinery1.pdf
5. https://nptel.ac.in/courses/105103093

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SEED PROCESSING AND STORAGE ENGINEERING

		L	T	P	C
VII Semester		L	T	P	C
Course Code: 171AG7E09		3	1	0	3

Course Objectives:

COB 1: To equip the students with techniques of seed drying, cleaning and plant layout planning.

COB 2: To make the students knowledgeable regarding seed treatments, seed packing, seed testing procedures in quality assessment at industry level.

COB 3: To understand the concepts of seed storage structures and storage engineering techniques.

Course Outcomes:

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

CO 1: Illustrate seed plant layout, and various seed cleaning equipment.
CO 2: Identify drying equipment based on different drying techniques.
CO 3: Categorize various unit operations in seed processing industry.
CO 4: Explain the changes during seed storage and concepts of storage.
CO 5: Explain the seed storage structures and their importance.

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)	2	1	--	--	--	2	3	--	--	3	2	--
CO2 (K3)	3	2	1	1	--	3	3	--	--	3	3	--
CO3 (K4)	--	3	2	2	--	2	--	--	--	--	--	--
CO4 (K2)	2	1	--	--	--	2	3	--	--	--	--	--
CO5 (K2)	2	1	--	--	--	2	3	--	--	--	--	--

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	--	--
CO2 (K3)	3	3	--
CO3 (K4)	3	--	--
CO4 (K2)	2	2	1
CO5 (K2)	2	--	--

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UNIT-I

Seed Plant layout: Planning, layout and establishment of seed processing plant, factors to be considered in planning and designing a seed processing plant, types of layouts.

Seed Cleaning: Parts of air screen cleaner. Upgrading the quality of cleaned seeds - Different upgrading machines, their principles of operation and uses.

UNIT-II

Seed Drying: Seed drying, seed processing and their steps, drying zones in seed bin drying, Different methods of drying: convective drying, radiation drying, dielectric drying, chemical drying, sack drying and puff drying. Heated air driers: flatbed type batch dryers, reciprocating batch drier, baffle dryer, rotary dryer. Recommended temperature and depth for heated air drying of various crop seeds in bin.

Unit – III

Seed Treatment: Definition, importance, types of seed treatment and their benefits and method of application, pre-sowing treatments, equipment used for seed treatment. seed coating - seed pelleting and seed invigoration.

Seed Packaging: Operations in packaging, packing equipment, types of packing material and packing size.

Seed Testing: Objectives of seed testing, seed testing laboratories, seed certification agencies, seed testing procedures for quality assessment, duties and powers of seed inspector.

Unit-IV

Seed Storage: Types and causes of spoilage in storage, Functional requirements of seed storage, control of temperature and relative humidity inside storage. Destructive agents, respiration of grains, control of its environment-air movement inside the storage, moisture and temperature changes in stored grains. Calculation of refrigeration load. Conditioning of environment inside storage through natural ventilation. Conditioning of environment inside storage through mechanical ventilation, artificial drying.

Unit-V

Grain storage: Principles of grain storage, parameters effecting the grain storage, Changes occurring during storage, bio chemical changes- minerals, carbohydrates, proteins and vitamins. storage insects, pests and their measures to control. Hermetically sealed and air-cooled storage, Controlled Atmosphere storage of grains, Modified Atmosphere storage of grains.

Grain Storage Structures: Different types of storage, constructional features and basic specifications of typical bag storage structures, design aspects of bag storage structures, Silos.

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Text Books:

1. Principles of Seed Technology by Agarwal, P.K. ICAR, New Delhi, 2010.
2. Techniques in Seed Science and Technology by Agarwal, P.K. and Dadlani, M., South Asian Publishers, New Delhi, 1986.
3. Seed Technology by Agarwal R.L., Oxford and IBH Publication Co., New Delhi, 2010.

Reference Books:

1. Unit Operations of Agricultural Processing, Sahay K M and Singh K K, Vikas Publishing House Pvt. Ltd., New Delhi,1994.
2. Grain Storage Engineering and Technology, Vijaya Raghavan, S. Batre Publisher, New Delhi, 1993.
3. Drying and Storage of Grains and Oilseeds by Donald B. Brooker, CBS Publishers & distributions, New Delhi, 1997.
4. Post Harvest Technology of Cereals, Pulses and Oil seeds by Chakravarthy A. Oxford and IBH Publishing Co. Ltd., Calcutta, 1988.
5. An Introduction to Seed Technology by Thomson. J.R. Leonard Hill, London, 1979.

Web Links:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=23
2. https://drive.google.com/file/d/0b-fs0jfhuxdsbgnmwwnbmtbfzmm/view
3. http://agriinfo.in/default.aspx?page=topiclist&superid=3&catid=18
4. http://www.agrimoon.com/wp-content/uploads/principles-of-seed-technology.pdf

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FOOD PACKAGING TECHNOLOGY

VII Semester L T P C

Course Code: 171AG7E11 3 1 0 3

Course Objectives:

COB 1: To make the students to know the fundamental concepts of food packaging and its importance in food industry.

COB 2: To enable students to know the effect of packaging material on fruits and vegetables.

COB 3: To enable students to acquire knowledge on different laws and regulations related to food packaging.

COB 4: To impart knowledge on innovations in food packaging technologies.

Course Outcomes:

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

CO 1: Explain the importance of packaging in food industry.

CO 2: Know different food packaging laws and regulations.

CO 3: Categorize paper and glass packaging material for manufacturing process.

CO 4: Classify various metal and plastic packaging material recommended for food packaging.

CO 5: Assess knowledge on advanced packaging technologies.

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)	--	--	--	--	--	2	3	--	--	--	--	--
CO2 (K2)	--	--	--	--	--	2	3	2	--	--	--	--
CO3 (K3)	3	--	1	1	3	3	3	--	--	--	--	--
CO4 (K3)	3	2	1	1	3	3	3	3	--	--	--	--
CO5 (K5)	3	3	3	3	--	3	3	--	--	--	--	--

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	--	1
CO2 (K2)	2	--	1
CO3 (K3)	3	1	2
CO4 (K3)	3	1	2
CO5 (K5)	3	3	3

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UNIT-I

Introduction to Food Packaging: Definition of package,-primary, secondary and teritiary packaging and packing. Packaging situation in India and in world, developments and need of packaging, handling and transportation, packaging machinery, public distribution, cost effective packaging. Levels of packaging, functions of packaging, packaging environments: Factors influencing shelf life of processed foods.

UNIT-II

Packaging Laws and Regulations: SWMA Rules, FSSAI Rules, PFA Rules, FPO Rules, MFPO Rules, Edible oil packaging order, AGMARK Rules. National Standards on Packaging code for food stuffs and perishables. Classification of food stuffs according to the BIS code. Packaging of milk and milk products, fruits, vegetables, meat, fish and poultry, protein rich foods. Packaging of edible starches, oils and fats, Food grain products, sugar and honey, Alcoholic drinks, carbonated beverages and spices.

UNIT-III

Paper Packaging: Paper manufacture: Pulp, mechanical pulping, chemical pulping. Alkaline process, soda process, sulfate process, sulphate process, semi chemical pulping, digestion. Bleaching, beating and refining, paper making: converting, calendaring, strength additives, sizing agents. Types of paper: Kraft paper, bleached paper, grease proof paper, glassine paper, vegetable parchment paper, waxed paper. Paper boards, paper board grades, folding cartons. Kinds of carton boxes: beverage cartons, molded pulp containers. Printing and varnishing, die cutting and creasing, gluing and sealing.

Glass Packaging: Composition of glass, Parts of glass container, Closures, Parts of closures, Types of closures, Properties of glass, Internal pressure resistance, Vertical load Strength, Resistance to impact, Resistance to scratches. Abrasion glass manufacture: Press and Blow (P&B), Narrow Neck Press and Blow (NNPB). Shape of glass, Hot and cold end treatment of surface, Inspection of Glass Bottles, advantages and disadvantages.

UNIT-IV

Metal Packaging: Introduction, Manufacture of tin plate, Manufacture of aluminium, Advantages and disadvantages. Container making processes, end manufacture, three piece can manufacture, welded side seams, soldered side seams, double seaming, Two piece can manufacture, D&I cans, DRD cans, protective and decorative coatings, aluminium foils and containers.

Plastic Packaging: Plastic consumption in India and world, plastic packaging material, classification of plastics, advantages and disadvantages. Polyethylene: Low density polyethylene, linear low density polyethylene, high density polyethylene, polypropylene, polystyrene, polycarbonate, polyvinyl chloride, polyvinyl chloride, ethylene vinyl alcohol, polyethylene terephthalate.

UNIT-V

Innovations in packaging: Controlled atmosphere packaging technology (cap), modified atmosphere packaging technology (MAP), advantages and disadvantages of MAP. Laminating coating process, laminating processes. Smart packaging, aseptic packaging: Specific fields of application, reasons for use of aseptic packaging, advantages of aseptic packaging. Machineries used in food packaging: Twist wrapping, bread wrapping and horizontal form fill sealing machine. Packaging of biscuits, milk powder, coffee, carbonated drink, fried snack foods.

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Testing of packaging material: Thickness, density, basis weight, grammage, burst strength, tear resistance, tensile strength, grease resistance, gas transmission rate (GTR), water vapour transmission rate (WVTR).

Text Books:

1. Food Packaging Technology by Richard Coles and Mark J. Kirwan, Wiley Blackwell Publishing, 2nd edition, 2011.
2. In-Pack Processed Foods by P Richardson, Wood head Publishing, 1st edition, 2008.
3. Food Packaging Principles and Practices by Gordon L. Robertson, CRC Press, 3rd edition, 2013.

Reference Books:

1. Recent Innovations in Barrier Technologies for Plastic Packaging - A Review by Jakob L, Packaging Technology and Science, 2003, 16:149-158.
2. New Concept in Dairy Packaging by Varghes S. and Goyal G. K., Beverage and Food World, 30 (1):52-55.
3. Packaging Aspects of Fruit Beverages by Kumar K. R, Beverage and Food World, 2002, 29 (9):28-30.
4. Action in Active and Intelligent Packaging by Brody, A. L, Food Technology, 2002, 56 (2):70-71.

Web Links:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=28
2. http://ecoursesonline.iasri.res.in/course/view.php?id=28&section=3
3. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1106

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FARM MACHINERY LAB – II

VII Semester L T P C

Course Code: 171AG7L06 0 0 3 2

Course objectives:

COB 1: To make the students to know different harvesting and threshing machinery available in India.

COB 2: To impart the knowledge on measurement of capacity, efficiency and loses during machinery operation in farms.

COB 3: To acquire knowledge on methods used for threshing and harvesting of different crops.

COB 4: To help the students acquire knowledge about construction details, adjustments and maintenance of harvesting and threshing machinery.

Course outcomes:

At the end of the course, student will be able to:

CO 1: Demonstrate working principles of various harvesting and threshing machinery.

CO 2: Measure harvesting and threshing capacity, efficiency and operational loses of farm machinery.

CO 3: Test the harvesters and threshers based on IS standards.

CO 4: Select suitable harvesting and threshing method for different crops and fruits.

CO 5: Explain constructional details of mowers, reapers, various crop combines and threshers.

CO 6: Explain safety measures, adjustments, care and maintenance of harvesters and threshers.

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	-	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	3	3	3	3	-	-	-	-	3	3	1	3
CO3(K6)	3	3	2	-	-	-	-	-	-	-	-	3
CO4 (K3)	3	2	-	3	-	-	-	-	-	-	-	-
CO5 (K5)	3	3	-	-	-	-	-	-	-	-	-	-
CO6 (K2)	2	-	-	-	-	-	-	-	-	-	-	-

Mapping of course outcome with program specific outcome

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	2	-
CO2 (K5)	3	3	3
CO3(K6)	3	-	3
CO4 (K3)	3	3	-
CO5 (K5)	-	-	3
CO6 (K2)	2	2	-

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List of experiments

1. To study the various farm machinery and equipment in the contest of enhanced production, multiple cropping, labour scarcity etc.
2. To visit the machinery production industry and ICAR SAU'S Research Station.
3. To practice the alignment and registration of mower.
4. To measure the various grain losses in a harvester.
5. To practice the various threshing methods.
6. To measure the threshing efficiency of a thresher.
7. To practice the hay/silage making.
8. To study about the various types of chaff cutters and their capacity.
9. To study about constructional details, materials used and working of potato harvesters.
10. To study about constructional details, materials used and working of groundnut harvesters
11. To study about safety rules for operating the harvesters, threshers and combiners based on IS standards.
12. To study about different horticultural tools and gadgets.

List of Augmented experiments
(Any two of the following experiments can be performed)

1. To study the various types of mowers, constructional details, materials and working.
2. To study the various types of reaper, constructional details, materials used, working and performance.
3. To study the various types of reaper binder, constructional details, materials used and working.
4. To study the various types of forage harvesters, constructional details, materials used and working.
5. To study the various types of sugarcane harvesters, constructional details, materials used and working.
6. To study the various types of cotton strippers, constructional details, materials used and working.

Reference Books:

1. Farm Machinery, Stone A A 1958. John wiley and sons, New York.
2. Farm Machinery and Equipment. Smith H.P. 1971. Tata McGraw-Hills Publishing Co., Ltd., New Delhi.
3. Testing and Evaluation of Agricultural Machinery. Mehta M.L., Verma S.R. Misra S.K. and Sharma V.K. Daya Publishing House, New Delhi.
4. Farm Machinery and Equipment, Smith H P 1971. Tata McGraw Hill Publishing Co. Ltd., New Delhi.

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2. http://www.hillagric.ac.in/edu/coa/agengg/lecture/243/agriengg-243.htm
3. http://www.agrimoon.com/farm-power-and-machinery-icar-ecourse-pdf-book/
4. http://www.dbskkv.org/pdf/Faculty/Engineering/Farm%20Power%20and%20Machinery1.pdf

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DAIRY AND FOOD ENGINEERING LAB

VII Semester	L	T	P	C
Course Code: 171AG7L07	0	0	3	2

Course Objectives:

COB 1: To impart the knowledge on properties of milk.
COB 2: To make the students know about the various Milk Processing Devices used in laboratory.
COB 3: To enable the students understand the working principle of different operations involved in milk processing.

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

CO1: Explain Milk Properties.
CO2: Illustrate heat treatment processes used in milk preservation.
CO3: Determine the energy required to process the fresh milk.
CO4: Demonstrate the working of homogenizer and cream separator.
CO5: Examine the design and layout of dairy plant.

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	2	--	--	--	--	--	--
CO2 (K2)	2	1	--	--	2	2	3	2	--	--	--	--
CO3 (K2)	3	1	--	--	2	2	--	--	--	--	--	--
CO4 (K2)	2	1	--	--	2	2	3	--	--	--	--	--
CO5 (K2)	2	1	--	--	2	2	3	--	--	--	--	--

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	--	--
CO2 (K2)	2	--	1
CO3 (K2)	2	--	1
CO4 (K2)	--	--	1
CO5 (K2)	2	--	1

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List of Experiments

1. To study the physical properties of fresh milk and processed milk.
2. To study various parts of Pasteurizer and its working.
3. To study various parts of Sterilizer and its working.
4. To study various parts of Homogenizer and its working.
5. To study various parts of Cream Separator and its working.
6. To study various parts of Butter Churner and its working.
7. To study various parts of Evaporator and its working.
8. To study various parts of spray dyer and its working.
9. To study various parts of freezer and its working.
10. To analyze the microbial population of milk based products.
11. To design and layout of dairy plant.
12. To Visit to food industry/ dairy plant.

List of Augmented Experiments
(Any two of the following experiments can be performed)

1. To estimate steam requirement for various operations in dairy plant.
2. To study the applications of ultra-filtration in milk processing.
3. To study the working of packaging of milk.
4. To study composite milk processing plant & equipments.

Reference Books:

1. Outlines of Dairy Technology by Sukumar D, Oxford University Press, 2001, New Delhi.
2. Principles of Food Science by Fennema, O. R, The Bangalore Printing & Publishing Co. Ltd., 2006, Bangalore.
3. Dairy Plant Engineering and Management by Tufail Ahmad, Kitab Mahal publications, 1st edition, 2003. New Delhi.

Web Links:

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2. http://ecoursesonline.iasri.res.in/course/index.php?categoryid=9
3. https://onlinecourses.nptel.ac.in/noc18_ar10/previe

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DESIGN OF AGRICULTURAL MACHINERY

VIII Semester

Course Code: 171AG8E17

L	T	P	C
3	1	0	3

Course Objectives:

COB 1: To make students know the basic concepts of machine design.

COB 2: To enable the students to apply the basic concepts of machine design in designing various machine parts and element.

COB 3: To impart the knowledge on designing an agricultural implements by application of individual machine member design.

Course Outcomes:

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

CO1: Understand the basic concept of machine design.
CO2: Examine basic principles in designing of cotter joint, knuckle joint, levers and springs.
CO3: Apply principles of design to mechanical power transmission elements such as shafts, keys & couplings, bearings.
CO4: Explain the design procedure of flywheel.
CO5: Classify the types of bearing used in machine design.
CO6: Apply principles of design in designing farm machinery implements.

Mapping of course outcome with program outcome:

CO's/PO's	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	--	--	2	--	--	--	--	--	--	--
CO2 (K4)	3	3	2	2	--	--	--	--	--	--	--	--
CO3 (K3)	3	2	1	1	3	--	--	--	--	--	--	--
CO4 (K2)	2	1	--	--	--	--	--	--	--	--	--	--
CO5 (K4)	3	--	--	--	--	--	--	--	--	--	--	--
CO6 (K3)	3	2	1	1	3	--	--	--	--	--	--	--

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	2	-
CO2 (K4)	3	-	3
CO3 (K3)	3	3	2
CO4 (K2)	2	-	-
CO5 (K4)	3	3	3
CO6 (K3)	3	3	2

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UNIT – I

Introduction to Machine Design: Definition, classification and general considerations in machine design, general procedure in machine design. Simple stress in machine parts – tensile, compressive, bending and shear stress. Stress - strain diagram, working stress, factor of safety, stresses in composite bars, thermal stress. Principal stresses and principal planes. Theories of failure under static load - Rankine's theory, Guest's theory and maximum distortion theory. Stress concentration and notch sensitivity.

UNIT – II

Cotter joint: Types of cotter joints, design of socket and spigot cotter joint.
Knuckle joint: Dimensions of various parts of knuckles joint, methods of failure of knuckle joint, design procedure of knuckle joint.
Levers: Introduction, application of levers in engineering practice, design of levers - hand lever, foot lever and cranked lever.
Springs: Introduction, terminology, types of springs, material for helical springs, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.

UNIT – III

Shafts: Material used for shafts, types and sizes of shafts. Design of shafts based on axial, bending, twisting, combined bending and twisting, buckling and fluctuating loads. Design of shafts on the basis of deflection and rigidity.
Keys and couplings: Introduction, types of keys - sunk key, saddle key, tangent key, round key and splines. Forces acting on sunk key. Effect of key ways. Shaft couplings – definition and types, muff coupling, design of flange coupling.

UNIT – IV

Fly wheel: Introduction, coefficient of fluctuation of speed, fluctuation of energy, maximum fluctuation of energy, energy stored in a flywheel, design of flywheel.
Bearing: Introduction, classification of bearing, types of sliding contact bearings, rolling contact bearings, radial ball bearings, advantages and disadvantages of rolling contact bearing over sliding contact bearings. Standard dimensions and designations of ball bearings, basic static load rating of rolling contact bearings, life of a bearing. Basic dynamic load rating of rolling contact bearings, dynamic load rating for rolling contact bearings under variable loads, reliability of bearing.

UNIT – V

Design of Machinery: Design of agricultural machinery - cultivator, rotavator, tractor operated seed cum fertilizer drill, tractor mounted boom sprayer, harvesting and threshing equipment.

Text books:

1. Machine Design – Khurmi R.S. and Gupta J.K, Eurasia Publishing House Pvt. Ltd., New Delhi, 1996.
2. Design of machine elements, by Bhandari, McGraw Hill Education India Private Limited; Fourth edition, 2017.
3. Farm Machinery Design Principles & Problems by Sharma D N, Jain Bros, 2013.

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Reference Books:

1. Machine Design – Jain R.K. 1991. Khanna Publishers, NewDelhi.
2. Machine Design Data Handbook by PatilH. G,I K International Publishing House Pvt. Ltd,2011.
3. Machine Design, by Pearson, Pearson Education; Fifth edition,2018
4. Shigley's Mechanical Engineering Design, by Richard G Budynas; J Keith Nisbett, McGraw Hill Education; First edition, 2017.

Web Links:

1. https://nptel.ac.in/downloads/112105125/#
2. http://ecoursesonline.iasri.res.in/course/view.php?id=521
3. https://lecturenotes.in/subject/261/machine-design-md

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INDUSTRIAL POLLUTION CONTROL ENGINEERING

VIII Semester
Course Code: 171AG8O02

L	T	P	C
3	1	0	3

Course objectives:

COB 1: To make the students learn the essential principles used in industrial pollution abatement, understand important issues in industrial pollution abatement and pertinent environmental legislations.

COB 2: To enable the students to understand the basic scientific and technical principles involved in the waste water pollution, control and air pollution control.

COB 3: To impart the knowledge on application of mathematical and technical principles to monitor pollution level in atmosphere.

Course outcomes:

At the end of the course, student will be able to:

CO 1: Identify different types of wastes generated in an industry, their effects on living and non-living things.

CO 2: Identify the standards for ambient air, noise emission and effluents.

CO 3: Explain about quantification and analysis of waste water treatment.

CO 4: Categorize different unit operations and unit processes involved in conversion of highly polluted water to potable standards.

CO 5: Explain atmospheric dispersion of air pollutants, and operating principles, design calculations of particulate control devices.

CO 6: Demonstrate about analysis and quantification of hazardous and non-hazardous solid waste wastes, treatment and disposal.

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	-	-	-	-	-	-	-	-	-	2	-
CO2 (K3)	3	2		-	-	-	-	-	-	-	3	-
CO3(K5)	3	2	3	3	-	-	-	-	-	-	-	3
CO4 (K4)	3	3	3	2	-	-	-	-	-	-	-	3
CO5 (K5)	3	3	3	3	-	-	-	-	-	-	-	3
CO6 (K2)	2	-	-	-	-	-	-	-	-	-	2	-

Mapping of course outcome with program specific outcome:

CO's/PSO's	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	2	2	-
CO2 (K3)	-	3	2
CO3(K5)	3	-	2
CO4 (K4)	3	3	3
CO5 (K5)	-	3	-
CO6 (K2)	2	2	1

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UNIT-I

Introduction: Industrial pollution: definition, Type of pollution and their sources, Environment legislation, Environmental Laws and rules, standards for ambient air, noise emission and effluents.

UNIT-II

Water quality monitoring: Characterization of effluent streams, Oxygen demands and their determination (alkalinity, BOD, COD, and TOC), BOD curve mathematical, Controlling of BOD curve, Oxygen sag curve, Self-purification of running streams, Sources and characteristics of pollutants in fertilizer, paper and pulp industry, petroleum and petroleum industry.

UNIT-III

Water Pollution Control: Introduction to waste water treatment, Methods of waste water treatment.

Primary/physical treatments: pre-treatment, solids removal by Setting, Screening, Sedimentation, Flotation, Neutralization, filtration centrifugation, coagulation and flocculation.

Secondary/Biological Treatment: Anaerobic and aerobic treatment, biochemical kinetics, Aerobic processes- Suspended growth processes, Activated aerated lagoons and stabilization of ponds, Attached growth processes, Trickling filters, Rotary drum filters, and Anaerobic processes.

UNIT IV

Tertiary/chemical treatment: Carbon absorption, Ion exchange, Reverse osmosis, Ultra filtration, Chlorination, Ozonation.

Solids Disposal: Solids waste disposal - composting, landfill, briquetting / gasification and incineration.

UNIT-V

Air pollution sampling and measurements: Air pollution sampling and measurement: Types of pollutants and sampling and measurement, ambient air sampling: Collection of gaseous air pollutants, Collection of particulate air pollutants. Stack sampling: Sampling system, Particulate sampling, and gaseous sampling. Collection efficiency

Source correction methods: raw material changes, process changes, and equipment modification.

Pollution control equipment: particulate emission control-gravitational settling chambers, Cyclone separators, fabric filters, ESP, Scrubbers. Gaseous emission control -wet and dry absorption methods.

Text Book:

1. Environmental Pollution and Control Engineering, Rao C. S., Wiley Eastern Limited, India, 1993.
2. Waste Water Treatment, M.Narayana Rao and A.K.Datta, 3rd Edition, Oxford and IHB, 2008.
3. Industrial Pollution Control and Engineering, Swamy AVN, Galgotia publications, 2005.

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4. Pollution Control in Process Industries, S.P. Mahajan, TMH. 1985.

Reference Books:

1. Fundamentals of Air Pollution", Vallero D. 4th Ed; Academic Press.
2. Industrial Water Pollution Control. Eckenfelder W.W. 2 Ed; McGraw Hill.
3. Handbook of Solid Waste Management. Kreith F. and Tchobanoglous G. 2 Ed; Mc Graw Hill.
4. Waste Management Practices: Municipal, Hazardous and Industrial. Pichtel J.CRC.
5. Waste Water Engineering: Treatment and Reus. Tchobanoglous G., Burton F. L. and Stensel H.D. 4th Ed; Tata McGraw Hill.

Web Links:

1. https://nptel.ac.in/syllabus/103107084/
2. https://nptel.ac.in/courses/105102089/8
3. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html

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OPERATIONS RESEARCH
(Common to CSE, IT & Ag. E)
(Open Elective)

VIII Semester L T P C

Course Code: 171CS8O04 3 1 0 3

Course Objectives:

COB 1: To formulate a mathematical model of a real world problem involving decision making.

COB 2: To find an optimal solution of a model using various techniques i.e., Linear programming problem, transportation model, assignment model and sequencing algorithm.

COB 3: To find optimal parameters by using replacement model, inventory model, queuing theory, dynamic programming, game theory and simulation technique.

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

CO1 : Apply mathematical modeling to formulate real world problems involving decision making.

CO2 : Solve linear programming problem, transportation and assignment problems.

CO3 : Solve sequencing problem, replacement problem and inventory problem.

CO4 : Apply game theory problems, queuing theory in decision making

CO5 : Apply dynamic programming and simulation techniques in real world problems.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO3 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	-	3	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PO	PSO1 (K3)	PSO2 (K3)	PSO3 (K4)
CO1 (K3)	-	2	-
CO2 (K5)	-	2	-
CO3 (K5)	-	2	-
CO4 (K3)	-	2	-
CO5 (K3)	-	2	-

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UNIT I

Introduction:

Definition and scope of operations research, phases of operations research - mathematical formulation of the problem, graphical solution.

Linear Programming Problem:

Standard Form of LPP, basic feasible solutions, unrestricted variables, simplex algorithm, artificial variables, big m method, two phase simplex method, degeneracy, alternative optimal, unbounded solutions, infeasible solutions, primal and dual problems and their relations, dual simplex method.

UNIT II

Transportation Problem:

Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model.

Assignment Problem:

Hungarian method, optimal solution, unbalanced assignment matrix. Flight scheduling problems, Traveling salesman problem.

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 III

Job Sequencing:

Sequencing Problems, Johnson's method for N-Jobs 2-Machine Problem, N-Jobs K- Machines Problem, Two-Jobs M- Machines Problem.

Inventory Control: Inventory, factors effecting inventory, EOQ, ABC and VED analysis, inventory problems with and without shortages, price breakups, multi item deterministic problems. Probabilistic inventory problems.

UNIT IV

Queuing Theory: Queuing systems and their characteristics. M/M/1: FCFS/ / M/M/2: FCFS/,M/M/1: FCFS/ /N queuing models.

Theory of games:

Introduction, Rectangular two person zero person games, solution of rectangular games in terms of mixed strategies , solution of 2x2 games without saddle points, concept of dominance to reduce the given matrix , graphical method for 2xn and nx2games.

UNIT V

Dynamic Programming:

Introduction – Bellman's principle of optimality – applications of DP- Capital budgeting problem – Shortest path problem.

Simulation:

Definition and applications- Monte Carlo simulation- Random numbers and random number generation- Application problems in queuing and inventory.

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Department of Agricultural Engineering

Syllabus revision Index 2020-21

S.No	Name of the course	Percentage of syllabus change
1	Soil Science and Agronomy Field Lab	20
2	Integral Transforms and Applications of Partial Differential Equations	40
3	Principles of Agronomy and Soil Science Lab	20
4	Farm Power and Tractor Systems Lab	50
5	Farm Machinery and Equipment – II	20
6	Seed Processing and Storage Engineering	20
7	Food Packaging Technology	20
8	Farm Machinery Lab – II	20
9	Dairy and Food Engineering Lab	20
10	Design of Agricultural Machinery	20
11	Industrial Pollution Control Engineering	20
12	Operations Research	20

Department of Agricultural Engineering

1.1.2. Table-Prior/Post revision of syllabus

S.No.	Regulation	Pre-Revision	Post-Revision
	Course Title	Principles of Agronomy and Soil Science Lab	Soil Science and Agronomy Field Lab
1	**Course Code**	191AG3T01	201ES1L04
	Syllabus	1. To study the soil profile and collection of soil samples. 2. To determine pH and EC of soils using pH meter and EC meter. 3. To study tillage practices. 4. To prepare seed bed for sowing. 5. To practice sowing operations. 6. To practice weeding operations. 7. To identify manures and fertilizers. 8. To identify nutrient deficiency symptoms of crops in field. 9. To practice fertilizer application. 10. To determine the bulk density and particle density of soil. 11. To determine infiltration rate of soil using double ring infiltrometer. 12. To measure rainfall and evaporation	1. To study the soil profile and collection of soil samples. 2. To determine pH and EC of soils using pH meter and EC meter. 3. To study tillage practices. 4. To prepare seed bed for sowing. 5. To practice sowing operations. 6. To practice weeding operations. 7. To identify manures and fertilizers 8. To identify nutrient deficiency symptoms of crops in field. 9. To practice fertilizer application. 10. To determine the bulk density and particle density of soil. 11. To determine infiltration rate of soil using double ring infiltrometer. 12. To measure rainfall and evaporation.
		LIST OF AUGMENTED EXPERIMENTS (Any two of the following experiments can be performed) 13. To estimate the value of K and Na in the given sample. 14. To practice harvesting operation. 15. To study various meteorological instrumentation. 16. To determine the soil colour.	**LIST OF AUGMENTED EXPERIMENTS** (Any two of the following experiments can be performed) 13. To estimate the value of K and Na in the given sample. 14. To practice harvesting operation. 15. To study various meteorological instrumentation. 16. To determine the soil colour. 17. To study the classification of different filed crops.

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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	Mathematics-II	Integral Transforms and Applications of Partial differential equations
Course Code	171BS2T02	191BS3T12
Syllabus	UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation: Introduction- Bisection method – Method of false position – Iteration method – Newton - Raphson method.Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Relation between operators - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.	UNIT-I: Fourier series: Fourier series of periodic function, Dirichlet's conditions for Fourier expansion, Functions having points of discontinuities, Change of interval, Even and odd functions, Half-range series.
	UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations- Euler's method, Modified Euler's method – Runge - Kutta method (fourth order).	UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier Transforms, Fourier sine and cosine transforms, properties, inverse transforms, Finite Fourier transforms.
	UNIT III: Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.	UNIT-III: Laplace Transforms: Laplace transforms of standard functions, First Shifting theorem, change of scale, Multiplication with t, Division by t, transforms of derivatives and integrals, Unit step function, Dirac delta function, Periodic function, evaluating improper integrals by using Laplace Transform.
	UNIT IV: Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.	UNIT-IV: Inverse Laplace Transforms: Inverse Laplace transforms, Convolution theorem (without proof), Second shifting theorem, Solving differential equations and integro-differential equations using Laplace transforms, **(MATLAB Exercise:

		Computing Laplace transform off(t) using symbolic toolbox, Solving initial value problems
	UNIT V: Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.	UNIT-V: Application of PDE: Classification of Higher order P.D.E - Method of separation of Variables- Solution of Onedimensional Wave equation, Heat equation and two-dimensional Laplace equation.

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3	**Regulation**	**Pre-Revision**	**Post-Revision**
	Course Title	Soil Science and Agronomy Field Lab	Principles of Agronomy and Soil Science Lab
	Course Code	171AG3L01	191AG3L01
	Syllabus	1. To study the soil profile and collection of soil samples 2. To determine the bulk density and particle density of soil 3. To determine the soil moisture by oven dry method. 4. To determine pH and EC of soils using pH meter and EC meter. 5. To determine infiltration rate of soil using double ring infiltrometer. 6. To measure rainfall and evaporation. 7. To study tillage practices. 8. To prepare seed bed for tillage operation. 9. To practice sowing operation. 10. To practice of weeding operation 11. To practice fertilizer application 12. To practice harvesting operation	1. To study the soil profile and collection of soil samples. 2. To determine pH and EC of soils using pH meter and EC meter. 3. To study tillage practices. 4. To prepare seed bed for sowing. 5. To practice sowing operations. 6. To practice weeding operations. 7. To identify manures and fertilizers 8. To identify nutrient deficiency symptoms of crops in field. 9. To practice fertilizer application. 10. To determine the bulk density and particle density of soil. 11. To determine infiltration rate of soil using double ring infiltrometer. 12. To measure rainfall and evaporation.
		LIST OF AUGMENTED EXPERIMENTS (Any two of the following experiments can be performed) 13. To estimate the value of K and Na in the given sample. 14. To determine the soil texture (field method). 15. To study various meteorological instrumentation. 16. To study various manures and fertilizers. 17. To study the classification of different field crops	**LIST OF AUGMENTED EXPERIMENTS** (Any two of the following experiments can be performed) 13. To estimate the value of K and Na in the given sample. 14. To practice harvesting operation. 15. To study various meteorological instrumentation. 16. To determine the soil colour. 17. To study the classification of different filed crops.

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4	Regulation	Pre-Revision	Post-Revision
	Course Title	Field Operations and Maintenance of Tractors Lab	Farm Power and Tractor Systems Lab
	Course Code	171AG5L03	191AG4L05
	Syllabus	1. To familiarize with different makes and models of 4 wheel and 2-wheel drive tractors. 2. To familiarize with tractor controls and learning procedure of tractor starting andstopping. 3. To practice the driving of tractor in forward and reverse gears – driving safety rules. 4. To study the steps to be taken for preparing the tractor for storage – removal of battery from the tractor – removal of tyres – drain the cooling system. 5. To study the maintenance of air fuel system – cleaning of air cleaners – Frequent troubles and remedies – Process to remove air lock in the diesel engine – Precautions inhandling diesel fuels in diesel engine. 6. To study the maintenance of lubrication system – Frequent troubles and remedies – Troubles in lubrication system – Excessive oil consumption – Care and maintenance of lubrication system. 7. To study the maintenance of transmission system – General maintenance – Differential trouble shooting – Frequent troubles and Remedies. 8. To study the maintenance of cooling system and cleaning of radiators - Frequent troubles and Remedies – Cooling system troubles – Over heating –slow warm up of theengine – care and maintenance of cooling system. 9. To study the maintenance of Ignition system – Care and Maintenance of batteries – Frequent troubles and Remedies – causes of ignition	1. To study the constructional details of tractors and power tillers of various make and to measure the chassis parameters. 2. To familiarize with tractor controls and to practice the driving of tractor in forward and reverse gears – driving safety rules. 3. To study constructional details of engine components- Assembling and dismantling. 4. To measure PTO or Engine power by using dynamometer. 5. To study the maintenance of air fuel system – cleaning of air – Process to remove air lock in the diesel engine – Precautions in handling diesel fuels in diesel engine. 6. To study the maintenance of lubrication and cooling system– Troubles and remedies – Care and maintenance of lubrication and cooling system. 7. To study the maintenance of transmission system – General maintenance –Differential trouble shooting – Frequent troubles and Remedies. 8. To study the maintenance of electrical system – Ignition system in petrol engine and starting system of diesel engine tractors –working – care and maintenance. 9. To study the maintenance of clutch and brakes – principle operation –frequent troubles and remedies – care and maintenance. 10. To study the maintenance of steering system – principle of

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		failure in battery system. 10.To study the maintenance of hydraulic system – Working principle – Basic componentsof hydraulic system – Types of hydraulic system – Frequent troubles and Remedies – Repairs and maintenance of hydraulic system–Precautions of hydraulic system. 11. To study the maintenance of brakes – principle operation – classification ofbrakes – requirements of good braking system- frequent troubles and remedies – hydraulic brake troubleshooting. 12. To study the periodical maintenance of tractors – at 8 – 10 engine working hours – at 50 60 engine working hours at 100-120 engine working hours – at 200-250 engine working hours – at 480-500 engine working hours – at 960 –1000 engine working hours.	operation – troubleshootingof steering system – care and maintenance of steering system. 11. To study the maintenance of hydraulic system – Working principle – Basic components of hydraulic system – Position and Draft controls – Frequent troubles and Remedies – Repairs and maintenance of hydraulic system– Precautions of hydraulic system. 12. To study hitching and unhitching of an implement to a tractor.
		List of Augmented experiments (Any two of the following experiments can be performed) 13. To study the emission of smoke – Over heating ofengines. 14. To study the maintenance of clutch, brakes and hydraulicproblems. 15. To study the components and working of 2 strokeengine. 16. To study the components and working of 4 strokeengine	**List of Augmented experiments** (Any two of the following experiments can be performed) 13. To study the emission of smoke – Over heating of engines. 14. To study the components and working of 2 stroke engine and 4 stroke engine. 15. To study tractor testing procedure – types of tests – test at main power take off – test atvarying speed at full load – Test at varying load – Belt or pulley shaft test. 16. Visit to tractor repairing workshop or tractor industrial visit

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5	Regulation	Pre-Revision	Post-Revision
	Course Title	Farm Machinery And Equipment-II	Farm Machinery And Equipment-II
	Course Code	R1641352	171AG7T19
	Syllabus	**Unit – I:** Harvesting – Crop harvesting machinery, history of development, manual harvesting and its classification. Principles and types of cutting mechanisms – principle of cutting mechanism, impact cutting, types of impact cutting, shear cutting Construction and adjustments of shear and impact type cutting mechanisms. Mowers – history and development, tractor mounted mowers, Trail behind tractor , integral Rear mounted mowers, side or central mounted tractor mower, semi-mounted mowers, safety precautions in operation and adjustments of mowers, Knife drives, cutter bar and its parts – inside and outside shoes. Cutter Bar – Guards, Ledger plates, wearing plates, knife clips, grass board and various parts of cutter bar assembly, alignment and registration of cutter bar. Windrowing – Methods of windrowing, Self propelled windrows, effects on yields and quality of Reapers, Animal drawn reaper, Tractor mounted Vertical conveyer reaper Repairs & maintenance of Harvesting equipment	**UNIT – I** **Harvesting**: Definition, methods of harvesting – traditional and mechanical methods, requirements for mechanical harvesting. Principles and types of cutting mechanisms. **Mowers**: Classification of mowers based on power source and hitching. Components of conventional mower. Cutter bar assembly: Guards, ledger plates, wearing plates, knife clips and grass board. Adjustments of mowers: Alignment and registration of cutter bar. Care and maintenance of mowers. **Windrowing:** Methods of windrowing, Self-propelled windrowers, effects of self-propelled windrowers upon yield and quality. **Reapers:** Types: Animal drawn reaper, tractor mounted vertical conveyer reaper and power operated vertical conveyer reapers. Reaper binders. Care and maintenance of reapers
		Unit-II: Power operated vertical conveyer reapers – Reaper binders – Care and maintenance, types Forage harvesting equipment – row forage harvesting equipment, field forage harvesters, types of field forage harvesters. Field chopper harvesters, forage wagons and boxes, field flail forage harvesters, theself propelled forage harvester, siloforage blowers, silo un loaders	**UNIT – II** **Forage harvesting equipment**: Types of row crop forage harvesting equipment. Row binder and ensilage cutter, field harvester and blowers. Types of field forage/silage harvesters. Field chopper harvesters and field flail forage harvesters. Methods of handling chopped hay and forage crops. Forage wagons and boxes, silo forage blowers and silo

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			unloaders. **Threshing**: Principal of threshing, construction and working of threshing units. Threshing methods: manual, animal and mechanical. Power thresher-classification and components. Types of threshing cylinders and their characteristics. Factors affecting performance of thresher, cylinder adjustments and permissible limits of performance parameters. Threshers- multi crop threshers and high capacity (hadamba) threshers. Threshers for specific crops. Performance parameters of power thresher, efficiencies, determination of corrected output capacity and power consumption. Safety during threshing operation
		Unit – III: Threshing – Principal of threshing, threshing methods, threshing by manual, threshing by animals, threshing by machines, olpad threshers, Power thresher – types of power threshers, hammer mill type, rasp bar, spike tooth, syndicator, Classification threshers based on feeding type, components of power thresher. Cleaning unit- Aspirator, blower, winnower, winnowing fan, cylinder adjustment, wheat thresher, groundnut thresher, and terminology connected with power thresher. Development of the binder and development of the combine	**UNIT – III** **Combine harvesters:** Typesof combines – Tractor drawn and self-propelled combines. Components of combine. Functions of a combine - cutting, threshing, separating, cleaning and storage. Advantages and disadvantages of combines. Performance of combine harvester, grain losses and factors affecting the combine harvester performance. **Corn harvesting equipment**: Introduction, classification, types of corn pickers-snappers, picker husker, picker sheller. Power transmission, gathering and snapping mechanism, conveying and elevating mechanism. Husking and shelling mechanism, factors affecting performance of corn pickers, safety rules for operating corn pickers. **Sugar cane harvesters**: Introduction, methods of sugarcane harvesting, self-propelled sugar cane harvester, cleaning and special sugar canewagon
		Unit – IV: Harvester, advantages and disadvantages of combines, types of combines – Tractor drawn and self propelled combines. Functions performed by a combine, cutting	**UNIT-IV** **Root crop harvesting equipment**: Introduction and classification. **Groundnut harvesters**: Harvesters, diggers and shakers, groundnut threshers and strippers,

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		mechanism, threshing mechanism, separating mechanism, cleaning mechanism, attachments for combine. Combine harvesting equipment- types of corn pickers, snappers, picker husker, Picker Sheller, power transmission, gathering and snapping mechanism, conveying and elevating mechanism. Husking mechanism, shelling mechanism, factors affecting performance of corn pickers, safety rules for operating corn pickers - Root crop harvesting equipment – groundnut harvester, groundnut diggers, digger operation and adjustments – groundnut shakers, groundnut threshers and pickers, groundnut combines different units and its operation. Potato harvesters – harvesting methods and equipment, one row harvester, two rowharvester, digging and soil separation, vine removal by harvesters, separation of stones and clods	groundnut combines, different units. Its operation and adjustments. **Potato harvesters**: Harvesting methods and equipment, digging and soil separation, vineremoval, separation of stones and clods
		Unit-V: Cotton harvesting equipment – cotton stripper, types of cotton strippers, factors affecting the performance of the cotton strippers, plant characteristics – thickness of plants – conveying system. Cotton pickers – types of pickers, drum type and chain belt spindle arrangements in cotton pickers, methods of mounting spindles, doffing of the cotton, conveying systems, working, factors affecting performance of cotton pickers. Sugar cane harvesters – self-propelled sugar cane harvester, cleaning and special sugar cane wagon. Sugar cane harvesters – Self-propelled sugar cane harvester, conveying and special sugar cane wagon. **Unit-VI:** Principles of fruit harvesting tools and machines – Harvesting methods – manual harvesters – hold on and twist type – Horticultural tools and gadgets. Testing of farm machine- Introduction, Standardization efforts, testing	**UNIT-V** **Cotton harvesting equipment**: Introduction, types of cotton harvesting equipment-cotton stripper and pickers. Types of cotton strippers- brush type and finger type. Factors affecting the performance of the cotton strippers. Cotton pickers – types of pickers. Adjustments in cotton pickers, conveying systems- working and factors affecting the performance. Fruit harvesters: Principles of fruit harvesting, tools and machines, harvesting methods- manual and mechanical fruit harvesters. Robotics in fruit harvesting.

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		programme and Procedure, Type of testing systems, national testing, prototype testing, testing for quality marketing.	

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6	**Regulation**	Pre-Revision	Post-Revision
	Course Title	Seed Processing and Storage Engineering	Seed Processing and Storage Engineering
	Course Code	R164135A	171AG7E09
	Syllabus	**Unit-I:** Moisture contents and methods for determination: Moisture content representation, wet basis, dry basis, direct and indirect methods of moisture content determination, problems. Importance of EMC and methods of its determination: static method, dynamic methods: desortation method and isotenoscopic method. EMC curve and EMC model: Henderson equation, hysteresis effect, bound moisture, unbound moisture, free moisture. Deep bed drying and their analysis, time of advance of drying front, decreasing rate period – remarks on the deep bed, problems on drying. Critical moisture content, drying models, rate of drying curves for constant drying conditions, calculation methods for falling rate drying period	**UNIT-I** **Seed Plant layout:** Planning, layout and establishment of seed processing plant, factors to be considered in planning and designing a seed processing plant, types of layouts. **Seed Cleaning**: Parts of air screen cleaner. Upgrading the quality of cleaned seeds - Different upgrading machines, their principles of operation and uses.
		Unit-II: Calculation of drying air temperature and air flow rate, air pressure within the grain bed, Shred's and Hukill's curve. Different methods of drying: convective drying, radiation drying, dielectric drying, chemical drying, sack drying, puff drying, foam mat drying, freeze drying etc. Study of different types of dryers: unheated air driers: air distribution systems, heated air driers: flat bed type batch dryers, reciprocating batch drier. Study of LSU dryer, baffle dryer, rotary dryer, performance, energy utilization pattern and efficiency	**UNIT-II** **Seed Drying:** Seed drying, seed processing and their steps, drying zones in seed bin drying, Different methods of drying: convective drying, radiation drying, dielectric drying, chemical drying, sack drying and puff drying. Heated air driers: flatbed type batch dryers, reciprocating batch drier, baffle dryer, rotary dryer. Recommended temperature and depth for heated air drying of various crop seeds in bin
		Unit – III: Types and causes of spoilage in storage. Functional requirements of seed storage, control of temperature	**Unit – III** **Seed Treatment**: Definition, importance, types of seed treatment and their benefits and

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		and relative humidity inside storage. Calculation of refrigeration load, control of its environment, air movement inside the storage. Storage of grains: destructive agents, respiration of grains, moisture and temperature changes in stored grains. Conditioning of environment inside storage through natural ventilation. Conditioning of environment inside storage through mechanical ventilation, artificial drying	methodof application, pre-sowing treatments, equipment used for seed treatment. seed coating - seed pelleting and seed invigoration. **Seed Packaging**: Operations in packaging, packing equipment, types of packing material and packing size. **Seed Testing**: Objectives of seed testing, seed testing laboratories, seed certification agencies, seed testing procedures for quality assessment, duties and powers of seed inspector
		Unit-IV: Design and control of environment. Storage of cereal grains and their products. Storage of seeds – terminology and treatments. Principles of grain storage – parameters – effecting the grain storage. Changes occurring during storage, nutritive changes, minerals, carbohydrates, proteins and vitamins. Moisture migration, storage insects, pests and their control	**Unit-IV** **Seed Storage**: Types and causes of spoilage in storage, Functional requirements of seed storage, control of temperature and relative humidity inside storage. Destructive agents, respiration of grains, control of its environment-air movement inside the storage, moisture andtemperature changes in stored grains. Calculation of refrigeration load. Conditioning of environment inside storage through natural ventilation. Conditioning of environment inside storage through mechanical ventilation, artificial drying
		Unit-V: Grain storage structures – bag storage of grains: different types of storage, classification planning for a bag storage complex, constructional features and basic specifications of typical bag storage structures, design aspects of bag storage structures. Bulk storage of grains: advantages of bulk handling system, types of bulk storage traditional storage structures, moral, bhukari, kothari type storage structures. Bulk storage of grains, pusa bin, brick and cement bin, bunker storage, vertical silos. **Unit-VI:** Grain handling equipment-bucket elevator: types of bucket elevators, components of bucket elevators, head section, boot section, elevator legs, elevator belt, buckets, drive mechanism and power requirement problems. Belt conveyors: Salient features, design considerations, belt	**Unit-V** **Grain storage**: Principles of grain storage, parameters effecting the grain storage, Changes occurring during storage, bio chemical changes- minerals, carbohydrates, proteins and vitamins. storage insects, pests and their measures to control. Hermetically sealed and air- cooled storage, Controlled Atmosphere storage of grains, Modified Atmosphere storage of grains. Grain Storage Structures: Different types of storage, constructional features and basic specifications of typical bag storage structures, design aspects of bag storage structures, Silos.

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		tension, power, design problems. Screw Conveyors: Salient features, Conveyor elements, selection of screw conveyors and power requirements–problems. Pneumatic conveyor, essential components, description of typical plant, limitations of pneumatic conveyor. Hermetically sealed and air cooled storage. Controlled Atmosphere storage of grains. Modified Atmosphere storage of grains.Tutorial problems on drying	

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7	Regulation	Pre-Revision	Post-Revision
	Course Title	Food Packaging Technology	Food Packaging Technology
	Course Code	R164135E	171AG7E11
	Syllabus	**UNIT-I** Introduction to Food Packaging – Packaging situation in World and in India – Developments in Indian packaging - Definition of Packaging - Package, Packaging, Packing - Need of Packaging food – Logistics – Merchandising Outlets – Handling – Transportation – Packaging machinery – Technology up gradation – Public Distribution – Cost effective packaging - Levels of packaging – Functions of packaging –Packaging environments – Functions/ Environment grid - Shelf life of processed foods – Factors influencing shelf life – Product – package –Environment - Hazards of distribution – mechanical hazards – climatic hazards – other hazards.	**UNIT-I** **Introduction to Food Packaging:** Definition of package,-primary, secondary and teritiary packaging and packing. Packaging situation in India and in world, developments and need of packaging, handling and transportation, packaging machinery, public distribution, cost effective packaging. Levels of packaging, functions of packaging, packaging environments: Factors influencing shelf life of processed foods.
		UNIT II Factors influencing shelf Life of fruits and vegetables –Respiratory Metabolism - Controlled Atmosphere Packaging Technology (CAP) – Modified Atmosphere - Packaging Technology (MAP) – Advantages and disadvantages of MAP – Gases - used in MAP - Packaging laws and Regulations – SWMA Rules – PFA Rules – FPO Rules – MFPO Rules – Edible oil packaging order - AGMARK Rules - National Standards on Packaging code for foodstuffs and Perishables – Classification of food stuffs according to the BIS code – Packaging of milk and milk products - Packaging of fruits and vegetables – Meat, fish and poultry – Bakery and confectionary products – Protein rich foods - Packaging of Edible starches and starch products – Oils and Fats – Food grains - and food	**UNIT-II** **Packaging Laws and Regulations:** SWMA Rules, FSSAI Rules, PFA Rules, FPO Rules, MFPO Rules, Edible oil packaging order, AGMARK Rules. National Standards on Packagingcode for food stuffs and perishables. Classification of food stuffs according to the BIS code. Packaging of milk and milk products, fruits, vegetables, meat, fish and poultry, protein rich foods. Packaging of edible starches, oils and fats, Food grain products, sugar and honey, Alcoholic drinks, carbonated beverages and spices

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		grain products – Sugar and Honey - stimulant foods – Alcoholic drinks and carbonated beverages –Spices and Condiments	
		UNIT III Packaging materials – Classification of packages – Paper as packaging material – Paper manufacture – pulp – Mechanical pulp – Chemical pulping – Alkaline process – Soda process- Sulfate process – sulphate process – semi chemical - pulping – Digestion - Bleaching - Beating and Refining - Paper making - Converting - Calendering – Strength additives - Sizing agents - Types of paper - Kraft paper - Bleached paper - Grease proof paper – Glassine - paper - Vegetable parchment Waxed paper - Paper Boards - Paper board grades - Folding Cartons - Kinds of carton boxes – Beverage Cartons - Molded Pulp containers - Printing and varnishing - Die cutting and creasing - Gluing and sealing	**UNIT-III** **Paper Packaging:** Paper manufacture: Pulp, mechanical pulping, chemical pulping. Alkaline process, soda process, sulfate process, sulphate process, semi chemical pulping, digestion. Bleaching, beating and refining, paper making: converting, calendaring, strength additives, sizing agents. Types of paper: Kraft paper, bleached paper, grease proof paper, glassine paper, vegetable parchment paper, waxed paper. Paper boards, paper board grades, folding cartons. Kinds of carton boxes: beverage cartons, molded pulp containers. Printing and varnishing, die cutting and creasing, gluing and sealing. **Glass Packaging:** Composition of glass, Parts of glass container, Closures, Parts of closures, Types of closures, Properties of glass, Internal pressure resistance, Vertical load Strength, Resistance to impact, Resistance to scratches. Abrasion glass manufacture: Press and Blow (P&B), Narrow Neck Press and Blow (NNPB). Shape of glass, Hot and cold end treatment of surface, Inspection of Glass Bottles, advantages and disadvantages
		UNIT IV Glass as Package material - Composition of Glass - Parts of Glass container - Closures - Parts of Closures - Types of Closures - Properties of glass – Internal pressure resistance - Vertical load Strength- Resistance to impact - Resistance to Scratches and Abrasions Glass manufacture - Press and Blow (P&B) - Narrow Neck Press and Blow (NNPB) - Shape of glass Container Improvements in glass manufacturing - Hot and Cold end treatment of surface – Inspection of Glass Bottles - Advantages and	**UNIT-IV** **Metal Packaging:** Introduction, Manufacture of tin plate, Manufacture of aluminium, Advantages and disadvantages. Container making processes, end manufacture, three piece can manufacture, welded side seams, soldered side seams, double seaming, Two piece can manufacture, D&I cans, DRD cans, protective and decorative coatings, aluminium foils and containers. **Plastic Packaging:** Plastic consumption in India and world,

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		Disadvantages Metal as Packaging material -Introduction - Manufacture of Tin Plate - Tin plating Manufacture of ECCS- Manufacture of Aluminium - Advantages and Disadvantages	plastic packaging material, classification of plastics, advantages and disadvantages. Polyethylene: Low density polyethylene, linear low density polyethylene, high density polyethylene, polypropylene, polystyrene, polycarbonate, polyvinyl chloride, polyvinyl chloride, ethylene vinyl alcohol, polyethylene terephthalate
		UNIT V Container Making Processes - End Manufacture - Three Piece Can Manufacture - Welded Side seams - Soldered Side seams - Double Seaming - Two Piece Can Manufacture D&I Cans - DRD Cans - Protective and Decorative coatings - Aluminium foils and Containers - Tube - Retort Pouch Plastic Consumption in India and World - Plastic packaging material - Classification of Plastics – Advantages and disadvantages Polyethylene - Low Density Polyethylene - Linear Low Density Polyethylene - High Density Polyethylene - Polypropylene - Polystyrene - Polycarbonate – Polyvinyl Chloride – Polyvinylidene Chloride – Ethylenvinyl Alcohol-Polyethylene terephthalate Coating - Laminating - Coating process – Laminating Processes. **UNIT VI** Aseptic Packaging –Introduction – Specific fields of application – Reasons for use of Aseptic Packaging – Historical development – Principles of sterilization – Sterilization processes Aseptic packaging system – Carton, Can, Bottle, Sachet and Pouch, Cup systems Horizontal form fill sealing machine Machineries used in Food Packaging –Twist wrapping – Bread wrapping- Horizontal form fill sealing machine - Sequence of operations of a basic twin web machine - Sequence of operations of a basic single web machine - Packaging of Biscuits, , Milk Powder, Coffee - Carbonated soft drink- Fried Snack Foods Package	**UNIT-V** Innovations in packaging: Controlled atmosphere packaging technology (cap), modified atmosphere packaging technology (MAP), advantages and disadvantages of MAP. Laminating coating process, laminating processes. Smart packaging, aseptic packaging: Specific fields of application, reasons for use of aseptic packaging, advantages of aseptic packaging. Machineries used in foodpackaging: Twist wrapping, bread wrapping and horizontal form fill sealing machine. Packaging of biscuits, milk powder, coffee, carbonated drink, fried snack foods. Testing of packaging material: Thickness, density, basis weight, grammage, burst strength, tear resistance, tensile strength, grease resistance, gas transmission rate (GTR), water vapour transmission rate (WVTR)

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		Testing - Thickness – Paper density - Basis weight – Grammage - Burst Strength - Tear Resistance - Tensile Strength - Grease Resistance – Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR)	

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8	Regulation	Pre-Revision	Post-Revision
	Course Title	Farm Machinery Lab – II	Farm Machinery Lab – II
	Course Code	R1641357	171AG7L06
	Syllabus	1. To study the various types of mowers, constructional details, materials and working. 2. To practice the alignment and registration of mower. 3. To study the various types of reaper, constructional details, materials used, working and performance 4. To measure the different losses in thresher and threshing efficiency of a thresher. 5. To study about the various types of chaff cutters and their capacity. 6. To study about constructional details, materials used and working of potato harvesters. 7. To study about constructional details, materials used and working of groundnut harvesters 8. To study the various types of cotton strippers, constructional details, materials used and working 9. To study about safety rules for operating the harvesters, threshers and combiners based on IS standards. 10. To study about different horticultural tools. 11. To visit the machinery production industry and ICAR SAU'S Research Station	1. To study the various farm machinery and equipment in the contest of enhanced production, multiple cropping, labour scarcity etc. 2. To visit the machinery production industry and ICAR SAU'S Research Station. 3. To practice the alignment and registration of mower. 4. To measure the various grain losses in a harvester. 5. To practice the various threshing methods. 6. To measure the threshing efficiency of a thresher. 7. To practice the hay/silage making. 8. To study about the various types of chaff cutters and their capacity. 9. To study about constructional details, materials used and working of potato harvesters. 10. To study about constructional details, materials used and working of groundnut harvesters 11. To study about safety rules for operating the harvesters, threshers and combiners based on IS standards. 12. To study about different horticultural tools and gadgets. **LIST OF AUGMENTED EXPERIMENTS** (Any two of the following experiments can be performed) 13. To study the various types of mowers, constructional details, materials and working. 14. To study the various types of reaper, constructional details, materials used, working and performance. 15. To study the various types of reaper binder, constructional details, materials used and

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			working. 16. To study the various types of forage harvesters, constructional details, materials usedand working. 17. To study the various types of sugarcane harvesters, constructional details, materialsused and working. 18. To study the various types of cotton strippers, constructional details, materials used and working.

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9	Regulation	Pre-Revision	Post-Revision
	Course Title	Dairy and Food Engineering Lab	Dairy and Food Engineering Lab
	Course Code	R1641358	171AG7L06
	Syllabus	1. To study composite pilot milk processing plant &equipments 2. To study various parts of Pasteurizer and its working 3. To study various parts of Sterilizer and its working 4. To study various parts of Homogenizer and its working 5. To study various parts of Cream Separator and its working 6. To study various parts of Butter Churner and its working 7. To study various parts of Evaporator and its working 8. To study various parts of milk dyer and its working 9. To study various parts of freezer and its working 10. Design and layout of dairy plant 11. To determine various physical properties of Food Products 12. To estimate steam requirement for various operations in dairy plant 13. Visit to food industry/ dairy plant	1. To study the physical properties of fresh milk and processed milk. 2. To study various parts of Pasteurizer and its working. 3. To study various parts of Sterilizer and its working. 4. To study various parts of Homogenizer and its working. 5. To study various parts of Cream Separator and its working. 6. To study various parts of Butter Churner and its working 7. To study various parts of Evaporator and its working 8. To study various parts of spray dyer and its working 9. To study various parts of freezer and itsworking 10. To analyze the microbial population of milk based products. 11. To design and layout of dairy plant. 12. To Visit to food industry/ dairy plant
			LIST OF AUGMENTED EXPERIMENTS (Any two of the following experiments can be performed) 13. To estimate steam requirement for various operations in dairy plant. 14. To study the applications of ultra-filtration in milk processing. 15. To study the working of packaging of milk. 16. To study composite milk processing plant & equipment's.

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10	Regulation	Pre-Revision	Post-Revision
	Course Title	Design of Agricultural Machinery	Design of Agricultural Machinery
	Course Code	R1642351	171AG8E17
		Unit-I: Machine Design – Definition, Classification of machine design, General considerations in machine design, General procedure in machine design. Fundamental units, Mass and Weight, inertia, laws of motion, force, moment of force, couple mass density, torque, work, power and energy. Simple stress in machine parts – Introduction, load, stress, strain, tensile stress and strain, compressive stress and strain, Young's modulus, shear stress and strain, shear modulus, bearing stress.	**UNIT-I** **Introduction to Machine Design**: Definition, classification and general considerations in machine design, general procedure in machine design. Simple stress in machine parts – tensile, compressive, bending and shear stress. Stress - strain diagram, working stress, factor of safety, stresses in composite bars, thermal stress. Principal stresses and principal planes. Theories of failure under static load - Rankine's theory, Guest's theory and maximum distortion theory. Stress concentration and notch sensitivity.
	Syllabus	**Unit-II:** Stress strain diagram, working stress, Factor of safety and selection, stresses in composite bars, thermal stress, linear and lateral strain, Poisson's ratio, volumetric strain, bulk modulus and relations, impact stress, resilience. Principal stresses and principal planes – Theories of failure under static load, Rankine's theory, Guest's theory, maximum distortion theory, stress concentration, notch sensitivity - Important terms used in Limit System, fits, types of cotter joints, design of socket and spigot cotter joint. Knuckle joint, Dimensions of various parts of knuckles joint, methods of failure of knuckle joint, design procedure of knuckle joint	**UNIT – II** **Cotter joint**: Types of cotter joints, design of socket and spigot cotter joint. **Knuckle joint:** Dimensions of various parts of knuckles joint, methods of failure of knucklejoint, design procedure of knuckle joint. **Levers**: Introduction, application of levers in engineering practice, design of levers - hand lever, foot lever and cranked lever. **Springs**: Introduction, terminology, types of springs, material for helical springs, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.
		Unit-III: Levers – Introduction, application of levers in engineering practice, design of lever hand levers, foot lever, cranked lever. Springs –	**UNIT – III** **Shafts:** Material used for shafts, types and sizes of shafts. Design of shafts based on axial, bending, twisting, combined bending and

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		Introduction, types of springs, material for helical springs, spring wire, terminology, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs	twisting, buckling and fluctuating loads. Design of shafts on the basis of deflection and rigidity. **Keys and couplings**: Introduction, types of keys - sunk key, saddle key, tangent key, round key and splines. Forces acting on sunk key. Effect of key ways. Shaft couplings – definition and types, muff coupling, design of flange coupling.
		Unit-IV: Shafts – Material used for shafts, types and sizes of shafts, stresses in shafts, maximum working stresses. Design of shafts, for twisting moment, bending moments, fluctuating loads, axial load in addition to combined twisting and bending loads, design of shafts on the basis of rigidity. Keys and coupling – Introduction, types of keys, sunk keys, saddle keys, tangent keys, round keys, splines, forces acting on sunk keys, strength of sunk key. Effect of key ways, shaft couplings, types of shaft couplings, muff coupling, design of flange coupling	**UNIT – IV** **Fly wheel**: Introduction, coefficient of fluctuation of speed, fluctuation of energy, maximum fluctuation of energy, energy stored in a flywheel, design of flywheel. **Bearing**: Introduction, classification of bearing, types of sliding contact bearings, rolling contact bearings, radial ball bearings, advantages and disadvantages of rolling contact bearing over sliding contact bearings. Standard dimensions and designations of ball bearings, basic static load rating of rolling contact bearings, life of a bearing. Basic dynamic load rating of rolling contact bearings, dynamic load rating for rolling contact bearings under variable loads, reliability ofbearing.
		Unit-V: Design of Machinery: Design of Tillage equipment –a. Cultivator (Manually Drawn and Power Operated); b. Rotavator (Power Operated); c. M.B Plough (Manually Drawn and Power Operated). Design of Sowing Machinery – Tractor Operated seed cum Fertilize drill **Unit-VI:** Design of harvesting equipment: a. Reaper, b. Mower. Design of Thresher: Power operated thresher (Spike tooth and Raspbar), Design of spraying equipment – Tractor mounted Boom sprayer	UNIT – V **Design of Machinery: Design of agricultural machinery - cultivator, rotavator, tractor operatedseed cum fertilizer drill, tractor mounted boom sprayer, harvesting and threshing equipment**

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11	Regulation	Pre-Revision	Post-Revision
	Course Title	Industrial Pollution Control Engineering	Industrial Pollution Control Engineering
	Course Code	R163235D	171AG8O02
	Syllabus	UNIT-I: Types of emissions from Chemical industries and Effects of environment, Environment legislation, Type of pollution and their sources, Effluent guidelines and standards	**UNIT-I** **Introduction:** Industrial pollution: definition, Type of pollution and their sources, Environment legislation, Environmental Laws and rules, standards for ambient air, noise emission and effluents.
		UNIT-II: Characterization of effluent streams, Oxygen demands and their determination (BOD, COD, and TOC), Oxygen sag curve, BOD curve mathematical, Controlling of BOD curve, Self- purification of running streams, Sources and characteristics of pollutants in fertilizer, paper and pulp industry, petroleum and petroleum industry	**UNIT-II** **Water quality monitoring:** Characterization of effluent streams, Oxygen demands and their determination (alkalinity, BOD, COD, and TOC), BOD curve mathematical, Controlling of BOD curve, Oxygen sag curve, Self-purification of running streams, Sources and characteristics of pollutants in fertilizer, paper and pulp industry, petroleum and petroleum industry
		UNIT-III: Methods of Primary treatments: Screening, Sedimentation, Flotation, Neutralization, and methods of tertiary treatment. Brief studies of Carbon absorption, Ion exchange, Reverse osmosis, Ultra filtration, Chlorination, Ozonation, treatment and disposal	**UNIT-III** **Water Pollution Control:** Introduction to waste water treatment, Methods of waste water treatment. **Primary/physical treatments:** pre-treatment, solids removal by Setting, Screening, Sedimentation, Flotation, Neutralization, filtration centrifugation, coagulation and flocculation. **Secondary/Biological Treatment:** Anaerobic and aerobic treatment, biochemical kinetics, Aerobic processes- Suspended growth processes, Activated aerated lagoons and stabilization of ponds, Attached growth processes, Trickling filters, Rotary drum filters, and Anaerobic processes
		UNIT-IV: Introduction to waste water	**UNIT IV**

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		treatment, Biological treatment of wastewater, Bacterial and bacterial growth curve, Aerobic processes, Suspended growth processes, Activated aerated	**Tertiary/chemical treatment**: Carbon absorption, Ion exchange, Reverse osmosis, Ultra filtration, Chlorination, Ozonation. **Solids Disposal:** Solids waste disposal - composting, landfill, briquetting / gasification and incineration
	•	UNIT-V: Air pollution sampling and measurement: Types of pollutant and sampling and measurement, ambient air sampling: Collection of gaseous air pollutants, Collection of particulate air pollutants. Stack sampling: Sampling system, Particulate sampling, and gaseous sampling. UNIT-VI: Air pollution control methods and equipments: Source collection methods: raw material changes, process changes, and equipment modification. Cleaning of gaseous equipments particulate emission control: Collection efficiency, Control equipment like gravitational settling chambers, Cyclone separators, fabric filters, ESP. Scrubbers and absorption equipment	**UNIT-V** **Air pollution sampling and measurements:** Air pollution sampling and measurement: Types of pollutants and sampling and measurement, ambient air sampling: Collection of gaseous air pollutants, Collection of particulate air pollutants. Stack sampling: Sampling system, Particulate sampling, and gaseous sampling. Collection efficiency **Source correction methods**: raw material changes, process changes, and equipment modification. Pollution control equipment: **particulate emission control-gravitational settling chambers, Cyclone separators, fabric filters, ESP, Scrubbers. Gaseous emission control -wet and dry absorption methods**

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12	**Regulation**	**Pre-Revision**	**Post-Revision**
	Course Title	Operations research	Operations research
	Course Code	R1642351	171CS8O04
	Syllabus	UNIT-I: **Introduction:** Development – Definition– Characteristics and Phases – Types of operation Research models – applications. **Allocation:** Linear Programming - Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques - Two–phase method, Big-M method – Duality Principle	**UNIT I** **Introduction:** Definition and scope of operations research, phases of operations research -mathematical formulation of the problem, graphical solution. **Linear ProgrammingProblem**: Standard Form of LPP, basic feasible solutions, unrestricted variables, simplex algorithm, artificial variables, big m method, two phase simplex method, degeneracy, alternative optimal, unbounded solutions, infeasible solutions, primal and dual problems and their relations, dual simplexmethod
		UNIT – II **Transportation Problem**: Formulation – Optimal solution – unbalanced transportation problem – Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem	**UNIT-II** **Transportation Problem:** Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model **Assignment Problem:** Hungarian method, optimal solution,unbalanced assignment matrix. Flight scheduling problems, Travelingsalesman problem **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-III **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** **Job Sequencing:** Sequencing Problems, Johnson's method for N-Jobs 2-Machine Problem, N- Jobs K- Machines Problem, Two-Jobs M- Machines

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		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.	Problem. **Inventory Control**: Inventory, factors effecting inventory, EOQ, ABC and VED analysis, inventory problems with and without shortages, price breakups, multi item deterministic problems. Probabilistic inventory problems
		UNIT-IV: **Theory Of Games:** Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – dominance principle – m X 2 & 2 X n games -graphical method	**UNIT IV** **Queuing Theory:** Queuing systems and their characteristics. M/M/1: FCFS/ / M/M/2: FCFS/,M/M/1: FCFS/ /N queuing models. **Theory of games:** Introduction, Rectangular two person zero person games, solution of rectangular games in terms of mixed strategies , solution of 2x2 games without saddle points, concept of dominance to reduce the given matrix , graphical method for 2xn and nx2games
		UNIT – V **Inventory:** Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochasticmodels – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost- Single period model. UNIT – VI **Dynamic Programming:** Introduction –Terminology- Bellman's Principle of optimality – Applications of dynamic programming- 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 – Brief Introduction of Simulation Languages	**UNIT V** **Dynamic Programming**: Introduction Bellman's principle of optimality – applications of DP- Capital budgeting problem – Shortest path problem. **Simulation:** Definition and applications- Monte Carlo simulation- Random numbers and random number generation- Application problems in queuing and inventory

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Program Name : M.Tech. in Structural Engineering

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	192ST1T01	Theory of Elasticity	0
2	I	192ST1T02	Structural dynamics	0
3	I	192ST1T03	Advanced Concrete Technology	0
4	I	1925T1E03	Design of RCC Foundations	0
5	I	1925T1E01	Matrix Analysis of Structures	0
6	I	1925T1E02	Analytical & Numerical Method for Structural Engineering	0
7	I	1925T1E05	Repair & Rehabilitation of Structures	0
8	I	1925T1E04	Bridge Engineering	0
9	I	1925T1E06	Advanced Reinofced Concrete Design	0
10	I	1925T1L01	Advanced Concrete Technology Laboratory	0
11	I	1925T1L02	Advanced Structural Engineering Laboratory	0
12	II	192ST2T04	Finite Element Methods in Structural Engineering	0
13	II	192ST2T05	Theory of Plates and Shells	0
14	II	1925T2E07	Stability of Structures	0
15	II	1925T2E08	Advanced Steel Design	0
16	II	1925T2E09	Analysis of offshore Structures	0
17	II	1925T2E10	Earthquake Restant Design of Buildings	0
18	II	1925T2E11	Precast and Prefabricated Structures	0
19	II	1925T2E12	Earth Retaining Structures	0
20	II	192ST2L03	Computer Aided Design Laboratory	0
21	II	192ST2L04	Structural Design Laboratory	0

22	II	192ST2P01	Mini Project With Seminar	0
23	I/II	C1A01/192MC2	English for Research Paper Writing	0
24	I/II	C1A02/192MC2	Disaster Management	0
25	I/II	C1A03/192MC2	Sanskrit for Technical Knowledge	0
26	I/II	C1A04/192MC2	Value Education	0
27	I/II	C1A05/192MC2	Constitution of India	0
28	I/II	C1A06/192MC2	Pedagogy Studies	0
29	I/II	C1A07/192MC2	Stress Management by Yoga	0
30	I/II	C1A08/192MC2	Personality Development through Life Enlightenment Skills	0
31	I/II	C1A09/192MC2	Soft Skills	0
32	3	192ST3E13	Design of Pre-stressed Concrete structures	33
33	3	192ST3E14	Structural Health Monitoring	100
34	3	192ST3E15	Industrial Structures	0
35	3	19STMOOC1	MOOCS-I*	100
36	3	---	MOOCs-II #	100
37	3	192PD3O01	Renewable Energy Technologies	100
38	3	192PD3O02	Hybrid Electric Vehicles	100
39	3	192PD3O03	Energy Audit and conservation Management	100
40	3	192PD3O04	Neural Networks and Fuzzy Logic	100
41	3	192PD3O05	Industrial Safety	100
42	3	192PD3O06	Composite Materials	100
43	3	192TE3O01	Energy Systems	100
44	3	192TE3O02	Fuels and Combustion	100
45	3	192TE3O04	IC Engines	100
46	3	192TE3O05	Automotive Technology	100
47	3	192ES3O01	Embedded System Design	100
48	3	192ES3O02	Digital System Design	100

49	3	192ES3O03	Programming Languages for Embedded Systems	100
50	3	192ES3O04	Sensors & Actuators	100
51	3	192VD3O01	Physical Design Automation	100
52	3	192VD3O02	VLSI Technology	100
53	3	192VD3O03	Nano-electronics	100
54	3	192CS3O01	Python Programming (CSE)	100
55	3	192CS3O02	Principles of Cyber Security	100
56	3	192CS3O03	Internet of Things	100
57	3	192CS3O04	Machine Learning	100
58	3	192CS3O05	Artificial Intelligence	100
59	3	192CS3O06	Deep Learning	100
60	3	192PE3O01	Introduction to Petroleum Engineering	100
61	3	192PE3O02	Process Intensification	100
62	3	192PE3O03	Fundamentals of Liquified Natural Gas	100
63	3	192PE3O04	Subsea Engineering	100
64	3	192PE3O06	HSE in Petroleum Industry	100
65	3	192ST3P02	Dissertation-I/ Industrial Project	100
66	4	192ST4P03	Dissertation – II	0
Total number of courses in the academic year 2020-2021				= 66
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				= 32
Percentage of syllabus revision carried out in the academic year 2020-2021 = (32/66)*100				= 48.08%

Program Coordinator

Head of the Department

Head of the Department
Dept. of Civil Engineering
ADITYA ENGINEERING COLLEGE (A)

2020-21

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	
192ST1T01	Theory of Elasticity	PCC	3	0	0	3	3
192ST1T02	Structural Dynamics	PCC	3	0	0	3	3
192ST1T03	Advanced Concrete Technology	PCC	2	0	0	2	2
---	Professional Elective-1	PEC	3	0	0	3	3
---	Professional Elective-2	PEC	3	0	0	3	3
192ST1L01	Advanced Concrete Technology Laboratory	PCC	2	0	4	6	2
192ST1L02	Advanced Structural Engineering Laboratory	PCC	0	0	4	4	2
---	Audit Course-1	MC	2	0	0	0	0
		TOTAL	**18**	**0**	**8**	**24**	**18**

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	
192ST2T04	Finite Element Methods in Structural Engineering	PCC	3	0	0	3	3
192ST2T05	Theory of Plates and Shells	PCC	3	0	0	3	3
---	Professional Elective-III	PEC	3	0	0	3	3
---	Professional Elective-IV	PEC	3	0	0	3	3
192ST2L03	Computer Aided Design Laboratory	PCC	0	0	4	4	2
192ST2L04	Structural Design laboratory	PCC	0	0	4	4	2
192ST2P01	Mini Project With Seminar	PROJ	0	0	4	4	2
---	Audit Course-2	MC	2	0	0	2	0
		TOTAL	**14**	**0**	**12**	**26**	**18**

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	
---	Professional Elective-V	PEC	3	0	0	3	3
---	Open Elective	OEC	3	0	0	3	3
192ST3P02	Dissertation-I/ Industrial Project	PROJ	0	0	20	20	0
		TOTAL	**6**	**2**	**20**	**26**	**6**

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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	
192ST4P03	Dissertation – II	PROJ	0	0	32	32	26
		TOTAL	0	0	32	32	26

BSC: Basic Sciences Courses; HSMC: Humanities and Social Sciences including Management Courses; PCC: Professional Core Courses; PEC: Professional Elective Courses; OEC: Open Elective Courses; MC: Mandatory Courses; PROJ: Project.

Audit Course-1 & Audit Course-2 has to be chosen from the following list of courses.

S.No	Course Code		Name of the Course
	I Semester	II Semester	
01	192MC1A01	192MC2A01	English for Research Paper Writing
02	192MC1A02	192MC2A02	Disaster Management
03	192MC1A03	192MC2A03	Sanskrit for Technical Knowledge
04	192MC1A04	192MC2A04	Value Education
05	192MC1A05	192MC2A05	Constitution of India
06	192MC1A06	192MC2A06	Pedagogy Studies
07	192MC1A07	192MC2A07	Stress Management by Yoga
08	192MC1A08	192MC2A08	Personality Development through Life Enlightenment Skills
09	192MC1A09	192MC2A09	Soft Skills

Professional Elective – I (I Semester)

S.No	Course Code	Name of the Course
1	192ST1E01	Matrix Analysis of Structures
2	192ST1E02	Analytical & Numerical Meth for Structural Engineering
3	192ST1E03	Design of RCC Foundations

Professional Elective – II (I Semester)

S.No	Course Code	Name of the Course
1	192ST1E04	Bridge Engineering
2	192ST1E05	Repair and Rehabilitation of Structures
3	192ST1E06	Advanced Reinforced Concrete Design

Professional Elective – III (II Semester)

S.No	Course Code	Name of the Course
1	192ST2E07	Stability of Structures
2	192ST2E08	Advanced Steel Design
3	192ST2E09	Analysis of Offshore Structures

Professional Elective – IV (II Semester)

S.No	Course Code	Name of the Course
1	192ST2E10	Earthquake Resistant Design of Buildings
2	192ST2E11	Precast and Prefabricated Structures
3	192ST2E12	Earth Retaining Structures

Professional Elective – V (III Semester)

S.No	Course Code	Name of the Course
1	192ST3E13	Design of Pre-stressed Concrete structures
2	192ST3E14	Structural Health Monitoring
3	192ST3E15	Industrial Structures
4	19STMOOC1	MOOCS-I*

Open Elective (III Semester)

S.No	Course Code	Name of the Course
1	---	MOOCs-II #
2	---	Courses offered by other departments in the college

***MOOCS- I:** A student should select a 12 weeks course which is not opted/ studied earlier.

 # MOOCS- II: A student should select a 12 weeks course in Engineering/ Management/ Mathematics offered by other than parent department.

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Open Elective – Courses offered by Departments

S. No	Course Code	Name of the Course	Not offered to the students of the following M. Tech Specializations	Offered by Dept.
1.	192ST3O01	Repair & Rehabilitation of Structures	ST	CE
2.	192ST3O02	Green Building Systems	ST	CE
3.	192ST3O03	Basic Concrete Technology	ST	CE
4.	192ST3O04	Basic Foundation Engineering	ST	CE
5.	192PD3O01	Renewable Energy Technologies	PED	EEE
6.	192PD3O02	Hybrid Electric Vehicles	PED	EEE
7.	192PD3O03	Energy Audit and conservation Management	PED	EEE
8.	192PD3O04	Neural Networks and Fuzzy Logic	PED	EEE
9.	192PD3O05	Industrial Safety	PED	EEE
10.	192PD3O06	Composite Materials	PED	EEE
11.	192TE3O01	Energy Systems	TE	ME
12.	192TE3O02	Fuels and Combustion	TE	ME
13.	192TE3O03	Green Engineering Technology	ST, TE	ME
14.	192TE3O04	IC Engines	TE	ME
15.	192TE3O05	Automotive Technology	TE	ME
16.	192ES3O01	Embedded System Design	ES	ECE
17.	192ES3O02	Digital System Design	VLSID	ECE
18.	192ES3O03	Programming Languages for Embedded Systems	ES	ECE
19.	192ES3O04	Sensors & Actuators	ES	ECE
20.	192VD3O01	Physical Design Automation	VLSID	ECE
21.	192VD3O02	VLSI Technology	VLSID	ECE
22.	192VD3O03	Nano-electronics	VLSID	ECE
23.	192CS3O01	Python Programming (CSE)	CSE, SE	CSE
24.	192CS3O02	Principles of Cyber Security	CSE	CSE
25.	192CS3O03	Internet of Things	CSE, SE	CSE
26.	192CS3O04	Machine Learning	CSE, SE	CSE
27.	192CS3O05	Artificial Intelligence	SE	IT
28.	192CS3O06	Deep Learning	CSE, SE	IT
29.	192PE3O01	Introduction to Petroleum Engineering	PE	PT
30.	192PE3O02	Process Intensification	PE	PT
31.	192PE3O03	Fundamentals of Liquified Natural Gas	PE	PT
32.	192PE3O04	Subsea Engineering	PE	PT
33.	192PE3O05	Geology	PE, ST	PT
34.	192PE3O06	HSE in Petroleum Industry	PE	PT

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DESIGN OF PRE-STRESSED CONCRETE MEMBERS
(ELECTIVE – V)

III Semester **L T P C**
Course Code: 192ST3E13 **3 0 0 3**

Course Objectives:

- COB 1: To impart knowledge on pre stressing systems with their losses and stresses.
- COB 2: To equip the students to formulate various deflections in pre-stressed concrete members
- COB 3: To make the students with necessary knowledge on composite constructions.
- COB 4: To enable the students to learn the prestressed members of slabs and pipes.
- COB 5: To introduce the various theories on beams and end blocks.

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

- CO 1: Explain the principle, types and systems of prestressing and analyze the losses.
- CO 2: Determine the deflections as per code references in pre-stressed concrete members.
- CO 3: Analyze the Composite construction of Pre-stressed members.
- CO 4: Design the pre-stressed concrete members of slabs, pipes and poles.
- CO 5: Analyze the continuous beams and end blocks by different theorems

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	-	1	-	-	-	-	-	-	-	-
CO2 (K3)	1	-	1	-	-	-	-	-	-	-	-
CO3 (K4)	2	3	2	-	-	-	1	-	-	-	-
CO4 (K4)	2	3	2	-	-	-	1	-	-	-	-
CO5 (K4)	2	3	2	-	-	-	1	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1(K4)	PSO 2(K6)	PSO 3(K3)
CO1 (K3)	2	-	-
CO2 (K3)	2	-	-
CO3 (K4)	3	1	3
CO4 (K4)	3	1	3
CO5 (K4)	3	1	3

UNIT-I
Introduction – Prestressing Systems – Pretensioning Systems – Postensioning Systems – High Strength Steel and Concrete - Analysis of Prestress - Resultant Stresses at a Section – Pressure Line or Thrust Line – Concept of Load Balancing - Losses of Prestress – Loss Due to Elastic Deformation of Concrete – Shrinkage of Concrete – Creep – Relaxation of Stress in Steel – Friction – Anchorage Slip.

UNIT-II

Deflections Of Prestressed Concrete Members : Importance of Control of Deflections – Factors Influencing Deflection – Short-term Deflections of Uncracked Members – Prediction of Long-time Deflections – Deflections of Cracked Members – Requirements of IS 1343-2012.

UNIT –III

Composite Constructions: Introduction, Advantages, Types of Composite Construction, Analysis of Composite beams- Differential shrinkage- Ultimate Flexural and shear strength of composite sections- Deflection of Composite Beams. Design of Composite sections.

UNIT-IV

Prestressed Concrete Slabs: Types Of Prestressed Concrete Floor Slabs- Design of Prestressed Concrete One Way and Two-Way Slabs.

Prestressed Concrete Pipes and Poles : Circular prestressing- Types of Prestressed Concrete Pipes- Design of Prestressed Concrete Pipes - Prestressed Concrete Poles.

UNIT-V

Continuous Beams: Advantage of Continuous Members – Effect of Prestressing Indeterminate Structures – Methods of Achieving Continuity – Methods of Analysis of Secondary Moments – Concordant Cable Profile – Guyon's Theorem. Redistribution of moments in a continuous beam.

Anchorage Zone Stresses in Beams : Introduction, Stress distribution in End Block – Anchorage zone stresses –Magnel's method- Guyon's Method - Anchorage zone Reinforcement.

Text Books:

1. Prestressed Concrete, 6e by N. Krishna Raju, Mc Graw Hill Publishers.
2. Prestressed Concrete by K. U.Muthu, PHI Learning Pvt Limited.

Reference Books:

1. Prestressed Concrete Analysis and Design, Antone E. Naaman 2e, Techno Press 3000.
2. Design of Prestressed Concrete- T. Y. Lin, Ned H. Burns 3e, Wiley Publications.
3. Design of prestressed Concrete by E.G. Nawy.
4. Prestressed Concrete by N. Rajagopalan, Narosa Publishing.
5. IS1343 2012 Prestressed concrete Code of Practice.

eb Links:

1. http://icivil-hu.com/Civil-team/5th/prestressed/Dr.%20 Hazim%20 Slides/ Lecture %202.1% 20-%20Methods%20of%20Prestressing.pdf
2. http://www.velhightech.com/Documents/CE6702-PSC-notes-wecompress.com.pdf
3. https://web.itu.edu.tr/~haluk/COMPOSITE%201.pdf
4. https://theconstructor.org/concrete/prestressed-concrete-pipes-types/7174/
5. http://ocw.utm.my/pluginfile.php/1381/mod_resource/content/0/pdfs/SAB4323_OCWTopic_9.pdf

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Department of Civil Engineering

Syllabus revision Index for the Academic Year 2020-2021 M.Tech Structural Engineering

S.No	Name of the course	Percentage of syllabus change
1	Design of Prestressed Concrete Structures 192ST3E13	33.4

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Department of Civil Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	PRE-STRESSED CONCRETE	Design of Prestressed Concrete Structures
Course Code	172SE2E07	192ST3E13
Syllabus	UNIT-I Introduction General principles of Pre-stressing- Pre-tensioning and Post tensioning - Pre tensioning and Post tensioning methods- Different systems of Pre-stressing- Analysis of prestress and Bending stresses– Resultant– stress at a section – pressure line – concept of load balancing – stresses in tendons	UNIT-I Introduction – Prestressing Systems – Pre-tensioning Systems – Post-tensioning Systems – High Strength Steel and Concrete - Analysis of Prestress - Resultant Stresses at a Section – Pressure Line or Thrust Line – Concept of Load Balancing - Losses of Prestress – Loss Due to Elastic Deformation of Concrete – Shrinkage of Concrete – Creep – Relaxation of Stress in Steel – Friction – Anchorage Slip.
	UNIT-II Losses of Pre-stressing Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage-bending of members and frictional losses- Long term losses	UNIT-II Deflections Of Prestressed Concrete Members : Importance of Control of Deflections – Factors Influencing Deflection – Short-term Deflections of Uncracked Members – Prediction of Long-time Deflections – Deflections of Cracked Members – Requirements of IS 1343-2012.
	UNIT –III Flexural, Shear, Torsional Resistance and Design of Prestressed Concrete Section Types of flexural failure – code procedures-shear and principal stresses – Prestressed concrete members in torsion – Design of sections for flexure, Axial Tension, Compression and bending, shear, Bond.	UNIT –III Composite Constructions: Introduction, Advantages, Types of Composite Construction, Analysis of Composite beams- Differential shrinkage- Ultimate Flexural and shear strength of composite sections- Deflection of Composite Beams. Design of Composite sections

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	UNIT-IV Analysis of Continuous Beams Elastic theory- Linear transformation and concordant tendons- Deflections of prestressed concrete beams: Importance of control of deflections- factors influencing deflections-short term deflections of un-cracked member – prediction of long term deflections.	UNIT-IV Prestressed Concrete Slabs: Types Of Prestressed Concrete Floor Slabs- Design of Prestressed Concrete One Way and Two-Way Slabs. Prestressed Concrete Pipes and Poles : Circular prestressing- Types of Prestressed Concrete Pipes- Design of Prestressed Concrete Pipes - Prestressed Concrete Poles.
.	UNIT-V Analysis of End Blocks By Guyon's method and Magnel's method, Anchorage zone stresses- Approximate method of design- anchorage zone reinforcement- transfer of pre stresses- pre tensioned members-Composite sections: Introduction-Analysis for stressesdifferential shrinkage- generaldesignconsiderations	UNIT-V Continuous Beams: Advantage of Continuous Members – Effect of Prestressing Indeterminate Structures – Methods of Achieving Continuity – Methods of Analysis of Secondary Moments – Concordant Cable Profile – Guyon's Theorem. Redistribution of moments in a continuous beam. Anchorage Zone Stresses in Beams : Introduction, Stress distribution in End Block – Anchorage zone stresses –Magnel's method- Guyon's Method - Anchorage zone Reinforcement

Signature of the course coordinator

Signature of the HOD

Head of the Department
Dept. of Civil Engineering
ADITYA ENGINEERING COLLEGE (A9)

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Program Name : M.Tech. in Thermal Engineering

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	I	192TE1T01	Advanced Fluid Mechanics	0
2	I	192TE1T02	Computational Fluid Dynamics	0
3	I	192TE1E01	Advanced IC Engines, Electric and Hybrid Vehicles	0
4	I	192TE1E02	Gas Dynamics	0
5	I	192TE1E03	Cryogenic Engineering	0
6	I	192TE1E04	Advanced Thermodynamics	0
7	I	192TE1E05	Gas Turbines	0
8	I	192TE1E06	Alternative Fuel Technologies	0
9	I	192TE1E07	Energy Conservation and Management	0
10	I	192TE1E08	Theory And Technology of Fuel Cells	0
11	I	192HS1T01	Research Methodology And IPR	0
12	I	192TE1L01	Computational Fluid Dynamics Lab-I	0
13	I	19TE1L02	Thermal Engineering Lab -1	0
14	I	192MC1A01/192MC2A01	English for Research Paper Writing	0
15	I	192MC1A02/192MC2A02	Disaster Management	0
16	I	192MC1A03/192MC2A03	Sanskrit for Technical Knowledge	0
17	I	192MC1A04/192MC2A04	Value Education	0
18	I	192MC1A05/192MC2A05	Constitution of India	0
19	I	192MC1A06/192MC2A06	Pedagogy Studies	0
20	I	192MC1A07/192MC2A07	Stress Management By YOGA	0
21	I	192MC1A08/192MC2A08	Personality Development Through Life Enlightment Skills	0
22	I	192MC1A09/192MC2A09	Soft Skills	0
23	II	192TE2T03	Advanced Heat Transfer	0
24	II	192TE2T04	Thermal Measurements and Process Controls	0
25	II	192TE2E09	Equipment Design for Thermal Systems	0
26	II	192TE2E10	Solar Energy Technologies	0
27	II	192TE2E11	Advanced Power Plant Engineering	0
28	II	192TE2E12	Combustion, Emissions and Environment	0
29	II	192TE2E13	Jet Propulsion and Rocket Engineering	0
30	II	192TE2E14	Automotive Engineering	0
31	II	192TE2E15	Modeling and I.C. Engines	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
32	II	192TE2E16	Renewable Energy Technologies	0
33	II	192TE2L03	Computational Fluid Dynamics Lab-II	0
34	II	192TE2L04	Thermal Engineering Lab -II	0
35	II	192TE2P01	Mini Project with Seminar	0
36	III	192TE3E17	Optimization Techniques and Applications	0
37	III	192TE3E18	Design and Analysis of Experiments	100
38	III	192TE3E19	Convective Heat Transfer	0
39	III	192TE3E20	Waste to Energy	100
40	III	192ST3O01	Repair & Rehabilitation of Structures	100
41	III	192ST3O02	Green Building Systems	100
42	III	192ST3O03	Basic Concrete Technology	100
43	III	192ST3O04	Basic Foundation Engineering	100
44	III	192PD3O01	Renewable Energy Technologies	100
45	III	192PD3O02	Hybrid Electric Vehicles	100
46	III	192PD3O03	Energy Audit and Conservation Management	100
47	III	192PD3O04	Neural Networks and Fuzzy Logic	100
48	III	192PD3O05	Industrial Safety	100
49	III	192PD3O06	Composite Materials	100
50	III	192ES3O01	Embedded System Design	100
51	III	192ES3O02	Digital System Design	100
52	III	192ES3O03	Programming Languages for Embedded Systems	100
53	III	192ES3O04	Sensors & Actuators	100
54	III	192VD3O01	Physical Design Automation	100
55	III	192VD3O02	VLSI Technology	100
56	III	192VD3O03	Nano-Electronics	100
57	III	192CS3O01	Python Programming	100
58	III	192CS3O02	Principles of Cyber Security	100
59	III	192CS3O03	Internet of Things	100
60	III	192CS3O04	Machine Learning	100
61	III	192CS3O05	Artificial Intelligence	100
62	III	192CS3O06	Deep Learning	100
63	III	192PE3O01	Introduction to Petroleum Engineering	100
64	III	192PE3O02	Process Intensification	100
65	III	192PE3O03	Fundamentals of Liquefied Natural Gas	100
66	III	192PE3O04	Subsea Engineering	100
67	III	192PE3O05	Geology	100
68	III	192PE3O06	HSE In Petroleum Industry	100
69	III	192TE3P02	Dissertation I/Industrial Project	0
70	IV	192TE4P03	Dissertation II	0

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
Total number of courses in the academic year 2020-2021				70
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021				31
Percentage of syllabus revision carried out in the academic year 2020-2021 = (31/70)*100				= 44.28

Program Coordinator

Head of the Department

Head of the Department
Department of Mechanical Engineering
Aditya Engineering College (A)
SURAMPALEM-533 437

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	
192TE1T01	Advanced Fluid Mechanics	PCC	3	0	0	3	3
192TE1T02	Computational Fluid Dynamics	PCC	3	0	0	3	3
---	Professional Elective-I	PEC	3	0	0	3	3
---	Professional Elective-II	PEC	3	0	0	3	3
192HS1T01	Research Methodology and IPR	HSMC	2	0	0	2	2
192TE1L01	Computational Fluid Dynamics Lab-1	PCC	0	0	4	4	2
192TE1L02	Thermal Engineering Lab-1	PCC	0	0	4	4	2
---	Audit Course-1	MC	2	0	0	2	0
		TOTAL	**16**	**0**	**8**	**24**	**18**

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	
192TE2T03	Advanced Heat Transfer	PCC	3	0	0	3	3
192TE2T04	Thermal Measurement and Process Controls	PCC	3	0	0	3	3
---	Professional Elective-III	PEC	3	0	0	3	3
---	Professional Elective-IV	PEC	3	0	0	3	3
192TE2L03	Computational Fluid Dynamics Lab-II	PCC	0	0	4	4	2
192TE2L04	Thermal Engineering Lab-II	PCC	0	0	4	4	2
192TE2P01	Mini Project with Seminar	PROJ	2	0	0	2	2
---	Audit Course-2	MC	2	0	0	2	0
		TOTAL	**16**	**0**	**8**	**24**	**18**

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	
---	Professional Elective-V	PEC	3	0	0	3	3
---	Open Elective	OEC	3	0	0	3	3
192TE3P02	Dissertation I/ Industrial Project	PROJ	0	0	20	20	0
		TOTAL	**6**	**0**	**20**	**26**	**6**

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	
192TE4P03	Dissertation II	PROJ	0	0	32	32	26
		TOTAL	**0**	**0**	**32**	**32**	**26**

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BSC: Basic Sciences Courses; HSMC: Humanities and Social Sciences including Management Courses; PCC: Professional Core Courses; PEC: Professional Elective Courses; OEC: Open Elective Courses; MC: Mandatory Courses; PROJ: Project.

Audit Course-1 & Audit Course-2 has to be chosen from the following list of courses.

S. No	Course Code		Name of the Course
	I Semester	II Semester	
1	192MC1A01	192MC2A01	English for Research Paper Writing
2	192MC1A02	192MC2A02	Disaster Management
3	192MC1A03	192MC2A03	Sanskrit for Technical Knowledge
4	192MC1A04	192MC2A04	Value Education
5	192MC1A05	192MC2A05	Constitution of India
6	192MC1A06	192MC2A06	Pedagogy Studies
7	192MC1A07	192MC2A07	Stress Management by Yoga
8	192MC1A08	192MC2A08	Personality Development through Life Enlightenment Skills
9	192MC1A09	192MC2A09	Soft Skills

Professional Elective – I (I Semester)

S.No	Course Code	Name of the Course
1	192TE1E01	Advanced IC Engines, Electric and Hybrid vehicles
2	192TE1E02	Gas Dynamics
3	192TE1E03	Cryogenic Engineering
4	192TE1E04	Advanced Thermodynamics

Professional Elective – II (I Semester)

S.No	Course Code	Name of the Course
1	192TE1E05	Gas Turbines
2	192TE1E06	Alternative Fuel Technologies
3	192TE1E07	Energy Conservation and Management
4	192TE1E08	Theory and Technology of Fuel Cells

Professional Elective – III (II Semester)

S.No	Course Code	Name of the Course
1	192TE2E09	Equipment Design for Thermal Systems
2	192TE2E10	Solar Energy Technologies
3	192TE2E11	Advanced Power Plant Engineering
4	192TE2E12	Combustion, Emissions and Environment

Professional Elective – IV (II Semester)

S.No	Course Code	Name of the Course
1	192TE2E13	Jet Propulsion and Rocket Engineering
2	192TE2E14	Automotive Engineering
3	192TE2E15	Modeling and I.C. Engines
4	192TE2E16	Renewable Energy Technologies

Professional Elective – V (III Semester)

S.No	Course Code	Name of the Course
1	192TE1E17	Optimization Techniques and Applications
2	192TE1E18	Design and Analysis of Experiments
3	192TE1E19	Convective Heat Transfer
4	192TE1E20	Waste to Energy
5	-------	MOOCs-I*

Open Elective (III Semester)

S.No	Course Code	Name of the Course
1	-----	MOOCs-II#
2	-----	Courses offered by other Departments in the College

***MOOCS-I:** A student should select a 12 weeks course which is not opted/ studied earlier.

#MOOCS-II: A student should select a 12 weeks course in Engineering/ Management/ Mathematics offered by other than parent department.

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Open Elective – Courses offered by Departments

S. No	Course Code	Name of the Course	Not offered to the students of the following M. Tech Specializations	Offered by Dept.
1.	192ST3O01	Repair & Rehabilitation of Structures	ST	CE
2.	192ST3O02	Green Building Systems	ST	CE
3.	192ST3O03	Basic Concrete Technology	ST	CE
4.	192ST3O04	Basic Foundation Engineering	ST	CE
5.	192PD3O01	Renewable Energy Technologies	PED	EEE
6.	192PD3O02	Hybrid Electric Vehicles	PED	EEE
7.	192PD3O03	Energy Audit and conservation Management	PED	EEE
8.	192PD3O04	Neural Networks and Fuzzy Logic	PED	EEE
9.	192PD3O05	Industrial Safety	PED	EEE
10.	192PD3O06	Composite Materials	PED	EEE
11.	192TE3O01	Energy Systems	TE	ME
12.	192TE3O02	Fuels and Combustion	TE	ME
13.	192TE3O03	Green Engineering Technology	ST, TE	ME
14.	192TE3O04	IC Engines	TE	ME
15.	192TE3O05	Automotive Technology	TE	ME
16.	192ES3O01	Embedded System Design	ES	ECE
17.	192ES3O02	Digital System Design	VLSID	ECE
18.	192ES3O03	Programming Languages for Embedded Systems	ES	ECE
19.	192ES3O04	Sensors & Actuators	ES	ECE
20.	192VD3O01	Physical Design Automation	VLSID	ECE
21.	192VD3O02	VLSI Technology	VLSID	ECE
22.	192VD3O03	Nano-electronics	VLSID	ECE
23.	192CS3O01	Python Programming (CSE)	CSE, SE	CSE
24.	192CS3O02	Principles of Cyber Security	CSE	CSE
25.	192CS3O03	Internet of Things	CSE, SE	CSE
26.	192CS3O04	Machine Learning	CSE, SE	CSE
27.	192CS3O05	Artificial Intelligence	SE	IT
28.	192CS3O06	Deep Learning	CSE, SE	IT
29.	192PE3O01	Introduction to Petroleum Engineering	PE	PT
30.	192PE3O02	Process Intensification	PE	PT
31.	192PE3O03	Fundamentals of Liquefied Natural Gas	PE	PT
32.	192PE3O04	Subsea Engineering	PE	PT
33.	192PE3O05	Geology	PE, ST	PT
34.	192PE3O06	HSE in Petroleum Industry	PE	PT

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Program Name : Master of Computer Applications

Syllabus Revision for the Academic Year 2020-2021

S.No	Semester	Course Code	Course Name	% of content revised for the existing year
1	1	203MC1T01	Business Communication	100
2	1	203MC1T02	Mathematical and Statistical Foundations	100
3	1	203MC1T03	Computer Organization & Operating Systems	100
4	1	203MC1T04	Data Structures	0
5	1	203MC1T05	Object Oriented Programming with JAVA	100
6	1	203MC1L01	Operating Systems and Linux Lab	100
7	1	203MC1L02	Data Structures Lab	100
8	1	203MC1L03	JAVA Programming Lab	100
9	1	203MC1P01	Socially Relevant Project using Design Thinking	100
10	2	203MC2T06	Database Management Systems	100
11	2	203MC2T07	Computer Networks	100
12	2	203MC2T08	Software Engineering and Design Patterns	100
13	2	203MC2T09	Data Warehousing and Mining	100
14	2	203MC2E02	Design and Analysis of Algorithms	100
15	2	203MC2L04	DBMS Lab	100
16	2	203MC2L05	Computer Networks Lab	100
17	2	203MC2L06	Software Engineering and Design Patterns Lab	100

18	2	203MC2T10	Employability Skills	100
19	3	193MC3T11	Database Management Systems	0
20	3	193MC3T12	Computer Networks	0
21	3	193MC3T13	Design & Analysis of Algorithms	0
22	3	193MC3T14	Advanced Java Programming	100
23	3	193MC3T15	Object Oriented Analysis and Design	100
24	3	193MC3L07	Database Management Systems Lab	0
25	3	193MC3L08	Advanced Java Programming Lab	100
26	3	193MC3L09	OOAD through UML Lab	100
27	4	193MC4T16	Data Warehousing & Data Mining	0
28	4	193MC4T17	Full Stack Technologies	100
29	4	193MC4T18	Python Programming	100
30	4	193MC4E01	Embedded Computing	80
31	4	193MC4E02	Artificial Intelligence	0
32	4	193MC4E03	MOOCs-1	100
33	4	193MC4E04	Cloud Computing	0
34	4	193MC4E05	Multimedia Application Development	100
35	4	193MC4E06	MOOCs-2	100
36	4	193MC4L10	Full Stack Technologies Lab	100
37	4	193MC4L11	Data Mining with R Lab	100
38	4	193MC4L12	Python Programming Lab	100
39	5	173MC5T19	Big Data Analytics	0
40	5	173MC5T20	Network Programming	0

41	5	173MC5T21	Python Programming	0
42	5	173MC5E07	Cyber Security	0
43	5	173MC5E08	Computer Forensics	0
44	5	173MC5E09	E – Commerce	0
45	5	173MC5E10	Internet of Things	0
46	5	173MC5E11	Multimedia Application Development	0
47	5	173MC5E12	Software Testing Methodologies	0
48	5	173MC5E13	Big Data Analytics Lab	0
49	5	173MC5E14	Network Programming Lab	0
50	5	173MC5E15	Python Programming Lab	0
51	6	173MC6R01	Seminar	0
52	6	173MC6P01	Major Project	0

Total number of courses in the academic year 2020-2021	= 52
Number of courses having revision in syllabus content >/= 20% in the academic year 2020-2021	=30
Percentage of syllabus revision carried out in the academic year 2020-2021 = (30/52)*100	= 57.6

T. Satya
Program Coordinator

Beulah
Head of the Department

Head of the Department
Department of MCA
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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
203MC1T01	Business Communication	2	0	0	2	2
203MC1T02	Mathematical and Statistical Foundations	3	0	0	3	3
203MC1T03	Computer Organization & Operating Systems	3	1	0	4	4
203MC1T04	Data Structures	3	0	0	3	3
203MC1T05	Object Oriented Programming with JAVA	3	0	0	3	3
203MC1L01	Operating Systems and Linux Lab	0	0	3	3	1.5
203MC1L02	Data Structures Lab	0	0	3	3	1.5
203MC1L03	JAVA Programming Lab	0	0	3	3	1.5
203MC1P01	Socially Relevant Project using Design Thinking	0	0	1	1	0.5
	TOTAL	**14**	**1**	**10**	**25**	**20**

II SEMESTER

Course Code	Name of the Course	Total Number of contact hours: Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	Credits (C)
203MC2T06	Database Management Systems	3	0	0	3	3
203MC2T07	Computer Networks	3	0	0	3	3
203MC2T08	Software Engineering and Design Patterns	3	0	0	3	3
203MC2T09	Data Warehousing and Mining	3	0	0	3	3
----	**Professional Elective-1**	3	0	0	3	3
203MC2L04	DBMS Lab	0	0	3	3	1.5
203MC2L05	Computer Networks Lab	0	0	3	3	1.5
203MC2L06	Software Engineering and Design Patterns Lab	0	0	3	3	1.5
203MC2T10	Employability Skills	0	0	1	1	0.5
203MC2S01	Bridge Course (Python Programming to be taken through MOOCs)	0	0	0	0	0
	TOTAL	**15**	**0**	**10**	**25**	**20**

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PROGRAM STRUCTURE

I SEMESTER

Course Code	Name of the Course	Total Number of contact hours				Credits (C)
		Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
193MC1T01	Problem Solving with C	3	0	0	3	3
193MC1T02	Computer Organization	3	0	0	3	3
193MC1T03	Discrete Mathematical Structures	3	0	0	3	3
193MC1T04	Probability and Statistics	3	0	0	3	3
193MC1T05	Accounting and Financial Management	3	0	0	3	3
193MC1L01	English Language Communication Skills Lab	0	0	3	3	1.5
193MC1L02	Problem Solving with C Lab	0	0	3	3	1.5
193MC1L03	IT Workshop (Lab)	0	0	3	3	1.5
	TOTAL	**15**	**0**	**9**	**24**	**19.5**

II SEMESTER

Course Code	Name of the Course	Total Number of contact hours				Credits (C)
		Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
193MC2T06	Data Structures	3	0	0	3	3
193MC2T07	Operating Systems	3	0	0	3	3
193MC2T08	Software Engineering	3	0	0	3	3
193MC2T09	OOP Through Java	3	0	0	3	3
193MC2T10	Optimization Techniques	3	0	0	3	3
193MC2L04	OOP Through Java Lab	0	0	3	3	1.5
193MC2L05	Data Structures Lab	0	0	3	3	1.5
193MC2L06	Operating Systems and Linux Lab	0	0	3	3	1.5
	TOTAL	**15**	**0**	**9**	**24**	**19.5**

III SEMESTER

Course Code	Name of the Course	Total Number of contact hours				Credits (C)
		Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
193MC3T11	Database Management Systems	3	0	0	3	3
193MC3T12	Computer Networks	3	0	0	3	3
193MC3T13	Design & Analysis of Algorithms	3	0	0	3	3
193MC3T14	Advanced Java Programming	3	0	0	3	3
193MC3T15	Object Oriented Analysis and Design	3	0	0	3	3
193MC3L07	Database Management Systems Lab	0	0	3	3	1.5
193MC3L08	Advanced Java Programming Lab	0	0	3	3	1.5
193MC3L09	OOAD through UML Lab	0	0	3	3	1.5
	TOTAL	**15**	**0**	**9**	**24**	**19.5**

IV SEMESTER

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Course Code	Name of the Course	Total Number of contact hours				Credits (C)
		Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
193MC4T16	Data Warehousing & Data Mining	3	0	0	3	3
193MC4T17	Full Stack Technologies	3	0	0	3	3
193MC4T18	Python Programming	3	0	0	3	3
Elective – I						
193MC4E01	Embedded Computing	3	0	0	3	3
193MC4E02	Artificial Intelligence					
193MC4E03	MOOCs-1					
Elective – II						
193MC4E04	Cloud Computing	3	0	0	3	3
193MC4E05	Multimedia Application Development					
193MC4E06	MOOCs-2					
193MC4L10	Full Stack Technologies Lab	0	0	3	3	1.5
193MC4L11	Data Mining with R Lab	0	0	3	3	1.5
193MC4L12	Python Programming Lab	0	0	3	3	1.5
	TOTAL	**15**	**0**	**9**	**24**	**19.5**

V SEMESTER

Course Code	Name of the Course	Total Number of contact hours				Credits (C)
		Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
193MC5T19	Cryptography and Network Security	3	0	0	3	3
193MC5T20	Big Data Analytics	3	0	0	3	3
193MC5T21	Machine Learning	3	0	0	3	3
Elective – III						
193MC5E07	Digital Marketing	3	0	0	3	3
193MC5E08	Natural Language Processing					
193MC5E09	MOOCs-3					
Elective – IV						
193MC5E10	Internet of Things	3	0	0	3	3
193MC5E11	DevOps					
193MC5E12	MOOCs-4					
193MC5L13	Cryptography and Network Security Lab	0	0	3	3	1.5
193MC5L14	Big Data Analytics Lab	0	0	4	4	2
193MC5L15	Machine Learning with Python Lab	0	0	3	3	1.5
	TOTAL	**15**	**0**	**10**	**25**	**20**

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V SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC5T19	Big Data Analytics	3	1	---	3
173MC5T20	Network Programming	3	1	---	3
173MC5T21	Python Programming	3	1	---	3
Elective – III					
173MC5E07	Cyber Security	3	1	---	3
173MC5E08	Computer Forensics				
173MC5E09	E – Commerce				
Elective – IV					
173MC5E10	Internet of Things	3	1	---	3
173MC5E11	Multimedia Application Development				
173MC5E12	Software Testing Methodologies				
173MC5L13	Big Data Analytics Lab	---	---	3	2
173MC5L14	Network Programming Lab	---	---	3	2
173MC5L15	Python Programming Lab	---	---	3	2
	TOTAL	**15**	**5**	**9**	**21**

VI SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC6R01	Seminar	---	---	---	2
173MC6P01	Major Project	---	---	---	19
	TOTAL	---	---	---	21

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Department of Master of Computer Applications

Syllabus revision Index (2020-2021)

S.No	Name of the course	Percentage of syllabus change
1.	Embedded Computing	80

Beulah

Signature of the HOD

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Department of Master of Computer Applications

1.1.2. Table-Prior/Post revision of syllabus (2020-202)

Regulation	Pre-Revision	Post-Revision
Course Title	EMBEDDED SYSTEMS	Embedded Computing
Course Code	173MC4E06	193MC4E01
Syllabus	UNIT-I: Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.	UNIT-I: Introduction to Embedded System: Understanding the Basic Concepts, The Typical Embedded System – Characteristics and Quality attributes.
	UNIT-II: 8—bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.	UNIT-II: Hardware Software Co-Design and Program Modelling – Fundamental Issues, Computational Models- Data Flow Graph, Control Data Flow Graph, State Machine, Sequential Model, Concurrent Model, Object oriented model, UML.
	UNIT-III: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.	UNIT-III: Design and Development of Embedded Product – Firmware Design and Development – Design Approaches, Firmware Development Languages

	UNIT-IV: Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.	. UNIT-IV: Integration and Testing of Embedded Hardware and Firmware- Integration of Hardware and Firmware. Embedded System Development Environment – IDEs, Cross Compilers, Disassemblers, Decompilers, Simulators, Emulators and Debuggers.
	UNIT-V: The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware. Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.	UNIT-V: RTOS based Design – Basic operating system services. Interrupt handling in RTOS environment. Design Principles. Task scheduling models. How to Choose an RTOS. Embedded Product Development Life Cycle – Description – Objectives -Phases – Approaches. Recent Trends in Embedded Computing

T-Satya
Signature of the course coordinator

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EMBEDDED COMPUTING

IV Semester | **L T P C**
Course Code: 193MC4E01 | **3 0 0 3**

Course Objectives:

COB 1: Develop an understanding of the technologies behind embedded computing systems.
COB 2: Introduce students to the various software components involved in embedded system design and development.
COB 3: Expose students to the recent trends in embedded system design.

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

CO 1: Understand the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO 2: Analyze the characteristics of different computing elements and select the most appropriate one for an embedded system.
CO 3: Model the operation of a given embedded system.
CO 4: Understand different software modules in the development of an embedded system.
CO 5: Illustrate simple tasks to run on an RTOS and examine the latest trends prevalent in embedded system design.

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	1	1	2	2	2	-	-	-	-	-
CO2 (K4)	2	3	-	3	3	3	-	-	-	-	-
CO3 (K3)	1	2	-	3	3	2	-	-	-	-	-
CO4 (K2)	1	1	1	-	2	2	-	2	2	-	-
CO5 (K2)	1	1	1	-	2	1	-	2	2	-	-

Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K5)	PSO 2 (K4)	PSO 3 (K4)
CO1 (K2)	1	2	1
CO2 (K4)	2	3	3
CO3 (K3)	2	2	3
CO4 (K2)	1	1	1
CO5 (K2)	1	1	1

UNIT-I:
Introduction to Embedded System: Understanding the Basic Concepts, The Typical Embedded System – Characteristics and Quality attributes.

UNIT-II:
Hardware Software Co-Design and Program Modelling – Fundamental Issues, Computational Models- Data Flow Graph, Control Data Flow Graph, State Machine, Sequential Model, Concurrent Model, Object oriented model, UML.

UNIT-III:
Design and Development of Embedded Product – Firmware Design and Development – Design Approaches, Firmware Development Languages.

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UNIT-IV:

Integration and Testing of Embedded Hardware and Firmware- Integration of Hardware and Firmware. Embedded System Development Environment – IDEs, Cross Compilers, Disassemblers, Decompilers, Simulators, Emulators and Debuggers.

UNIT-V:

RTOS based Design – Basic operating system services. Interrupt handling in RTOS environment. Design Principles. Task scheduling models. How to Choose an RTOS. Embedded Product Development Life Cycle – Description – Objectives -Phases – Approaches. Recent Trends in Embedded Computing.

Text Books:

1. Shibu K.V., Introduction to Embedded Systems, McGraw Hill Education (India), 2009.
2. Raj Kamal, Embedded Systems: Architecture, Programming and Design, Third Edition, McGraw Hill Education (India).

Reference Books:

1. Jean J. Labrose, Micro C OS II: The Real Time Kernel, Second Edition, CRC Press.
2. Steave Heath, Embedded System Design, Second Edition, Elsevier.
3. J Staunstrup and Wayne Wolf, Hardware / Software Co-Design: Principles and Practice, Prentice Hall.

Web Links:

1. https://books.google.co.in/books?isbn=1111781389
2. https://books.google.co.in/books?isbn=8893850222
3. https://books.google.co.in/books?isbn=1425145078
4. https://books.google.co.in/books?isbn=3319515179
5. https://books.google.co.in/books?isbn=0596009836

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