ADITYA ENGINEERING COLLEGE

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Syllabus of the courses where the revision was carried out program wise in the academic year 2020-2021

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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

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.

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

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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	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

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Department of Electrical and Electronics Engineering

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

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

Department of Electrical and Electronics Engineering

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.K

Course Coordinator

Head of the Department

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Dept. Of Electrical & Electronics Engineering
Aditya Engineering College (A9)

Department of Electrical and Electronics Engineering

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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Department of Electrical and Electronics Engineering

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.

Course Coordinator

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Dept: Of Electrical & Electronics Engineering
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Department of Electrical and Electronics Engineering

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	**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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Department of Mechanical Engineering

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

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Department of Mechanical Engineering
Aditya Engineering College (A)
SURAMPALEM-533 437

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

Aditya Engineering College (A9)

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.

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.

Course Coordinator

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Surampalem

Department of Mechanical Engineering

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.	

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

Department of Mechanical Engineering

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
Syllabus	**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.
	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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Mechanical Engineering
Aditya Engineering College
Surampalem

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.

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

Department of Mechanical Engineering

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.	

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

Department of Mechanical Engineering

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.	

Course Coordinator

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Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

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.	

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

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.	

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

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.

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

Department of Mechanical Engineering

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.

Course Coordinator

Head of the Department

Head of the Department
Mechanical Engineering
Aditya Engineering College
Surampalem

Department of Mechanical Engineering

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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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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Department of Electronics and communication Engineering

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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Department of Electronics and communication Engineering

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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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%

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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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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. .

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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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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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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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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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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,	**UNIT-III:** Distributed Objects and Remote Invocation: Introduction, Communication between distributed objects, Remote procedure call, Events and notifications, Case Study: JAVA

	Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI	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. .

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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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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Robotics	Robotics
Course Code	R163205F	171EE8O05
Syllabus	**UNIT-I:** Introduction Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,	**UNIT-I:** Introduction: Automation-CAD/CAM-Robotics –An over view of Robotics – present and future applications – classification by coordinate system and control system. Applications of Material Transfer - Material handling, loading and unloading Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
	UNIT-II: Orientations and frames, Mappings Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics of Six Degree of Freedom Robot Arm – Robot Arm dynamics	**UNIT-II:** Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, Robot programming methods. Robot Actuators and Feed Back Components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.
	UNIT-III: Robot Drives and Power Transmission Systems Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical	**UNIT-III:** Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems. Manipulator Kinematics: Specifications of matrices, D-H notation

	transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,	joint coordinates and world coordinates Forward and inverse kinematics – problems.
	UNIT-IV: Manipulators Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators	**UNIT-IV:** Transformations: Differential transformation and manipulators, Jacobians – problems Dynamics: Lagrange – Euler formulations – Problems.
	UNIT-V: Robot End Effectors Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers. . **UNIT -VI**: Path planning & Programming Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.	**UNIT-V:** Trajectory Planning: General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion. .

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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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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Operating Systems	Operating Systems
Course Code	191CS5T11	201CS3T03
Syllabus	**UNIT-I:** Introduction to Operating System Concepts: What Operating System do, Operating System Structure, Operating System Operations, Process Management, Memory management, Storage Management, Protection and Security, Computing Environments, Open-Source Operating systems, Operating systems services, System call, Types of System call.	**UNIT-I:** Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing environments, Open-Source Operating Systems. System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, System Boot.
	UNIT-II: Process Management: Process Concept: The process, Process State, Process control block, Threads, Process Scheduling: Scheduling Queues, Schedulers, Context switch, Operations on Processes, Inter process Communication. Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms. Multithread Programming: Overview, Benefits, Multithreading Models.	**UNIT-II:** Process Concept: Process scheduling, Operations on processes, Inter-process communication. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues.
	UNIT-III: Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods for handling Deadlock, Deadlock Prevention, Deadlock Avoidance,	**UNIT-III:** Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Classical IPC Problems - Dining philosophers problem, Readers and writers problem. Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm,

	Deadlock Detection, Recovery from Deadlock.	Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.
	UNIT-IV: Memory Management: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory Management: Background, Demand Paging, Page Replacement, Thrashing.	**UNIT-IV:** Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation. File Systems: Files, Directories, File system implementation, management and optimization.
	UNIT-V: File System Interface: File concept, Access Methods, Directory and Disk structure, File system mounting, File sharing, protection. Implementing File-Systems: File system structure, File System implementation, Directory Implementation, allocation methods, free-space management. Mass-storage structure: Overview of Mass-storage structure, Disk scheduling. .	**UNIT**-V: Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation. System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights. System Security: Introduction, Program threats, System and network threats. Case Studies: Linux, Microsoft Windows. .

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Engineering	Software Engineering
Course Code	191CS3T01	201CS3T04
Syllabus	**UNIT-I:** Introduction to Software Engineering: Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges Software Process: Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models. Case Study: Survey on different process models including. i. Advantages and Disadvantages of the models. ii. Applicability of the model. iii. Projects developed using the various models.	**UNIT-I:** Introduction to Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. Software Process: Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models – Waterfall Model, Iterative Waterfall Model, Prototype Model, Incremental Model, Spiral Model, Agile Process Model and RUP process Model. Case Study: Survey on different process models including. i. Advantages and Disadvantages of the models. ii. Applicability of the model. iii. Projects developed using various models.
	UNIT-II: Software Project Management: Project Management Essentials, What is Project Management, Software Configuration Management, Risk management. Project Planning and Estimation: Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques. Case Study: Estimate the effort of the software development using Functional Points for the real time problem.	**UNIT-II:** Software Project Management: Project Management Essentials, What is Project Management, Software Configuration Management, Risk management. Project Planning and Estimation: Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques. Case Study: Estimate the effort of the software development using Functional Points and COCOMO Model for any one of the real time problem.

	UNIT-III: Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies, Implementation: Coding Principles, Coding Process, Code Verification, Code Documentation. Case Study: Construct the HLD and LLD using SRS created	**UNIT-III:** Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management. Case Study: Create a SRS document for any one of the following Software Projects. 1) Course Registration System 2) Students Marks Analyzing System 3) Online Ticket Reservation System 4) Stock Maintenance
	UNIT-IV: Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management, Case Study: Create a SRS document for a real time scenario.	**UNIT-IV:** Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies, Implementation: Coding Principles, Coding Process, CodeVerification, Code Documentation. Case Study: Construct the DFD and CFD for any one of the following Software Projects. 1) Airline Reservation System 2) Students Marks Analyzing System 3) ATM System 4) Library Management System
	UNIT-V: Software Testing: Testing Fundamentals, Test Planning, Black-Box Testing, White- Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches. Software Quality and Reliability: Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability. Case Study: Write the test cases for the real time scenario considered using White Box & Black Box Testing Techniques. .	**UNIT**-V: Software Testing: Testing Fundamentals, Test Planning, Black-Box Testing, WhiteBox Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches. Software Quality and Reliability: Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability. Case Study: Design the test cases for any one of the following real time scenarios using White Box & Black Box Testing Techniques. 1) E-Commerce application (Flipkart, Amazon) 2) Mobile Application

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Web Technologies	Web Technologies
Course Code	171CS6T16	191CS6T14
Syllabus	**UNIT-I:** HTML: Introducing HTML Document Structure, Working with Links, Images, Tables and Frames. Introduction to Forms and HTML Controls, Cascading Style Sheets. The Basics of JavaScript: Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Arrays, Functions, Pattern Matching using Regular Expressions, Events and Event Handling.	**UNIT-I:** HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, HTML styles, Elements, Attributes, Heading, Layouts, HTML Media, Iframes, Images, Links, Lists, Tables, Forms, GET and POST method, HTML 5, Dynamic HTML. CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, Box Model, Conflict Resolution, CSS3.
	UNIT-II: XML: Document type Definitions, XML Schemas, XSLT Style Sheets, Document Object Model, DOM and SAX Approaches	**UNIT-II:** Javascript - Introduction, Primitives, Variables – var, let, const, Operations and Expressions, Control Statements, Functions, Objects (Predefined - String, Number, Array, Date, Math, Random, RegExp, User Defined – Definition, Properties, Methods, Display, Accessors, Constructors), Events, Pattern Matching using Regular Expressions, Working with XML: Document type Definition (DTD), XML schemas, XSLT, XML and CSS, Document object model, Parsers - DOM and SAX.
	UNIT-III: PHP Programming: Introducing PHP: Creating PHP script, Running PHP Script, Working with variables and constants: Using variables, Using constants, Data types, Operators, Controlling program flow: Conditional Statements, Looping	**UNIT-III:** Node.js- Introduction, Advantages, Process Model, Modules, HTTP Module, File system, URL module, NPM, Events, Upload Files, Email. Angular JS – Introduction, Expressions, Modules, Directives, Model, Data Binding, Controllers,

	Statements, Working with Arrays, functions, Files, Directories, Working with forms and Databases: Tag and Form Elements, using PHP and MySQL. AJAX: A New Approach, Integrating PHP and AJAX.	Scopes, Filters, Services, HTTP, Tables, Select, Events, Forms, Validation, API, W3.CSS, Includes, Routing, SQL, DOM, Application.
	UNIT-IV: PERL: A Brief History of Perl, Perl Variables, Arithmetic and String Operators, Conditional Statements, Perl I/O, Perl Iterations, functions, The Perl CGI Module, Pattern Matching in Perl, Simple Page Search.	**UNIT-IV:** React JS – Introduction, Displaying "Welcome React", Introducing JSX, Rendering Elements, Components and Props, State and Lifecycle, Handling Events, Conditional Rendering, Lists and Keys, Forms, Lifting State Up, Composition vs Inheritance, Thinking in React.
	UNIT-V: Introduction to Ruby: Scalar Types and Their Operations, Simple Input and Output, Control Statements, Fundamentals of Arrays, Hashes, Methods, Classes, Blocks and Iterators, Pattern Matching. .	**UNIT-V:** PHP Programming - Introduction, Creating and Running PHP Script. Variables, Constants, DataTypes, Operators. Controlling Program Flow - Conditional and Loop statements, Arrays, Functions, Client-Server Scripting – XAMPP/LAMP Introduction, Running PHP Script in XAMPP, Super Globals, Working with Form Data, Database Connectivity – MySQL Introduction using XAMPP in Command Mode and GUI, Working with MySQL Queries, Integrating PHP and MySQL to work with Form Data. No SQL Database - MongoDB Introduction, Create and Drop Database, Create and Drop Collection, Data Types, Insert, Query, Update, Delete, Integrating PHP with MongoDB.

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1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Software Testing Methodologies	Software Testing Methodologies
Course Code	171CS5E04	191CS6E10 .
Syllabus	**UNIT-I:** Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing. Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relate STLC to SDLC, Software Testing Methodology	**UNIT-I:** Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs. Exhaustive Software Testing. Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology. Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.
	UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation. Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.	**UNIT-II:** Dynamic Testing-Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.
	UNIT-III: Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing. Static Testing: Inspections, Structured Walkthroughs, Technical reviews.	**UNIT-III:** Static Testing: Inspections, Structured Walkthroughs, Technical Reviews Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. Regression testing: Progressives Vs. regressive testing, Regression test

		ability, Objectives of regression testing, Regression testing types, Regression testing techniques.
	UNIT-IV: Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques.	**UNIT-IV:** Efficient Test Suite Management: growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite. Software Quality Management: Software Quality metrics, SQ Amodels. Debugging: process, techniques, correcting bugs.
	UNIT-V: Software Testing Tools: Introduction to Testing, need for Automated Testing, Taxonomy of Testing tools, Regression and performance Testing tools, Testing management tools, Source code testing tools, How to select a testing tool. Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, working with Test, Enhancing Test, Checkpoints, Test Script Language, putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.	**UNIT-V:** Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit. Test Automation using Selenium tool. .

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Department of Information Technology

1.1.2. Table-Prior/Post revision of syllabus

Regulation	Pre-Revision	Post-Revision
Course Title	Image Processing	Image Processing
Course Code	171CS7E15	191CS6E07
Syllabus	**UNIT-I:** Introduction: Digital Image Processing, Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels	**UNIT-I:** Introduction: Fundamentals Steps in Digital Image Processing, Components of an image processing system, Elements of Visual Perception ,Image Sensing and Acquisition ,Image Sampling and Quantization ,Relationships between pixels Color Image processing: Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.
	UNIT-II: Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection, Smoothing Spatial Filters, Sharpening Spatial Filters	**UNIT-II:** Image Enhancement: Spatial Domain: Gray level transformations , Histogram processing , Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters ,Ideal, Butterworth and Gaussian high pass filters, Homomorphic filtering. UNIT-III: Image Restoration: Image Restoration ,degradation model, Noise models, Mean Filters ,Order Statistic filters, Adaptive filters , Band reject Filters, Band pass Filters, Notch Filters ,Optimum Notch Filtering ,Inverse Filtering ,Wiener filtering.
	UNIT-III: Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale	**UNIT-III:** Image Restoration: Image Restoration ,degradation model, Noise models, Mean Filters ,Order Statistic filters, Adaptive filters , Band reject

	dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation	Filters, Band pass Filters, Notch Filters ,Optimum Notch Filtering ,Inverse Filtering ,Wiener filtering.
	UNIT-IV: Segmentation: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation.	**UNIT-IV:** Image Segmentation: Edge detection, Edge linking via Hough transform, Thresholding ,Region based segmentation: Region growing, Region splitting and merging, Morphological processing: Erosion and dilation, Segmentation by morphological watersheds :basic concepts , Dam construction ,Watershed segmentation algorithm
	UNIT-V: Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.	**UNIT-V:** Image Compression and Recognition: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors, Topological feature, Texture, Patterns and Pattern classes ,Recognition based on matching.

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Department of Petroleum Technology

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%

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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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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

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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.

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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

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Department of Mining Engineering

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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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)

V. Vani

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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 $\int f(x)dx$ ∞ −∞ – 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 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

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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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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 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
	Syllabus	**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.
		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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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

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

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Department of Management Studies

Syllabus revision Index (2020-21)

S.No	Name of the course	Percentage of syllabus change
1.	Performance Evaluation and Compensation Management	40
2.	Investment Analysis and Portfolio Management	50
3.	Managing Banks and Financial Institutions	20
4.	Financial Markets and Services	20
5.	Taxation	50
6.	Consumer Behavior	40
7.	Retail Management	50
8.	Supply Chain Management and Analytics	20
9.	International HRM	40
10.	Risk Management	20
11.	Promotional and Distribution Management	20

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Performance management	Performance evaluation and compensation management
Course Code	174HR3E03	194HR3E02
Syllabus	Introduction: Definition –concerns-scope-Historical developments in performance management-Over view of performance management-Process for managing performance-Importance –Linkage of PM to other HR processes-Performance Audit.	UNIT-I: Introduction: –Definition – concerns-scope-Historical developments in performance management-Over view of performance management-Process for managing performance Importance – Linkage of PM to other HR processes-Performance Audit.
	UNIT-2: Performance Management Planning: Introduction-Need-Importance-Approaches-The Planning Process—Planning Individual Performance- Strategic Planning – Linkages to strategic planning-Barriers to performance planning-Competency Mapping-steps-Methods.	UNIT-II: Performance Management Planning: Introduction-Need-Importance-Approaches-The Planning Process—Planning Individual Performance- Strategic Planning – Linkages to strategic planning-Barriers to performance planning-Competency Mapping-steps-Methods.
	UNIT-3: Management System: objectives – Functions- Phases of Performance Management System Competency based Performance Management Systems- Reward based Performance Management Systems-Electronic Performance Management Systems- HR Challenges-Appraisal for recognistion and reward-Purpose of Appraising –Methods of Appraising-Appraisal system design-Implementing the Appraisal System-Appraisal and HR decisions	UNIT-III: Management System: objectives – Functions- Phases of Performance Management System Competency, Reward and Electronic Performance Management Systems-Performance Monitoring and Counselling: Supervision- Objectives and Principles of Monitoring Monitoring Process- Periodic reviews-Problem solving- engendering trust-Role efficiency Coaching- Counselling and Monitoring- Concepts and Skills.

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	UNIT-4: Performance Monitoring and Counseling: Supervision- Objectives and Principles of Monitoring-Monitoring Process- Periodic reviews-Problem solving- engendering trust-Role efficiency- Coaching-Counseling and Monitoring- Concepts and Skills	UNIT-IV: Compensation: concept and definition – objectives and dimensions of compensation program – factors influencing compensation –Role of compensation and Reward in Modern organizations Compensation as a Retention strategy- aligning compensation strategy with business strategy - Managing Compensation: Designing a compensation system – internal and external equity– pay determinants - frame work of compensation policy - influence of pay on employee attitude and behaviour - the new trends in compensation management at national and international level.
	UNIT-5: Performance management skills: Operational change through performance management. High Performing Teams: Building and leading High performing teams – team oriented organizations – developing and leading high performing teams-Role of Leadership	UNIT-V: Compensation Structure: Compensation Structure -History and past practices, elements of, management compensation –Types of compensation system-Performance based and Pay based structures-Designing pay structures-comparison in evaluation of different types of pay structures-Significance of factors affecting-Tax Planning –Concept of Tax planning-Role of tax planning in compensation benefits-Tax efficient compensation package-Fixation of tax liability salary restructuring.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Security Analysis And Portfolio Management	Investment Analysis And Portfolio Management
Course Code	174FI3E01	194FI3E01
Syllabus	UNIT-1: Concept of Investment Education: Investment Vs Speculation, Investment alternatives - Investment Process - Sources of Investment Information – Trading System in Stock Exchanges –Market Indices. Calculation of SENSEX and NIFTY - Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk - Measurement of Risk. (Problems)	UNIT-I: Concept of Investment, Investment Vs Speculation, and Security Investment Vs Non security Forms of Investment-Investment Environment in India. Investment Process - Sources of Investment Information, Security Markets – Primary and Secondary – Types of securities in Indian Capital Market, Market Indices. Calculation of SENSEX and NIFTY.
	UNIT-2: Equity and Bond Valuation Models: Preference Shares and Equity Shares Earning valuation-Cash flow valuation-Asset Valuation-Dividend-discount model; Valuation of Bonds – Bond Returns and Risks -Bond Pricing Theorems convexity, duration, bond immunization. (Problems)	UNIT-II: Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk. Measurement of Total Risk - Intrinsic Value Approach to Valuation of Bonds - Preference Shares and Equity Shares
	UNIT-3: Investment Analysis: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Dow Theory – Elliot Wave Theory – Trends and Trend Reversals - Efficient Market Theory –Hypothesis- Forms of Market Efficiency.	UNIT-III: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Concept and Tools and Techniques Analysis – Technical Analysis Vs Fundamental Analysis - Efficient Market Hypothesis; Concept and Forms of Market Efficiency.
	UNIT-4: Portfolio Analysis and Selection: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model and Capital Asset Pricing Model, Arbitrage Pricing Theory. (Problems)	UNIT-IV: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model and Capital Asset Pricing Model, Arbitrage Pricing Theory.

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	UNIT-5: Portfolio Evaluation and Revision: Performance Evaluation of Portfolios; Sharpe Model – Jensen's Model for PF Evaluation, Evaluation of Mutual Fund – Portfolio Revision. (Problems)	UNIT-V: Performance Evaluation of Portfolios; Sharpe Model – Jensen's Model for PF Evaluation, Evaluation of Mutual Fund.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Banking & Insurance Management	Managing Banks And Financial Institutions
Course Code	174FI3E02	194FI3E02
Syllabus	UNIT-1: Introduction to Banking: Introduction to Indian Financial System - Meaning of a Bank and Customer Bank and customer Relationship - Role of commercial banks in Economic Development - Evolution of Banking in India – origin, nationalization, reforms and Financial Inclusion in India - Financial statements of banks with special focus on Indian banks - Financial statement analysis of banks: CAMEL Approach, Key Performance indicators-Sources of Bank Funds.	UNIT-I: Financial System in India: Introduction - Evolution of Banking - Phases of development - RBI and the Financial System - Committees on Banking Sector Reforms - Prudential Banking -- RBI Guidelines and directions.
	UNIT-2: Uses of Bank Funds: Features of Bank Credit - types of lending - assessment of credit worthiness of a prospective borrower - management of credit process - different types of loans and their features - Loan Pricing: The basic model, pricing fixed & floating rate loans, cost -benefit loan pricing, Customer Profitability Analysis - Non Performing Assets: - gross and net concept of NPAs, causes, implications & recovery of NPAs	UNIT-II: Organization, Structure and Functions of RBI and Commercial Banks: Introduction - Origination, Structure and Functions of RBI and Commercial Banks - Role of RBI and Commercial Banks - Lending and Operation policies - Banks as Intermediaries - NBFCs - Growth of NBFCs - FDI in Banking Sector - Banking Regulations - Law and Practice.
	UNIT-3: Regulation and Innovations in Banking System: Regulation of Bank Capital: The need to regulate Bank Capital - Concept of Economic Model - Concept of Regulatory Capital, Basel Accords I,II and III. - Banking Innovations - Core Banking Solution - Retail Banking - Products & Services: Nature, Scope, Future and	UNIT-III: Risk Management in Banks: Introduction - Asset/Liability Management Practices – Credit Risk Management - Credit Risk Models - Country Risk Management - Insurance Regulations and Development Authority (IRDA).

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	Strategies - Plastic Money - National Electronic Funds Transfer - ATM - Mobile Phone Banking - Net Banking- Banc- assurance. Changing role of Banks as Financial Intermediaries. Customer service quality in Indian banking industry	
	UNIT-4: Introduction to Insurance: Insurance as a Risk Management Tool- Principles of Insurance - Characteristics of Insurance contract - Functions of Insurers: Production, Underwriting, Rate Making, Managing Claims and Losses, Investment & Financing, Accounting & Record Keeping and other miscellaneous functions - Types of Insurers- Concept of Reinsurance, uses and advantages - Marketing channels: Agents & brokers – professionalism, remuneration, responsibilities, classification, criteria for appointment and capital adequacy norms for broker - an overview of IRDA	UNIT-IV: Financial Institutions and Development Banking: Introduction - Origin, Growth and Lending Policies of Terms lending Institutions - Working of IDBI - IFCI - STCs - SIDBI - LIC - GIC - UTI - Role of Financial Institutions in Capital Market.
	UNIT-5: Life Insurance and General Insurance: The concept of Life Insurance - types of Life Insurance contracts - Tax treatment of Life Insurance- Life Insurance Products- Classification of Life Insurance - The Actuarial Science- Provisions of Life Insurance contracts - Special Life Insurance forms - Health and General insurance–Overview, Types, Third Party Administrators- Micro Insurance in India	UNIT-V: New Financial Instruments and Institutions: Private Banks - Old generation and New generation private banks - Foreign Banks - NSE - Depositories - DFHI - New Equity and Debt Instruments - SEBI and RBI guidelines.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Financial Markets and Services	Financial Markets and Services
Course Code	174FI4E01	194FI3E03
Syllabus	UNIT-1: Structure of Financial System: Role of Financial System in Economic Development – Financial Markets and Financial Instruments – Capital Markets – Money Markets – Primary Market Operations – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector Problems and Reforms.	UNIT -1:Structure of Financial System – role of Financial System in Economic Development – Financial Markets and Financial Instruments – Capital Markets – Money Markets – Primary Market Operations – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector Problems and Reforms.
	UNIT-2: Financial Services: Concept, Nature and Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India.	UNIT-II: Financial Services: Concept, Nature and Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning-Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India. Leasing – types of Leases – Evaluation of Leasing Option Vs. Borrowing.
	UNIT-3: Venture Capital: Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital, Leasing – types of Leases – Evaluation of Leasing Option Vs. Borrowing	UNIT-III: Venture Capital – Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context.
	UNIT-4: Credit Rating: Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements –	UNIT-IV: Credit Rating – Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Mutual Funds – Concept and Objectives, Functions and Portfolio Classification,

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	Factoring in the Indian Context;	Organization and Management, Guidelines for Mutual Funds. Working of Public and Private Mutual Funds in India. Debt Securitization – Concept and Application – De-mat Services-need and Operations-role of NSDL and CSDL.
	UNIT-5: Mutual Funds: Concept and Objectives, Functions and Portfolio Classification, Organization and Mangement, Guidelines for Mutual Funds, Working of Public and Private Mutual Funds in India. Debt Securitisation – Concept and Application – De-mat Services-need and Operationsrole of NSDL and CSDL.	UNIT-V: Microfinance: Over view of Microfinance, Indian Rural financial system, introduction to Microfinance, Microfinance concepts, products, (savings, credit, insurance, pension, equity, leasing, hire-purchase service, Microfinance in kind, Micro-remittances, Micro Securitization. Microfinance models: Generic models viz. SHG, Grameen, and Co-operative, variants SHG NABARD model, SIDBI model, SGSY model, Grameen Bangladesh model, credit unions. Poverty and Need of Microfinance. Gender issues in Microfinance.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Taxation	Taxation
Course Code	174FI4E04	194FI3E04
Syllabus	UNIT-1: Direct and Indirect Taxes: Income Tax Act 1961 – Basic concepts – Income – Agricultural Income – Residential Status – Income exemption from tax – Income from House Property – Computation of Salary Income – Income from Business and Profession – Capital Gain from other sources – computation of Total Income. Indirect Taxes – Excise Duty – Introduction – Nature – Basic Concepts – Types and Taxable Event for Excise Duty.	UNIT-I: General Principles of Tax – Direct and Indirect Taxes – State Power to Levy Tax – Tax System – Provisions of Income Tax Act 1961 – Finance Act – Basic Concepts.
	UNIT-2: CENVAT : Input Goods and Services for CENVAT – Capital Goods for CENVAT – Exempted Final Products / Output Services – Customs Duty – Introduction – Basic Concepts – Scope and Converge of Customs Duty – Nature of Customs Duty – Classification for Customs – Types of Custom Duties – Exemptions from Customs Duty – Valuation for Customs Duty.	UNIT-II: Income Tax – Deductions, Computation, Payment and Accounting-deductions from Gross Total Income, Rebates and Reliefs and Computation of Taxable Income and Tax Payable, Filing of Income Tax Returns – Provisions, Forms and Due Dates, Notices and Assessments.
	UNIT-3: Introduction to Tax Planning: Nature of Tax – Essential components in levy of tax – Legal Principles of taxation laws – Five basic Rules of interpretation of statues – Law Lexicon and Legal Maxims – Concepts of Tax Avoidance, Tax Evasion – Tax Planning and Tax Management.	UNIT-III: Tax Planning for Firms, HUFs and AOPs- partnership firm under Income Tax Law, tax deductions available to firms, Provisions relating to interest and remuneration paid to partner, Computation of partnership firms' book profit, Set-off and carry-forward of losses of Firms and taxation of HUFs and Associations of Persons (AOPs).

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	UNIT-4: Tax Management Decisions: Tax considerations - Management Decisions, such as make / buyown/lease - export/local sale - Guidelines to Tax planning – Relief's – Concessions – Rebates – Deductions – Incentives (Payment of Advance Tax) – Filing of Returns – Refunds – Penalties for non-compliance.	UNIT-IV: Corporate Taxation-Computation of taxable income, Carry-forward and set-off of losses for companies, Minimum Alternative Tax (MAT), Set-off and Carry-forward of Amalgamation Losses, Tax Planning for Amalgamation, Merger and Demerger of Companies, Tax Provisions for Venture Capital Funds.
	UNIT-5: Multi National Taxation: Bilateral Tax Treaties- Transfer Pricing for Tax Planning – Uses of Inter Company Loans- Tax Intensives Organizational Setup of MNCs- Tax Reliefs and Rebates in India- Tax Credits- Tax Havens- Investment Decision on Tax Planning- Global Investment and Tax Incentives- Transfer Pricing Methods- Measures to Plug Tax Loopholes.	UNIT-V: Tax Audit and Accounting for Income Tax - Tax Audit, Qualities and Qualifications Required in Tax Auditors, Forms, Reports and Returns and Tax Reporting and Disclosure in Financial Statements.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	CONSUMER BEHAVIOR	CONSUMER BEHAVIOR
Course Code	174MA3E01	194MA3E01
Syllabus	UNIT-1: Introduction to Consumer Behavior: Understanding consumers and market segments. Evolution of consumer behavior, consumer analysis and business strategy. Models of Buyer Behavior, Howard Model, Howard- Sheth Model, EKB Model, Webster and Wind Model and Sheth Industrial Buyer Behavior Model.	UNIT-I: Introduction to Consumer Behaviour: Consumer Behaviour – Definition, Consumer and Customers, Buyers and Users, Organisations as Buyers, Development of Marketing Concept, Consumer Behaviour and its Applications in Marketing, Consumer Behaviour and Marketing Communications: Introduction, Marketing Communication Flow, Communications Process, Interpersonal Communication, Persuasive Communications,
	UNIT-2: Psychological Foundations of Consumer Behavior: Consumer Motivation, Perception, Personality and Behavior, Learning and Behavior Modification, Information Processing, Memory Organization and Function, Attitude Formation and Attitude Change. Social and Cultural Environment Economic, Demographic, Cross Cultural and Socio–Cultural Influences, Social Stratification, Reference Groups and Family, Personal influence.	UNIT-II: Marketing Segmentation and Positioning: Introduction, Requirements for Effective Segmentation, Bases for Segmentation, Product Positioning: An Introduction, Positioning Strategy, Positioning Approaches, Positioning Errors Consumer Motivation: Introduction, Needs and Goals, motivational Conflict, Defense Mechanisms, Motive Arousal, Motivational Theories, Maslow's hierarchy of needs
	UNIT-3: Communication and Consumer Behavior: Components of communications process, designing persuasive communication and Diffusion of Innovations. Consumer Decision Processes High and Low Involvement, Pre -purchase Processes, Post Purchase processes, Consumption and evaluation, Brand Loyalty and Repeat Purchase Behavior	UNIT-III: Situational Influence on Consumer's Decision and the Decision Models: Introduction, Nature of Situational Influence, Situational Variables, Types of Consumer Decisions, Nicosia Model of Consumer Decision-making (Conflict Model), Howard-Sheth Model (also called Machine Model), Engel, Blackwell, Miniard Model (also called Open

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		System).
	UNIT-4: Consumerism: The roots of consumerism, consumer safety, consumer information, environmental concerns, consumer privacy, legislative responses to consumerism and marketer responses to consumer issues.	UNIT-IV: Consumer Personality: Introduction, Self-concept, personality Theories, Brand Personality, emotions Consumer Perception: Introduction, Sensation (Exposure to Stimuli), Perceptual Selection, Perceptual Organisation, Factors that Distort Individual Perception, Price Perceptions, Perceived Product and Service Quality, Consumer Risk Perceptions.
	UNIT-5: Consumer Protection: Consumer Protection Act 1986, Central consumer protection council, state consumer protection councils, consumer disputes redressal agencies, consumer disputes redressal forum, National Consumer Disputes Redressal Commission.	UNIT-V: Consumer Decision-making Process – Problem Recognition, Information Search and Evaluation of Alternatives: Introduction, Problem Recognition, Information Search, Evaluation of Alternatives. Outlet Selection, Purchase and Post Purchase Behaviour, Introduction, Outlet Selection and Purchase, Post Purchase Behaviour

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Retail Management	Retail Management
Course Code	174MA3E02	194MA3E02
Syllabus	UNIT-1: Basic concept of retailing: Retail development – types and functions of retailers – multi channel retailing – organized retailing in India – special characteristics of retailing services retailing legislation for retailing in India.	UNIT-I: Introduction to Retailing: Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Retailing Marketing Environment: Elements in a Retail Marketing Environment, Environmental Issues, Indian vs. Global Scenario.
	UNIT-2: Retail strategy: market strategy – retail format and target market – building sustainable competitive advantage – growth strategies – strategic retail planning process.	UNIT-II: The Retail Marketing Segmentation: Introduction, Importance of Market, Segmentation in Retail, Targeted Marketing Efforts, Criteria for Effective Segmentation, Dimensions of Segmentation, Positioning Decisions , Limitations of Market Segmentation Store Location and Layout: Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies
	UNIT-3: Retail location: Types, location opportunities – selection of location and Site analysis - financial strategy – strategic profit model – setting and measuring performance objectives	UNIT-III: Store Location and Layout: Introduction, Target Market and Retail Format, Gauging Growth Opportunities, Building a Sustainable Competitive Advantage, the Strategic Retail Planning Process, Differentiation Strategies, Positioning Decisions, Retail Pricing-Introduction, Establishing Pricing Policies, Factors Influencing Pricing, Pricing Strategies, Psychological pricing, Mark-up and Mark-down Pricing.

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	UNIT-4: Store layout and design: Store operations and inventory management- Merchandise planning and control - Buying merchandise – Developing Assortment plan.	UNIT-IV: Customer Relationship Management in Retailing-Introduction, Benefits of Relationship Marketing, Management of Relationship, Principles of CRM, Customer Relationship Management Strategies, Components of CRM, Customer Service in Retailing, CRM and Loyalty Program Understanding Integrated Marketing Communication, - Integrated marketing process, Tools of IMC, Upcoming tools of IMC, Factors influencing the Increased use of sales promotion.
	UNIT-5: Retail Pricing Strategy: Category Management, Customer services – Retail branding - International retailing – Promotional strategies – advertising, sales promotion, Store atmosphere.	UNIT-V: International Retailing-Introduction, Stages in Retail Global Evolution, Reasons for Going Global, Benefits of Going Global, Other Opportunities and Benefits of Going Global, Market Entry Methods

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Logistics and supply chain management	Supply chain management and analytics
Course Code	174MB4T16	194MB4T14
Syllabus	UNIT-1: Logistics and Competitive strategy: Competitive advantage – Gaining Competitive advantage through logistics-Integrated supply chains– Competitive performance - Models in Logistics Management - Logistics to Supply Chain Management – Focus areas in Supply Chain Management.- Customer service and retention- Basic service capability Value added services	UNIT-1: Logistics and Competitive strategy: Competitive advantage – Gaining Competitive advantage through logistics-Integrated supply chains– Competitive performance - Models in Logistics Management - Logistics to Supply Chain Management – Focus areas in Supply Chain Management.- Customer service and retention- Basic service capability Value added services.
	UNIT-2: Measuring logistics costs and performance: The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom-line – Impact of Logistics on shareholder value - customer profitability analysis –direct product profitability – cost drivers and activity-based costing.	UNIT-2: Measuring logistics costs and performance: The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom-line – Impact of Logistics on shareholder value - customer profitability analysis –direct product profitability – cost drivers and activity-based costing.
	UNIT-3: Logistics and Supply chain relationships: Benchmarking the logistics process and SCM operations –Mapping the supply chain processes – Supplier and distributor benchmarking – setting benchmarking priorities –identifying logistics performance indicators –Channel structure – Economics of distribution –channel relationships –logistics service alliances. .	UNIT-3: Logistics and Supply chain relationships: Benchmarking the logistics process and SCM operations – Mapping the supply chain processes – Supplier and distributor benchmarking – setting benchmarking priorities – identifying logistics performance indicators –Channel. structure – Economics of distribution –channel relationships –logistics service alliances. .
	UNIT-4: Sourcing, Transporting and Pricing Products: sourcing decisions and transportation in supply chain –	UNIT-IV: Fuzzy Logic and Techniques-Application in SCM - Recent issues in SCM: Role of computer/ IT in supply

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	infrastructure suppliers of transport services – transportation economics and pricing – documentation - pricing and revenue management Lack of coordination and Bullwhip Effect - Impact of lack of coordination. - CRM –Internal supply chain management -	chain management, CRM Vs SCM, Benchmarking concept, features and implementation, outsourcing –basic concepts, value addition in SCM – concept of demand chain management.
	UNIT-5: Managing global Logistic: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy – Global strategy –Global purchasing – Global logistics – Channels in Global logistics –Global alliances.	UNIT-5: Managing global Logistic: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy – Global strategy –Global purchasing – Global logistics – Channels in Global logistics –Global alliances

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Global HRM	International human resource management
Course Code	174HR4E02	194HR4E06
Syllabus	Introduction: A Global HR Perspective in New Economy- Challenges of Globalization - Implications of Managing People and Leveraging Human Resource- - Conflicts - Strategic Role of International HRM – Global HR Planning – Staffing policy – Training and development – performance appraisal –International Labour relations – Industrial democracy – Talent crunch – Indian MNCs and Challenges - Legal content of Global HRM.	UNIT-I: Introduction: A Global HR Perspective in New Economy- Challenges of Globalization - Implications of Managing People and Leveraging Human Resource - Strategic Role of International HRM – Distinction between Domestic and International HRM – HR Challenges at International Level.
	UNIT-2: Managing International Assignments: Significance – Selection methods - Positioning Expatriate – Repatriate – factors of consideration - Strategies - International assignments for Women - Problems.	UNIT-II: Managing International Assignments: Significance -Global HR Planning – Staffing policy – Training and development – performance appraisal –International Labour relations – Industrial democracy - Positioning Expatriate – Repatriate – factors of consideration - Strategies - Legal content of Global HRM- International assignments for Women - Problems.
	UNIT-3: Cross Culture Management: Importance – Concepts and issues – theories- considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams.	UNIT-III: Cross Culture Management: Importance – Concepts and issues – Understanding Diversity – Managing Diversity Cross- Cultural Theories – Hofstede's Model – Kluchkohn – Strodthbeck Model – Andre- Laurent' Theory – Cultural Issues. considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams. Talent crunch – Indian MNCs and Challenges.

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	UNIT-4: Compensation Management: Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – global compensation implications on Indian systems - Performance Management.	UNIT IV Compensation Management: Objectives -Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – Approaches of Compensation in Global Assignments - global compensation implications on Indian systems - Performance Management.
	UNIT-5: Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture	UNIT V Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture.

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Risk Management	Risk Management
Course Code	174FI4E03	194FI4E07
Syllabus	Introduction to Risk Management: Role of Financial Institutions- Future Trends and Global Issues- Financial Services provided by Intermediaries- Need of Risk Management- What is Risk Sources of various Risk- Risk Management frame work in Organization- Identification of Risks like Liquidity Risk, Market Risk, Foreign Exchange Risk, Operational Risk etc..	UNIT I: Introduction The concept of Risk, Nature, Need and scope of risk. Source, measurement, identification and evaluation of Risk. Types of risk– Product market risk and capital market risk. Possible Risk events, Risk Indicators, Risk Management Process– pre- requisites and fundamentals. Misconceptions of Risk. An integrated approach to Corporate Risk Management. Risk management approaches and methods. A comprehensive view of Risk in Financial Institutions. Risk reporting process–internal and external.
	UNIT-2: Measurement of Risks: Measurement of Interest Rate Risk and Market Rate Risk-Measurement of Credit Risk- Measurement of operational and Technology Risk-Measurement of Foreign Exchange and Sovereign Risk- Measurement of Liquidity Risk- Measurement of Off Balance Sheet Risks	UNIT II: Measurement and Management of Risk: Value at risk (VaR): The concept, computation, stresses testing, back testing. Cash flow at risk (CaR): VaR and CaR to make investment decisions. Managing risk when risk is measured by VaR or CaR Non-Insurance methods of Risk Management-Risk Avoidance, Loss Control, Risk Retention and Risk Transfer. Asset Liability Management (ALM): evolution & concept, RBI guidelines. Capital Adequacy. Management of interest rate risk, liquidity risk, credit risk and exchange rate risk.
	UNIT-3: Management of Risks: Risk Management Tools- Interest Rate Risk Management- Market Risk Management- Credit Risk Management- Operational Risk	UNIT III: Techniques and Tools of Risk Management: Forward contracts and Futures contracts The concept of Derivatives and types of Derivatives. The role of Derivative securities to

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	Management- Foreign Exchange and Sovereign Risk Management- Liquidity Risk Management- Management of Capital Adequacy Risk Reporting	manage risk and to exploit opportunities to enhance returns. Individuals, speculators, hedgers, arbitrageurs and other participants in Derivatives Market. Forward contracts: Definition, features and pay-off profile of Forward contract. Valuation of forward contracts. Forward Contracts to manage Commodity price risk, Interest rate risk and exchange rate risk. Limitations of Forward contract. Futures contracts: Definition. Clearing house, margin requirements, marking to the market. Basis and convergence of future price to spot price. Valuation of Futures contract. Differences between forward contracts and futures contracts. Risk management with Futures contracts–the hedge ratio and the portfolio approach to a risk– minimizing hedge.
	UNIT-4: Regulatory and Other Issues in Risk Management: Regulatory Frame Work- Revised RBI Risk Management Norms to Banks- Organizational Structure for Market and Credit Risk- SEBI, NHB- Bank for International Settlement- BASEL Committee on Banking Supervision- BASEL Settlement I,II & III- Calculation of Minimum Capital Requirements.	UNIT IV: Techniques and Tools of Risk Management: SWAPS Definition, types of swaps. Interest rate swaps, Currency swaps. Interest rate Swaps: Mechanics of Interest rate swaps. Using Interest rate Swaps to lower borrowing costs, hedge against risk of rising and falling interest rates. Valuation of interest rate Swaps. Pricing of Interest rate swaps at origination and valuing of Interest rate swaps after origination. Currency Swaps: Types of Currency Swaps. Valuation of currency swaps. Using Currency Swaps to lower borrowing costs in foreign country, to hedge against risk of a decline in Revenue, to hedge against risk of an increase in Cost, to hedge against risk of a decline in the value of an asset, to hedge against risk of a rise in the value of a liability. Pricing of currency swap at origination and valuing of currency swap after origination.
	UNIT-5: Important Concepts of Risk Management: Time Value of Money- Advance Bond ConceptsCalculation of VaR- Balck-Scholes Model- Moody's KMV Portfolio Manager- Probability Distribution and Fundamentals of Statistics- Derivative	UNIT V: Techniques and Tools of Risk Management: Options Definition of an option. Types of options: call option, put option, American option and European option. Options in the money, at the money and out of the money. Option premium, intrinsic value and

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1.1.2. Table-Prior/Post revision of syllabus (2020-21)

Regulation	Pre-Revision	Post-Revision
Course Title	Promotional and Distribution Management	Promotional and Distribution Management
Course Code	174MA4E02	194MA4E06
Syllabus	UNIT-1: Introduction to Promotional Management: Sales Display and Sales Promotion- Sales Promotion Objectives- Types of Sales Displays- Factors Influencing Sales Promotion- Tools of Sales Promotion- Sales Promotion Strategies- Sales Promotion and Consumer Behavior Consumers Price Perceptions- Perceived Risk and Attitudes- Types of Promotion.	UNIT I: Marketing Communications: The nature of marketing communications. The integration of marketing communication. Integrated marketing communication planning process. Model of marketing communications decision process. Establishing objectives and budgeting for the promotional programme.
	UNIT-2: Introduction to Distribution Management: Physical Distribution Management- The Concepts of Total Distribution Costs and Cost Trade-offs- Customer Service Standards- Strategic Issues in Physical Distribution- Challenges and Opportunities- From Physical Distribution to Marketing Logistics- Major Logistics Functions	Developing Integrated Marketing Communications: Creative strategy development. Process of execution of creative strategy: Appeals, execution styles and creative tactics. Media planning & Strategy: Developing Media Plans & Strategies and Implementation with IMC perspective.
	UNIT-3: Marketing Channels: Nature and Importance of Marketing Channels- Emergence of Marketing Channel Structures- Types of Marketing Channels- Direct Marketing Channels vs Indirect Marketing Channels- Problems in Distribution- Selection of Distribution Channels- Channel Decisions	UNIT III: Personal Selling: Role of personal selling in IMC programme. Integration of personal selling with other promotional tools. Personal selling process and approaches. Evaluating, motivating and controlling sales force effort.
	UNIT-4: Channel Institutions and Designing Channel System: Wholesaling- Agent Wholesaling Middle Man- Patterns in Wholesaling- Wholesaler Marketing Decision- Changing Patterns Channel Design Decisions- Channel Design	UNIT IV: Sales Promotion and Support media: Sales Promotion - objectives, consumer and trade oriented sales promotion. Developing and operating sales promotion for consumers & trade: Sales promotion tools: off - shelf offers, price promotions, premium promotions,

	Products and its Markets- Margin and Mark-to-Market.	time value of options. Pricing of call and put options at expiration and before expiration. Options on stock indices and currencies. The Binominal option pricing model (BOPM): assumptions - single and two period models. The Black & Scholes option pricing model (BSOPM): assumptions.

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	Comparison Factors- Ideal Channel Structure-Types of Channels- Implementation and Integration of Channel Design.	prize promotions. Coordinating Sales promotions and advertisement. Support media – Elements of Support media and their role. Direct marketing, the internet & Interactive Marketing, publicity and public relations. Monitoring, evaluating & controlling promotion programme.
	UNIT-5: Ethical and Social Issues in Distribution Management: Business Ethics and Sales Management - Ethical Issues facing Sales Managers - Managing Sales Ethics - Modeling Ethical Behavior - Making Decisions on Ethical Problems - Building a Sales Ethics Programme International Distribution - Challenges in Managing an International Distribution Strategy.	UNIT V: Distribution Management: Role and functions of channels of distribution. Distribution Systems. Distribution cost, control and customer service. Channel design, and selection of channels, selecting suitable channel partners. Motivation and control of channel members. Distribution of Services, market logistics & supply chain management

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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

Signature of the HOD

Head of the Department
Department of MCA
Aditya Engineering Colle

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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Signature of the HOD

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