

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

COURSE STRUCTURE – R-18**I B. Tech – I Semester**

S. No	Course Code	Course Title	Hours Per week			Credits
			L	T	P/D	
1	BS 101	Mathematics-I	3	1	0	4
2	ES 101	Basic Electrical Engineering	3	1	0	4
3	ES 102	Engineering Drawing & Computer Graphics	1	0	4	3
4	BS 103	Engineering Physics	3	1	0	4
5	ES 104	Basic Electrical Engineering Lab	0	0	2	1
6	BS 105	Engineering Physics Lab	0	0	3	1.5
		Induction Programme				
		Total Credits	10	3	9	17.5

I B. Tech – II Semester

S. No	Course Code	Course Title	Hours Per week			Credits
			L	T	P/D	
1	BS 201	Mathematics-II	3	1	0	4
2	ES 203	Programming for Problem Solving	3	0	0	3
3	HS 201	English	2	0	0	2
4	BS 203	Engineering Chemistry	3	1	0	4
5	HS 202	English Language and Communication Skills Lab	0	0	2	1
6	ES 205	Programming for Problem Solving Lab	0	0	4	2
7	ES 206	Workshop and Manufacturing Practices	1	0	4	3
8	BS 205	Chemistry Lab	0	0	3	1.5
		Total Credits	12	1	13	20.5

II B.Tech – I Semester

S. No.	Course Code	Course Title	Hours Per week			Credits
			L	T	P/D	
1	F210B	Biological sciences	2	0	0	2
2	F213A	Instrumentation and Metrology	3	1	0	3
3	F213B	Thermodynamics	3	1	0	3
4	F214E	Basic Electronics Engineering	3	0	0	3
5	F213C	Materials Engineering	3	0	0	3
6	F213D	Engineering Mechanics	3	1	0	3
7	F2131	Machine drawing Practice	0	0	6	3
8	F2143	Basic Electronics lab	0	0	3	1.5
9	F210D	Environmental science	2	0	0	0
		Total Credits	19	3	9	21.5

II B.Tech – II Semester

S. No.	Course Code	Course Title	Hours Per week			Credits
			L	T	P/D	
1	F220A	Mathematics III	3	1	0	4
2	F223A	Theory of Machines -I	3	1	0	3
3	F223B	Manufacturing Technology -I	3	0	0	3
4	F223C	Mechanics of Solids	3	1	0	3
5	F220B	Managerial Economics and Financial Analysis	3	0	0	3
6	F2231	Materials Engineering Lab	0	0	3	1.5
7	F2232	Instrumentation & Metrology Lab	0	0	3	1.5
8	F2233	Manufacturing Technology Lab	0	0	3	1.5
9	F220F	Gender sensitization	2	0	0	0
		Total Credits	17	2	9	20.5



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UGC AUTONOMOUS

Bhaskar Nagar, Moinabad (M), RR Dist, Telangana-500075

B.Tech.: ME	L	T-P-D	C
I Year -I Semester	3	1-0-0	4

MATHEMATICS-I (LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS)

(COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM & MIE)

Course Objectives: The student will

- Learn the Matrix algebra and its uses in solving system of linear equations and in solving Eigen value problems.
- Understand an over view of ordinary differential equations in First order & higher order.
- Gain the knowledge on Sequence & nature of series

Course outcomes: After the completing the course the students will able to

- Solve system of linear equations and Eigen value problems.
- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Find the nature of sequences & series.

UNIT – I: MATRICES : (10L)

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method;

System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT – II: EIGEN VALUES and EIGEN VECTORS : (10L)

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix;

Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT – III : SEQUENCES and SERIES : (10L)

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test.

Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence

UNIT – IV: FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: (8L)

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay;

Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT – V : ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER : (10L)

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $xV(x)$;

Method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.



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B.Tech.: ME	L	T-P-D	C
I Year -I Semester	3	1-0-0	4

BASIC ELECTRICAL ENGINEERING (COMMON TO CE, ME, CSE, IT & MIE)

Course objectives: The student will

- Learn the concepts of electrical circuits and its components.
- Understand about magnetic circuits, DC circuits and AC single phase and three phase circuits.
- Gain the knowledge on different types of DC/AC machines and transformers.
- Understand the various electrical installations.

Course Outcomes: After the completing the course the students will be able to

- Analyze and solve electrical circuits using network laws and theorems.
- Analyze basic electric and magnetic circuits.
- Get an exposure of working principles of electrical machines.
- Do the components installation of low voltage electrical circuits.

UNIT-I: DC Circuits:

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with DC excitation.

Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT –II: AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor.

Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC series combinations, resonance in series RLC circuit. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit.

Losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Rotating Electrical Machines: D.C Motors - principle of operation, characteristics, speed control and application of series and shunt motor.

Three-phase induction motor - construction, generation of rotating magnetic fields, principle of operation, torque-slip characteristics. Single-phase induction motor - construction, working, torque-speed characteristic.

UNIT –V: Electrical Installations: Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wires and cables, earthing.

Types of batteries, important characteristics for batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS :

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

REFERENCES:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.



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B.Tech. : ME	L	T-P-D	C
I Year -I Semester	1	0-0-4	3

ENGINEERING DRAWING & COMPUTER GRAPHICS (Theory and Lab) (COMMON TO ME, ECE & MIE)

Pre-requisites: None

Course objectives: The student will

- Learn a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- Prepare to communicate effectively
- Learn to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Outcomes: After completing this course, the students will be

- Able to understand engineering drawing and its place in society
- Exposed to the visual aspects of engineering drawing and graphics
- Exposed to engineering graphics standards
- Exposed to computer-aided geometric design
- Exposed to creating working drawings
- Exposed to engineering communication

UNIT – I: INTRODUCTION TO ENGINEERING DRAWING (2 Lecture classes and 8 Practical's):

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only);

Cycloid, Epicycloids, Hypocycloid and In volute.

UNIT – II: ORTHOGRAPHIC PROJECTIONS AND PROJECTIONS OF POINTS, LINES AND PLANES (2 Lecture classes and 12 Practical's):

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

Projections of planes inclined to the Planes- Draw simple annotation, dimensioning and scale.

UNIT – III: PROJECTIONS OF REGULAR SOLIDS AND SECTIONAL VIEWS OF RIGHT REGULAR SOLIDS (2 Lecture Classes And 12 Practical's):

Projections of regular solids - Prism, Cylinder, Pyramid, Cone – Auxiliary Views;

Draw the sectional views of geometrical solids.

UNIT – IV: ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS (2 Lecture classes and 12 Practical's): Principles of Isometric projection – Isometric Scale, Isometric Views.

Conversion of Isometric Views to Orthographic Views and Vice-versa.

UNIT – V: OVERVIEW OF COMPUTER GRAPHICS (2 Lecture classes and 16 Practical's):

Drafting Software: Computer Aided Drafting (CAD) – Drafting Software – Manual Drafting vs Auto CAD Drafting. *Auto CAD commands:* Starting Auto CAD - Auto CAD commands – (Generation of Points, Lines, Curves and Polygons) - Editing and Modifications.

Drafting Settings - Dimensioning and Text - Geometrical Constructions. Projection of Points - Straight Lines - Plane surfaces – Solids - Isometric projections

Note: CAD Lab facility is required for this unit.

(Only theory Question to be set from this Unit for Examinations)

TEXT BOOKS :

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. K. Venugopal & V. Prabhu Raja (2011), Engineering Drawing + Auto CAD, New Age International Publishers. Fifth Edition.
3. CAD Software Theory and User Manuals

REFERENCES:

1. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.



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I Year -I Semester	3	1 – 0 - 0	4

ENGINEERING PHYSICS

(COMMON TO CE, ME & MIE)

Course Objectives: The student will

- Understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- Understand the concepts found in Mechanics, Harmonic Oscillations, Acoustics and Ultrasonic's, Dielectric and Magnetic Properties, wave Optics, Lasers, Fiber Optics and a broad base of knowledge in physics.
- Understand the scientific method, so that they may use the training beneficially in their higher pursuits.
- Learn stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphere of change he will encounter during his carrier.

Course Outcomes: The student will be able to

- Gain the knowledge of Physics relevant to engineering is critical for converting ideas into technology.
- Analyze the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements.
- Exposed to the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fiber Optics.
- Analyze various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.

UNIT-I: Harmonic Oscillations

Mechanical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion.

Damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical impedance, Steady state motion of forced damped harmonic oscillator. **(10H)**

UNIT-II: Acoustics and Ultrasonic's:

Introduction, Basic requirement for the acoustically good halls, reverberation and times of reverberation, factors, effecting the architectural acoustics and their remedy, sound absorbing materials, Sabine formula, Absorption co-efficient.

Introduction to Ultrasonic's, production of Ultrasonic's, Piezo Electric method, Properties of Ultrasonic's waves, use of Ultrasonic's for non-destructive testing. **(10H)**

UNIT-III: Dielectric and Magnetic Properties:

Introduction, types of polarizations, calculation of total electronic polarisability, internal field clausius - mossotti equation, Ferro electricity.

Introduction to magnetism, origin of magnetic movement, Bohr Magnton, Classifications of Dia, Para, Ferro, Antiferro and Ferri Magnetic materials on the basis of magnetic movement, hysteresis loop, soft and hard magnetic materials.**(10H)**

UNIT-IV : Wave Optics:

Huygen's principle, Superposition of waves and interference of light by division of wave front and amplitude , Young's double slit experiment, Newton's rings.

Difference between Frenel and Frunhofer diffraction , Frunhofer diffraction from a single slit, Diffraction grating- resolving power, Polarization, Brewster's angle, Double refraction, Nicol's prism. **(10H)**

UNIT-V: Lasers and Fiber Optics :

Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fiber Optics: Introduction, Construction and working principle of Optical fiber, Acceptance angle, Acceptance cone and Numerical aperture, Types of optical fibers, Applications of optical fibers.

TEXT BOOKS:

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. Engineering Physics, Gaur and Gupta, McGraw Hills.
3. “ Optics”, Ajoy Ghatak, McGraw Hill Education, 2012A textbook of Engineering Physics,

REFERENCES:

1. “The physics of vibrations and waves”, H. J. Pain, Wiley, 2006
2. “Principles of Lasers”, O. Svelto,
3. “Introduction to Mechanics”, M.K.Verma, Universities Press
4. P.K.Palanisamy, “Engineering Physics”, Scitech Publications, Fourth edition.



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B.Tech.: ME	L	T – P - D	C
I Year -I Semester	0	0 – 2 - 0	1

**BASIC ELECTRICAL ENGINEERING LAB
(COMMON TO CE, ME, CSE &IT)**

Course Objectives: The student will

- Understand the given network by applying various electrical laws and network theorems.
- Know the response of electrical circuits for different excitations.
- Calculate measure and know the relation between basic electrical parameters.
- Gain the knowledge on performance characteristics of DC and AC electrical machines.

Course Outcomes: The student will be able to

- Get an exposure to basic electrical laws.
- Relate the response of different types of electrical circuits to different excitations.
- Implement the concepts of measurement, calculation and relation between the basic electrical parameters in engineering applications.
- Inspect the basic characteristics of transformers and electrical machines.

Choice of 10-12 experiments from the following

List of Experiments

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient response of series RL and RC circuits using DC

excitation.

4. Transient response of RLC series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
7. B-H loop for single phase transformers.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
9. Load test on single phase transformer (Calculate Efficiency and Regulation).
10. Three phase transformer: Verification of relationship between voltages and currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
11. Measurement of active and reactive power in a balanced three-phase circuit.
12. Performance Characteristics of a DC Shunt Motor.
13. Torque-Speed Characteristics of a DC Shunt Motor.
14. Performance Characteristics of a Three-phase Induction Motor.
15. Torque-speed Characteristics of a Three-phase Induction Motor.



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B.Tech.: ME	L	T – P - D	C
I Year -I Semester	0	0 – 3 - 0	1.5

ENGINEERING PHYSICS LAB (COMMON TO CE, ME &MIE)

Course Objectives: The student will

- Demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Demonstrate competency and understanding of the concepts found in Mechanical, Electric and Electronic materials a broad base of knowledge in physics.
- Solve Experimental problems that potentially draw an experimental knowledge in multiple areas of physics.
- Study applications in engineering like Hall effect, Optical fiber, LASER, Photodiode and Solar cell

Course Outcomes: The student will be able to

- Learn the experimental concepts on in Mechanical, Electric and Electronic materials.
- Get the knowledge of fundamentals of Semiconductor physics, Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
- Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- Exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

List of Experiments:

1. Melde's experiment:
To determine the frequency of a vibrating bar or tuning fork using Melde's arrangement.
2. Torsional pendulum:
To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings:
To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating:
To determine the number of lines per inch of the grating.
5. LCR Circuit:
To determine the Quality factor of LCR Circuit (Series & Parallel).
6. Stewart's and Gee's Method:
To determine the Magnetic induction by using circular coil.
7. Sonometer:
To determine the frequency of AC Supply sonometer.
8. LASER:
To study the characteristics of LASER sources.
9. Dielectric constant:
To determine the Dielectric constant of the given material.
10. Optical fiber:
To determine the Numerical aperture of a given fiber.

Note: Any 8 experiments are to be performed

Text Books:

1. "Experiments in Engineering Physics" (Physics Lab Manual 4th edition) , Dr. Narendra, L. Mathakari
2. " Engineering Physics Lab Manual" By Department of Physics JBIET.



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	3	1-0-0	4

MATHEMATICS-II
(ADVANCED CALCULUS)
(COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM & MIE)

Course Objectives: The students will

- Evaluate of improper integrals using Beta and Gamma functions.
- Find maxima and minima of function of two and three variables
- Evaluate of multiple integrals and their applications
- Understand the physical quantities involved in engineering field related to vector valued functions
- Understand the basic properties of vector valued functions and their applications to line, surface and volume integrals

Course outcomes: After the completing the course the students will able to

- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT – I: CALCULUS : (10L)

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT – II: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS) : (8L)

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative;

Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT – III: MULTIVARIABLE CALCULUS (INTEGRATION): (10L)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form);

Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

UNIT – IV : VECTOR DIFFERENTIATION : (10L)

Vector point functions and scalar point functions. Gradient, Divergence and Curl.

Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT – V : VECTOR INTEGRATION : (10L)

Line, Surface and Volume Integrals.

Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2010.



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I Year -II Semester	2	0-0-0	2

ENGLISH (COMMON TO EEE, ME, ECE, CSE, IT & MIE)

Course Objectives: The students will

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course outcomes: After the completing the course the students will able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

UNIT –I:

‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions. **Reading:**

Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II:

‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms, Homophones, Homonyms, and Homographs. **Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension. **Writing:** Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT – III :

‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English. **Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. **Reading:** Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying-** Providing Examples or Evidence and Essay Writing

UNIT – IV:

‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English. **Grammar:** Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading. **Writing: Writing Practices--**Writing Introduction and Conclusion - Précis Writing.

UNIT – V :

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage. **Grammar:** Common Errors in English.

Reading: Reading Comprehension-Exercises for Practice. **Writing: Technical Reports-** Introduction – Characteristics of a Report – Categories of Reports

TEXT BOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCES:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	3	0-0-0	3

PROGRAMMING FOR PROBLEM SOLVING (COMMON TO CE, ME, CSE, IT & MIE)

Course Objectives: The students will

- Learn the fundamentals of computers.
- Understand the various steps in program development.
- Learn the syntax and semantics of C programming language.
- Learn the usage of structured programming approach in solving problems.

Course outcomes: After the completing the course the students will be able to

- Write algorithms and to draw flowcharts for solving problems.
- Convert the algorithms/flowcharts to C programs.
- Write the code and test a given logic in C programming language.
- Decompose a problem into functions and to develop modular reusable code.
- Use arrays, pointers, strings and structures to write C programs.

UNIT – I: INTRODUCTION TO PROGRAMMING :

Introduction to components of a computer system: disks, primary and secondary Memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems. Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with

examples, Program design and structured programming. Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

UNIT – II: ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays. **Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures **Preprocessor:** Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.

UNIT – III: POINTERS AND FILE HANDLING IN C:

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type.

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT – IV : FUNCTION AND DYNAMIC MEMORY ALLOCATION:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function,

passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries. **Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

UNIT – V: INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques),

Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Reema Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill



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B.Tech.: ME	L	T-P-D	C
I Year -II Semester	3	0-0-0	3

ENGINEERING CHEMISTRY (COMMON TO CE, ME, CSE, IT & MIE)

Course Objectives: The students will

- Understand the new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
- Learn the importance of spectroscopic techniques and molecular energy levels.
- Acquire knowledge of chemical reactions those are used in the synthesis of molecules.

Course outcomes: After the completing the course the students will be able to

- Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalize bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT – I: ATOMIC STRUCTURE AND THEORIES OF BONDING:

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2 , O_2 , F_2 , CO and NO.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT – II: WATER AND ITS TREATMENT:

Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization.

Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT – III : ELECTROCHEMISTRY AND CORROSION:

Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation, determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery).

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – techniques of coating-hot dipping, cementation and electroplating of Copper.

UNIT – IV: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS:

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy.

Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

UNIT – V: REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES:

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1 , S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule.

Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

TEXT BOOKS:

1. P. C. Jain & M. Jain; Dhanpat Rai , Engineering Chemistry ,Publishing Company (P) Ltd., New Delhi.
2. C.N. Banwell , Fundamentals of Molecular Spectroscopy
3. K.P.C. Volhardt and N. E. Schore, Organic Chemistry: Structure and Function ,5th Edition.
4. B.M. Mahan, University Chemistry, Pearson IV Edition.
5. P.W. Atkins ,Physical Chemistry,
6. by B.L. Tembe, Kamaluddin and M.S. Krishnan, Engineering Chemistry (NPTEL Web-book),

REFERENCES:

1. B. L. Tembe, Kamaluddin and M.S.Krishnan, Engineering Chemistry(NPTEL web book)
2. D.Narsipuri, Stereochemistry of organic compounds ,published by New age international publishers



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	0	0-2-0	1

**ENGLISH LANGUAGE AND COMMUNICATION
SKILLS LAB
(COMMON TO EEE, ME, ECE, CSE, IT & MIE)**

Course Objectives: The students will

- Understand the nuances of English speech sounds, word accent, intonation and rhythm
- Understand about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- Improve the fluency of students in spoken English and neutralize their mother tongue influence
- Understand the use language appropriately for public speaking and interviews

Course outcomes: After the completing the course the students will be able to

- Understanding of nuances of English language through audio-visual experience and group activities
- Do neutralization of accent for intelligibility
- Improve speaking skills with clarity and confidence which in turn enhances their employability skills

The following course content is prescribed for the English for the English Language and Communication Skills Lab based on Unit -6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the lab.

SYLABUS:

**English Language and Communication Sills Lab (ELCS) will have two parts: a) Computer Assisted Language Learning (CALL) Lab:
b) Interactive Communication Skills (ICS) Lab:**

Exercise – III:

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students. **System Requirement (Hardware component):** *Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

Interactive Communication Skills (ICS) Lab:

1. **The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	0	0-4-0	2

PROGRAMMING FOR PROBLEM SOLVING LAB (COMMON TO CE, ME, CSE, IT & MIE)

Course Objectives: The students will

- Work with an IDE to create, edit, compile, run and debug programs
- Analyze the various steps in program development.
- Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- Develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files.

Course outcomes: After the completing the course the students will able to

- Formulate the algorithms for simple problems
- Translate given algorithms to a working and correct program
- Do needful corrections of syntax errors as reported by the compilers
- Identify and correct logical errors encountered during execution
- Represent and manipulate data with arrays, strings and structures
- Apply pointers of different types
- Create, read and write to and from simple text and binary files
- Modularize the code with functions so that they can be reused.
- Modularize the code with functions so that they can be reuse

1.SIMPLE NUMERIC PROBLEMS:

- a) Write a program for find the max and min from the three numbers.
- b) Write the program for the simple, compound interest.
- c) c)Write program that declares Class awarded for a given percentage of marks, where mark $<40\%$ = Failed, 40% to $<60\%$ = Second class, 60% to $<70\%$ =First class, $\geq 70\%$ = Distinction. Read percentage from standard input.

2. EXPRESSION EVALUATION:

- a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
- b) Write a program that finds if a given number is a prime number
- c) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of these quence.
- d) Write a C program to find the roots of a Quadratic equation.

3.ARRAYS AND POINTERS AND FUNCTIONS:

- a) Write a C program to find the minimum, maximum and average in an array of integers.
- b) Write a C program to find Addition of Two Matrices
- c) Write a C program to find Multiplication of Two Matrices
- d) Write C programs that use both recursive and non-recursive functions
- e) Write a program for reading elements using pointer into array and display the values using array.

4.Files:

- a) Write a C program to display the contents of a file to standard output device.
- b) Write a C program which copies one file to another, replacing all lowercase characters with their upper case equivalents.

- c) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

5. Strings:

- a) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- b) Write a C program to count the lines, words and characters in a given text.

6. Sorting and Searching:

- a) Write a C program for using binary search method.
- b) Write a C program for linear search.
- c) Write a C program that implements the Bubble sort method.
- d) Write a C program that implements the Insertion sort method.
- e) Write a C program that implements the Quick sort method.
- f) Write a C program that implements the Merge sort method.

ADDITIONAL PROGRAMS (Given to Students as Assignment):

- 1) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
- a. $5 \times 1 = 5$
 - b. $5 \times 2 = 10$
 - c. $5 \times 3 = 15$
- 2) Write a program that shows the binary equivalent of a given positive number between 0 to 255.
- 3) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- 4) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- 5) Write a C program to calculate the following, where x is a fractional value. $1 - x/2 + x^2/4 - x^3/6$.
- 6)) Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$.
- 7) Write a C program to find the minimum, maximum and average in an array of integers.
- 8) Write a functions to compute mean, variance, Standard

Deviation, sorting of n elements in single dimension array.

- 9) Write a C program that uses functions to perform the following:
 - (a) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
 - (b) To find the factorial of a given integer.
 - (c) To find the GCD (greatest common divisor) of two given integers.
- 10) Write a C program that does the following:
 - (a) It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.
 - (b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
- 11) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
- 12) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- 13) Write a C program that uses functions to perform the following operations:
 - (a) To insert a sub-string in to a given main string from a given position.
 - (b) To delete n Characters from a given position in a given string.
- 14) Write a C program to construct a pyramid of numbers as follows:

1	*	1	1
1 2	**	2 3	2 2
1 2 3	***	4 5 6	3 3 3
			4 4 4 4
- 15) Write a C program that sorts a given array of names.

Suggested Reference Books for solving the problems:

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
3. Hall of India
4. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
5. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	1	0-4-0	3

WORKSHOP AND MANUFACTURING PRACTICES (COMMON TO CE, ME, ECE, ECM & MIE)

Pre-requisites: None

Course objectives: The student will

- Learn fabricating small components using engineering tools and machines
- Understand the working principles of maintaining dimensional accuracies and dimensional tolerances in different manufacturing processes
- Understand assembly of various components.

Course Outcomes: After completing this course, the students will able to

- Fabricate components with their own hands.
- Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- Produce small components of their interest by assembly

(I) WORKSHOP AND MANUFACTURING PRACTICES – 10

Lecture hours

1. Brief introduction to Manufacturing processes : –
 - a. machining on lathe, milling and drilling machines,
 - b. basic process involved in the casting,
 - c. brief process of forging , forming,
 - d. metal joining , brief process of gas welding **(3 hours)**
2. Demo of working of CNC machine **(2 hours)**
3. Fitting operations & power tools **(1 hour)**

4. Electric house wiring (**1 hour**)
5. Carpentry (**1 hour**)
6. Metal casting (**1hour**)
7. Welding (arc welding & gas welding), brazing (**1hour**)

(II) WORKSHOP PRACTICE: 60 hours

1. Machine shop (**12 hours**) - on Lathe , Milling and drilling
2. Fitting shop (**8 hours**)
3. Carpentry (**8 hours**)
4. Electrical house wiring (**8 hours**)
5. Welding shop (**8 hours (Arc welding 4 hrs + gas welding 4 hrs)**)
6. Foundry practices – mould preparation (**8 hours**)
7. Smithy – Black smithy and Tin smithy (**8 hours**)

TEXT BOOKS :

1. HajraChoudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,”Manufacturing Technology – I” Pearson Education, 2008.

REFERENCES:

1. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
2. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.



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B.Tech. : ME	L	T-P-D	C
I Year -II Semester	0	0-3-0	1.5

CHEMISTRY LABORATORY (COMMON TO CE, ME, CSE, IT & MIE)

Course Objectives: The student will

- Estimate the hardness & chloride content in water to check its suitability for drinking purpose.
- Determine the rate constant of reactions from concentrations as a function of time.
- Gain the knowledge about measurement of physical properties like adsorption and viscosity.
- Synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course outcomes: After completion of the lab the student will be able to:

- Determine the parameters like hardness and chloride content in water.
- Estimate the rate constant of a reaction from concentration – time relationships.
- Determine the physical properties like adsorption and viscosity.
- Calculate R_f values of some organic molecules by TLC technique.

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO_4
7. Estimation of amount of Cu^{+2} by Colorimetry
8. Estimation of amount of KMnO_4 by Colorimetry
9. Synthesis of Aspirin and Paracetamol
10. Determination of acid value of coconut oil
11. Thin layer chromatography calculation of R_f values. egortho and para nitro phenols
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

REFERENCES:

1. B.D. Khosla, A. Gulati and V. Garg ,Senior practical physical chemistry, B (R. Chand & Co., Delhi)
2. K.K. Sharma and D. S. Sharma , An introduction to practical chemistry, (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. S.S. Dara, Text book on Experiments and calculations in engineering chemistry.



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B.Tech: Mech	L	T-P-D	C
II Year -I Semester	2	0-0-0	2

(F210B) BIOLOGICAL SCIENCES

(Common to ME&CE)

Course Objectives: The student will

- Understand the basics of biology such as cell structure and functions
- Gain the knowledge on inheritance & evolution, systems of human life
- Learn basic concepts of genetics
- Learn basic concepts of microbiology

Course outcomes: After completing the course the students will be able to

- Obtain the Knowledge of basic biology
- Acquire the Knowledge of Human Biological Systems
- Gain the knowledge of Nutrients
- Collect the Knowledge on Microorganisms
- Acquire the knowledge geneexpression

UNIT - I:

Basic Biology : Introduction, Living organisms

Functions of cell organelles: Cell structure and Organelles, Organogenesis.

UNIT - II:

Human Anatomy: Systems of Life-Digestion, Respiration, Circulatory systems.

Excretion, Reproduction, and Nervous systems.

UNIT - III:

Biochemistry: Diet and Nutrition-Macro (Carbohydrates, proteins, lipids) - and Micronutrients (vitamins)

Minerals: Essential minerals and their role; deficiency symptoms; and their role; deficiency symptoms.

UNIT - IV:

Microbiology: Micro organisms-Classification of Microorganisms

Advantages and disadvantages of microorganisms: Beneficial and harmful effects of Bacteria, Fungi and Viruses.

UNIT - V:

Genetics: Basic principles of Mendel, molecular genetics, structure and function of genes and chromosomes

Gene expressions: Transcription and Translation, gene expression and regulation

TEXT BOOKS:

1. P K Gupta ,”Elements of Biotechnology”, RASTOGI Publications
2. Dr RC Dubey” Advanced Biotechnology”, S Chand Publications.

REFERENCE BOOKS:

1. “Cell biology” Rastogi Publications
2. Microbiology, PELCZAR
3. Biotechnology, U. sathyanarayana



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B.Tech: ME	L	T-P-D	C
II Year - I Semester	3	1-0-0	3

(F213A) INSTRUMENTATION AND METROLOGY

Course Objectives: The student will

- Get strong foundation in basic science and mathematics necessary to formulate, solve and analyze Control and Instrumentation problems
- Understand the different measurements in Instrumentation
- Learn about Instrumentation systems and their applications.
- Identify tolerances, limit gauges.
- Learn about surface roughness measurements and coordinate measuring machines

Course Outcomes: The student will be able to

- Understand basic instruments and analyze transducers.
- Know about various instruments for measurements
- Understand and analyze Instrumentation systems and their applications to various industries.
- Obtain good knowledge about limit gauges, tolerances
- Measure surface roughness and coordinates of the components

Pre-requisite: Engineering Mechanics

Unit-I

Definition – Basic principles of measurement – Measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. Dynamic performance characteristics – sources of error, Classification and elimination of error

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

Unit-II

Measurement Of Temperature: Classification – Various Principles of measurement – Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

Measurement of Pressure: Classification – different principles used. Manometers, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge.

Measurement of Flow: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer (LDA)

Unit-III

Measurement of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Non- contact type of tachometer.

Strain Measurements: Strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending, Strain gauge Rosettes.

Measurement Of Force, Torque And Power: Elastic force meters, load cells, Torsion meters, Dynamometers

Unit-IV

Limits, fits and tolerances- Unilateral and bilateral tolerance system, hole and shaft basis system. Interchangeability and selective assembly. FD and IT grades and fit designations **Limit Gauges:** Taylor's principle, Design of GO and NO GO gauges Measurement of angles, Bevel protractor, and Sine bar. Measurement of flat surfaces, straight edges, surface plates, optical flat and auto collimator, precision polygon

Unit-V

Surface Roughness Measurement: Roughness, Waviness. Surface roughness parameter symbols, Roughness measurement by Taylor Hobson. Methods of measurement of surface finish, Talysurf. Screw thread measurement, Gear measurement; Machine Tool Alignment Tests on lathe, milling and drilling machines

Coordinate Measuring Machines: Types and Applications of CMM.

TEXTBOOKS:

1. Measurement Systems: Applications and Design: D.S. Kumar, Anuradha Agencies.
2. Instrumentation, Measurement and Analysis: B.C. Nakra & K.K. Choudhary, TMH.
3. Engineering Metrology / IC Gupta / Danpath Rai.
4. Engineering Metrology / R/K / Jain / Khanna Publishers

REFERENCES:

1. Instrumentation and Control Systems: S. Bhaskar, Newage Publications, 1998.
2. BIS Standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
3. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson.



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B.Tech.ME	L	T-P-D	C
II Year - I Semester	3	1-0-0	3

(F213B) THERMODYNAMICS

Course Objectives: The student will

- Get basic knowledge of comprehensive and rigorous treatment of classical thermodynamics while retaining an engineering perspective.
- Understand the groundwork for subsequent studies in such fields as fluid mechanics, heat transfer and to prepare the students to effectively use thermodynamics in the practice of engineering.
- Develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments.
- Get a wealth of real world engineering examples to give students a feel for how thermodynamics is applied in engineering practice

Course Outcomes: Students will be able to

- Understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
- Conduct experiments regarding the measurement and calibration of temperatures and pressures in groups.
- Identify the properties of substances on property

- diagrams and obtain the data from property tables
- Define energy transfer through mass, heat and work for closed and control volume systems.
 - Apply Second Law of Thermodynamics and entropy concepts in analyzing the thermal efficiencies of heat engines such as Carnot and Rankine cycles and the coefficients of performance for refrigerators.

UNIT – I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries and Universe, Types of Systems, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle – Reversibility – Quasi – static Process – various Non -flow processes, properties, end states, Heat and Work Transfer, , Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points

– Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale-Joule’s Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation - Throttling and Free Expansion Processes – Flow processes.

UNIT-II

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump , Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics

UNIT – III

Perfect Gas Laws – Equation of State, specific and Universal Gas, changes in Internal Energy, enthalpy, entropy and specific heats, various non flow processes. Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – GasTables-

Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction, Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT - IV

Mixtures of perfect Gases – Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour.

UNIT - V

Thermodynamic Cycles : Power cycles: Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, Lenoir Cycle – Description and representation on P– V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles. Comparison of air standard cycles and actual cycles.

TEXT BOOKS :

1. Engineering Thermodynamics: PK Nag /TMH, 5thEdition
2. Engineering Thermodynamics/E Rathakrishnan, PHI, second Edition,2013

REFERENCE BOOKS:

1. Engineering Thermodynamics/DP Mishra/ Cengage Learning, Second impression2012
2. Thermodynamics – An Engineering Approach – YunusCengel&Boles,TMH
3. Thermodynamics – J.P.Holman,McGrawHill



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UGC AUTONOMOUS

Bhaskar Nagar, Moinabad (M), RR Dist, Telangana-500075

B.Tech:Mech	L	T-P-D	C
II Year - I Semester	3	0-0-0	3

(F214E) BASIC ELECTRONICS ENGINEERING

UNIT – I:

Semiconductors, Energy levels, PN- Junction diode, VI-characteristics of PN- Junction, Diode as a switch, Rectifiers and Filters, Zener diode, Zener diode characteristics, Voltage regulator.

UNIT-II:

Transistor, CB-Configuration, CE-configuration, CC- Configuration, current gains α , β , γ , Relation between current gains, Q-point.

UNIT-III:

Digital Circuits: Number Systems, Binary, Octal, Hexadecimal System, Binary - Decimal, Decimal - Binary Conversions. BCD Code. Logic Gates: AND, OR, NAND, NOR. Boolean Theorems, De- Morgan's Theorem, Universal Gates. Sum of products form. Algebraic simplification.

UNIT – IV:

Designing Combinational Logic Circuits, and Adder and Subtractor. Flip-flops - RS, D, JK

UNIT –V:

Definition of Modulation and Demodulation, Principles of Amplitude and Frequency Modulation,

Block Diagram of AM and FM receivers and transmitters.
Introduction to basic communication system

TEXT BOOKS:

- (1) Electronic Devices And Circuits Millman&Halkias Mcgraw Hill (Mandatory)
- (2) Integrated Electronics Millman&HalkiasMcgraw Hill

REFERENCE:

1. Electronic DevicesandCircuits BOYLESTAD
2. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7thedition, Pearson,2014.
3. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-HillEducation



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B.Tech. ME	L	T-P-D	C
II Year - I Semester	3	0-0-0	3

(F213D) MATERIALS ENGINEERING

Course Objectives: The Students will

- Get basic knowledge and learn the structure of metals, Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity.
- Learn to construct and interpretation of phase diagrams and Learn Iron-Carbon phase diagram and different types of heat treatment processes.
- Learn structure and properties of ferrous and non ferrous metals.
- Get the basic knowledge on ceramics, polymers and composites with their properties and applications.
- Get the basic theoretical knowledge on failure theories and fracture mechanics.

Course Outcomes: The student will be able to

- Determine the structure, packing factor and grain size of different metals.
- Draw interpretation of phase diagrams and determine the phases of metals at different temperatures.
- Identify the properties and structure of ferrous and non ferrous metals.

- Classify ceramics, polymers and composites with their properties and applications.
Understand the theory behind failures in materials.

Pre-requisite: Engineering Physics

UNIT – I

Engineering Materials and their properties: Grains and Grain Boundaries. Effect of grain size on the properties. Determination of grain size by different methods.

Testing of material and their properties: Tensile, compression and torsion tests; Young's modulus; stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, Hardness, resilience, toughness and elastic recovery.

UNIT –II

Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

Phase Diagrams: Construction and interpretation of phase diagrams, Phase rule and Lever rule. Binary phase Diagrams: Isomorphous, Eutectic, Eutectoid and Peritectic transformations with examples

Engineering Materials –I STEELS:

Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe₃C phase diagram. Construction of

TTT diagrams. Annealing, Normalizing, Hardening and Tempering of steels, Hardenability, Alloy steels. BIS designation of steels.

UNIT –III

Engineering Materials –II: CAST IRONS: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron and Nodular Cast Iron.

Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – IV

Engineering Materials–IV:

Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties and applications. Classification, properties and applications of composites. Classification, Properties and applications of Polymers.

UNIT – V

Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximum normal stress, Mohr-Coulomb and Modified Mohr-Coulomb;

Fracture mechanics: Introduction to Stress-intensity factor approach and Griffith criterion.

Fatigue failure: High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue.

TEXT BOOKS:

1. Introduction to Physical Metallurgy: Sidney H. Avner, S Chand Publications, 2nd Edition,1997.
2. Material Science and Metallurgy for Engineers: Kodgire, Everest Publications, 14thEdition,2003.
3. R. Subramanian, Strength of Materials, Oxford University Press,2007.
4. W. D. Callister, 2006, “Materials Science and Engineering-An Introduction”, 6th Edition, Wiley India.

REFERENCES:

1. Materials Science and engineering: William andcallister.
2. Engineering Material and Metallurgy : ErAmandeep SinghWadhva
3. Materials Science for Engineering Students: Traugott Fischer 2009Edition.



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B.Tech: ME	L	T-P-D	C
II Year - I Semester	3	1-0-0	3

(F213D) ENGINEERING MECHANICS

Course Objectives: The student will

- Learn the concept of system of forces and its applications.
- Determine the centroid and centre of gravity of different structures.
- Understand the concept of inertia and its real time applications.
- Analyze the bodies in motion.

Course Outcomes: The student will be able to

- Understand the concept of non equilibrium and equilibrium systems under the action of different forces.
- Calculate centroids, centre of mass and centre of gravity for different shapes and assess their importance in real time engineering.
- Calculate Moment of Inertia for different areas and learn their importance in real time engineering applications.
- Analyze particles and rigid bodies under kinematics and kinetic motion.

Pre-requisites: Engineering Physics, Engineering Mathematics

UNIT-I:

Introduction to Engineering Mechanics–Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces–Forces in Space–

Moment of Force (scaler and Vector methods) and its Application–

Couples and Resultant of Force Systems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium – Equilibrium of planar Systems -Equilibrium of Spatial Systems.

UNIT-II:

Centroid : Centroids of simple figures (from basic principles)–

Centroids of Composite Figures **Centre of Gravity:** Centre of

gravity of simple body (from basic principles), centre of gravity of

composite bodies, Pappus theorem.

Area moment of Inertia : Definition–Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

UNIT-III:

Analysis of structures: Introduction- Types of trusses- Analysis of Perfect truss-Imperfect truss.

Analysis of trusses: Method of joints-Method of sections.

UNIT-IV:

Kinematics: Rectilinear and Curvilinear motions–Velocity and Acceleration–Motion of Rigid Body Types and their Analysis in Planar Motion.

UNIT–V:

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation–Central Force Motion Equations of Plane Motion–Fixed Axis Rotation–Rolling Bodies.

TEXT BOOKS:

1. Engineering. Mechanics / Timoshenko & Young.
2. Engineering Mechanics, Basudev Bhattacharya, Oxford Univ. Press, New Delhi, Second Edition, 2014.

REFERENCES:

1. Engineering Mechanics / Ferdinand. L. Singer / Harper–Collins
2. Engineering Mechanics / S.S. Bhavikatti & J.G. Rajasekharappa
3. Engineering Mechanics / Irving. H. Shames Prentice–Hall.



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B.Tech. ME	L	T-P-D	C
II Year - I Semester	0	0-0-6	3

(F2131) MACHINE DRAWING PRACTICE

Course Objectives: The student will

- Understand drawing and develop capacity to represent any object / matter with the help of graphical representation.
- Develop primary knowledge of working drawing.
- Produce drawings with orthographic projections of different machine parts.
- Develop skill to produce assembly drawings.

Course Outcomes: The student will be able to

- Analyze complex design and drawing systems related to Mechanical Engineering.
- Make use of appropriate drawing practice tools and design innovative methods.
- Get motivated to develop new innovative me
- Improve the ability to work as teams.

Pre-requisites: Engineering Drawing, Engineering Workshop

Machine Drawing Conventions :

Need for Machine Drawings – Introduction to SI Conventions – Introduction to types of Drawings and working Drawings for Machine Parts.

- a) Conventional representation of Materials, Common Machine Elements and Parts such as Screws, Nuts, Bolts, Keys, Gears, Bearings, Springs, etc.
- b) Types of Sections – Selection of sectional planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centre lines, curved and tapered features.
- d) Title boxes - size, location and details - common abbreviations in general usage

I. Drawing of Machine Elements and Simple Parts

Selection of Views, additional views for the following machine elements and parts with easy drawing proportions.

- a. **Screw Threads and Fasteners** - Popular forms of Screw Threads, Bolts, Nuts, Stud Bolts, Tap Bolts, Set Screws.
- b. **Keys** – Saddle Keys, Sunk Keys, Feather Keys, Woodruff Keys, Splines
- c. **Cotter Joints** – with Sleeves, with Socket and Spigot ends, with Gibs
- d. **Pin Joints** – Knuckle Joint.

- e. **Riveted Joints:** Various types of Riveted Joints for plates.
- f. **Welded Joints:** Various types of Welded Joints and Symbols.
- g. **Shaft coupling** – Sleeve or Muff Couplings, Flanged Couplings, Universal Couplings, Oldham Coupling.
- h. **Pipe Joints:** Cast Iron Pipe Joints, Joints for Hydraulic Pipes, Pipe Fittings.
- i. **Pulleys:** Flat Belt Pulleys, ‘V’ – Belt Pulleys, Rope Pulleys.
- j. **Bearings:** Journal Bearings – Solid, Bushed and Collared Journal Bearings, Pivot or Foot-Step Bearings.

II. Assembly Drawings:

Drawings of Assembled Views for the part drawings of the following using conventions and easy drawing proportions.

- a) **Engine Parts:** Steam Engines: Stuffing Box, Cross Head, Eccentric. Petrol Engine: Connecting Rod, Piston Assembly.
- b) **Other Machine Parts:** Screws Jack, Plain Machine Vice, Plummer Block, Tail-stock.
- c) **Valves:** Gate Valve, Screw-down Stop Valve, Spring Loaded Safety / Relief Valve, Feed Check Valve and aircock.

TEXT BOOKS:

1. Machine Drawing: K.L.Narayana, P.Kannaiah & K. Venkata Reddy; New Age Publishers, 5th Edition, 2016.
2. Machine Drawing: N.D. Bhatt; Charotar Publications, 47th Edition, 2012.

REFERENCES:

1. Machine Drawing : Ajeet Singh; TMH Publications, 4th Edition,2010
2. Machine Drawing: P.S.Gill; Kataria Publications, 16th Edition,1996
3. Machine Drawing: Junarkar.N.D; Pearson Publication,2009.



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B.Tech: MECH	L	T-P-D	C
II Year - I Semester	0	0-3-0	1.5

(F2143) BASIC ELECTRONICS ENGINEERING LAB

Minimum Twelve experiments to be conducted:

S. No	Name of the Experiment
1	Forward & Reverse Bias Characteristics of a PN Junction Diode
2	Zener diode Characteristics
3	Zener diode as a voltage Regulator
4	Input & Output Characteristics of Transistor in CB Configuration.
5	Input & Output Characteristics of Transistor in CE Configuration.
6	Half Wave Rectifier with & without filters
7	Full Wave Rectifier with & without filters
8	Bridge Rectifier with & without filters
9	Verification of logic gates
10	Verification of Universal gates
11	Design and Verification of Half adder
12	Design and Verification of Full adder
13	Amplitude Modulation and Demodulation
14	Frequency Modulation and Demodulation



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B.Tech: Mech	L	T-P-D	C
II Year -I Semester	2	0-0-0	0

(F210D) ENVIRONMENTAL SCIENCES
(Common to ME & CE)

Course Objectives: The student will

- Know the importance of Environment is a key to the future of mankind.
- Understand global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues
- Understand the social, aesthetic, ethical, scientific, and technical aspects of environmental issues.
- Apply modeling to understand the behavior make predictions for future and plan management in view of changing environmental conditions

Course outcomes: After completing the course the students will be able to

- Understand the importance of natural resources and use them efficiently and knowing how to conserve the biodiversity.
- Apply environmental plan in developing any sort of environmental projects.
- Apply the environmental legislation in every walk of life and reserve the natural resources for future generations in sustainable manner.

UNIT - I:

Ecosystems & Natural Resources, Biodiversity: Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources.

Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats To Biodiversity, Conservation Of Biodiversity.

UNIT - II:

Global Environmental Problems And Global Efforts: Deforestation, Green house effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Environmental Impact Assessment (EIA) And Environmental Management Plan: Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

UNIT - III:

Environmental Policy, Legislation, Rules And Regulations:

Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act.

Towards Sustainable Future: Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

TEXT BOOKS:

1. Text book of Environmental Science and Technology by M.Anji Reddy 2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Environmental studies by Kaushik & Anubhakaushik

REFERENCE BOOKS:

1. Tata Mcgraw Hill : Introduction to Environmental Studies by Benny Joseph
2. Environmental Studies by Erach Bharucha 2005, University Grants Commission, University Press.



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B.Tech: Mech	L	T-P-D	C
II Year -II Semester	3	1-0-0	4

(F220A) MATHEMATICS-III

PROBABILITY AND PARTIAL DIFFERENTIAL EQUATIONS

Common to ME & CE

Course Objectives: The student will

- Learn basic properties of probability and random variables
- Understand different types of hypothesis and hypothesis testing
- Learn the T-distribution-distribution and chi-square distribution
- Different numerical techniques used for solving algebraic and transcendental equations
- Formation and solution of first order PDE

Course outcomes: After completion of this course the student will be able to

- Classify the types of random variables and calculate mean and variance
- Recognize where the binomial distribution could be appropriate model and find mean and variance
- Understand the foundation for classical inference involving confidence interval and hypothesis testing
- Calculate the solution of algebraic and transcendental equations
- Form to form first order PDE and solution of PDE

UNIT-I : PROBABILITY AND DISTRIBUTIONS

Random variables-Definitions of Random variables (Discrete and continuous).Distributions- Binomial

Poisson and normal distributions-related properties

UNIT-II: SAMPLING THEORY

Sampling distributions –Sampling distribution of means (σ known and Unknown)-Estimation- Point estimation.

Interval estimation-confidence interval estimates of parameters

UNIT-III : TESTING OF HYPOTHESIS

Tests of hypothesis -Large samples- Null hypothesis – Alternate hypothesis type I, & type II errors – critical region.

Confidence interval for mean testing of single variance, Difference between the means.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Introduction-Formation of partial equation by elimination of arbitrary constants

Arbitrary functions-solutions of first order linear (Lagrange) equation and nonlinear (Standard type)

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS SECOND ORDER

Introduction- Classification of linear PDEs-Method of separation of variables to solve IBVP like 1-D heat, 1-D wave.

BVP like 2-D Laplace's equations

TEXT BOOKS:

1. Grewal B.S, “Higher Engineering Mathematics”, Khanna publications, 42nd edition 2012
2. Advanced Engineering Mathematics by Jain and S.R.K. Iyengar, Narosa Publications.
3. Numerical Methods by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand

REFERENCES:

1. Engineering Mathematics by G. ShankarRao, I.K. International Publications.
2. KREYSZIG. E, “Advanced Engineering Mathematics” JohnWiley& Sons Singapore, 10th edition, 2012.
3. Veerarajan.T “Engineering Mathematics-I”, Tata McGrawhill Publishing Co.New Delhi, 5th edition, 2006.
4. Engineering Mathematics by B.V.Ramana, Tata McGrawhill Publishing company Ltd .New Delhi, 5th edition, 2011



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B.Tech. ME	L	T-P-D	C
II Year - II Semester	3	1-0-0	3

(F223A) THEORY OF MACHINES - I

Course Objectives: The student will

- Study the relative motion, velocity, and accelerations of the various elements in a mechanism.
- Study the Theory of Machines and Mechanisms in Engineering studies using prior knowledge taught in previous subjects, working the capabilities of engineering and making it attractive and useful for students, willing or not to opt for a mechanical profile.
- sensitize the students about the relationship between technology and society by analyzing the role of machines in this binomial and the sustainability of the current model of human activity
- Do the kinematic, static and dynamic analysis of the mechanisms and machines, from the concepts of rigid body mechanics and using the basic and operational tools.
- Use computer applications for the calculation and the simulation of mechanisms.
- Recognize the mechanical components and basic mechanical groups of the machines and mechanisms from examples taken of real situations.

Course Outcomes: The student will be able to

- Describe the concepts of machines, mechanisms and related terminologies.
- Recognize friction and its effects in mechanical components.
- Analyze planar mechanism for displacement, velocity and acceleration graphically.
- Analyze various motion transmission elements like gears, gear trains, cams.
- Utilize analytical, mathematical and graphical aspects of kinematics of machines for effective design.
- Perform the kinematic analysis of a given mechanism.

Pre-requisites: Engineering Mechanics, Engineering Physics.

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 or successfully constrained and incompletely constrained.

Machines : Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversions of quadric cycle chain – single and double slider crank chains. Mechanical Advantage –Grubler’s criterion.

UNIT –II

Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centrodes and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, Velocity diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT –III

Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint – Universal coupling – application – problems. **Straight Line Motion**

Mechanisms: Exact and approximate copied and generated types – Peaucellier, Hart and Scott Russel – Grasshopper – Watt, T. Chebicheff and Robert Mechanisms, Pantograph.

UNIT –IV

Cams: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower Motion -

Uniform Velocity – Simple Harmonic Motion and

Uniform Acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases. **Analysis of motion of followers:** Roller follower – circular cam with straight- Tangent cam with rollerfollower.

UNIT – V

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 – phenomenon of interference – Methods of reducing interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and wormgearing.

Gear Trains: Introduction – Train value – Types – Simple and reverted gear train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Compound Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. Theory of Machines: Thomas Bevan, Pearson Publications, 3rd Edition,2011.
2. Theory of Machines: S.S.Ratan, Tata McGrill,2015

REFERENCES:

1. Theory of Machines: R.K.Bansal, S.Chand,, 5th Edition,2010
2. Theory of Machines: PL. Ballaney, Khannapublishers.
- 3.Mechanism and Machine Theory: JS Rao and RV Dukkanpati,
NewAge



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B.Tech.ME	L	T-P-D	C
II Year - II Semester	3	0-0-0	3

(F223B) MANUFACTURING TECHNOLOGY – I

Course Objectives: The student will

- Study the different cutting tool materials and types & geometry of cutting tools
- Learn introductory concepts of various advanced machining processes
- Understand basic manufacturing processes like casting and welding
- Learn various aspects of different manufacturing techniques such as various casting methods and welding methods
- Have a knowledge to design a casting process for a product and design of welded joints

Course Outcomes: The student will be able to

- Select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- Select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- Conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

- Design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- Function effectively as a member or leader on a technical team;

Pre-requisites: Engineering Drawing, Engineering Workshop

UNIT – I

CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns ,pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems. Solidification of casting – Concept – Solidification of pure metal and alloys, short and long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes, Centrifugal casting, Die casting, Investment casting.

Methods of Melting: Crucible melting and cupola operation, steel making processes.

UNIT –II

Welding: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, Arc welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.

Cutting of Metals: Oxy Acetylene Gas cutting, water plasma cutting and Cutting of ferrous, non-ferrous metals

UNIT –III

Inert Gas welding, TIG and MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering and Brazing. Heat affected zones in welding;

welding defects – causes and remedies – destructive nondestructive testing of welds

UNIT –IV

Hot working, cold working, strain hardening, recovery, recrystallization and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

Extrusion of metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. **Forging processes:** Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations

UNIT – V

Elementary treatment of metal cutting theory – Basics of cutting process – Geometry of single point tool - angles chip formation and types of chips – built up edge and its effects, chip breakers - Mechanics of orthogonal cutting –Merchant's diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials.

TEXT BOOKS:

1. Manufacturing Technology: P.N. Rao, TMH, 2nd Edition, 2000.
2. Manufacturing Processes for Engineering Materials :Serope Kalpakjian and Steven R Schmid, Pearson Publishers.
3. Machine Tools: C.Elanchezhian and M. Vijayan, Anuradha Agencies Publishers, 2nd Edition, 2012.

REFERENCES:

1. Production Technology: Sharma P C, S. Chand Publications, 6th Edition, 2006.
2. Production Technology: R.K. Jain, Khanna Publications, 2005.
3. Production Engineering : Suresh Dalela & Ravi Shankar, Galgotia Publications Pvt. Ltd.



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B.Tech. ME	L	T-P-D	C
II Year - II Semester	3	1-0-0	3

(F223C) MECHANICS OF SOLIDS

Course Objectives: Students will be able to

- Understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviours due to different types of loading will be discussed.
- Understand and know how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
- Understand how to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations
- Understand how to calculate normal and shear stresses

Course Outcomes: The student will be able to

- Analyze the behaviour of the solid bodies subjected to various types of loading;
- Apply knowledge of materials and structural elements to the analysis of simple structures;
- Undertake problem identification, formulation and solution using a range of analytical methods;
- Analyze and interpret laboratory data relating to behaviour of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
- Expectation and capacity to undertake lifelong learning

Pre-requisites: Engineering Mechanics, Engineering Mathematics.

UNIT - I

Stresses in axially loaded members, Bars of uniform & varying section – composite bars – Temperature stresses.

UNIT - II

Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

Deflection of Beams: Deflection of Beams: Introduction- Relation between slope, deflection and radius of curvature- Deflection and slope of a beam subjected to uniform bending moment, Deflection of a simply supported beam carrying a point load at the centre, eccentric point load, and a uniformly distributed load. Deflection by using Double integration method, Macaulay's method, moment area method and strain energy method.

UNIT - III

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

Shear Stresses: Derivation of formula – Shear stress distribution

across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT - IV

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

UNIT - V

Torsion of Circular Shafts: Theory of pure torsion – Derivation of Torsion equations : $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

Thin and Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders– Thin spherical shells.Thick Cylinders- Lami's equations,Compound cylinders.

TEXT BOOKS:

1. Strength of materials – R.S. Kurmi andGupta.
2. Solid Mechanics, byPopov
3. Strength of Materials – Ryder. G.H.; Macmillan Long ManPub.
4. Strength of Materials – W.A. Nash,TMH

REFERENCES:

1. Strength of Materials -By Jindal, UmeshPublications.
2. Analysis of structures by Vazirani andRatwani.
3. Mechanics of Structures Vol –I by H. J. Shah and S. B. Junnarkar,Charotar Publishing House Pvt.Ltd.
4. Strength of Materials by D.S PrakashRao, Universities Press Pvt.Ltd.
5. Strength of Materials by S. S. Rattan, Tata McGraw Hill Education Pvt.Ltd.
6. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt.Ltd
7. Strength of Materials by R.K Rajput, S. Chand & CompanyLtd.



**J.B.INSTITUTE OF ENGINEERING &
TECHNOLOGY**

UGC AUTONOMOUS

Bhaskar Nagar, Moinabad (M), RR Dist, Telangana-500075

B.Tech: Mech	L	T-P-D	C
II Year II Sem	3	0-0-0	3

**(F220B) MANAGERIAL ECONOMICS AND FINANCIAL
ANALYSIS**
(COMMON TO ME,ECE AND ECM)

Course Objectives:

This course is intended to familiarize the students with the basics of management's concepts, production and cost analysis concepts, trends in economic environment and financial accounting topics.

Course Outcome

At the end of the course , students will be able to understand:

- Importance of management and contributions of management thinkers.
- Prominent importance of planning, vision& mission, types of organizational structures.
- Fundamentals of operations management & project management.
- Basic concepts of Human resource management, Job Evolution, Leadership and Motivation.
- Marketing management, Marketing mix, PLC, rural marketing, Logistics &SCM

UNIT I

Introduction to Managerial Economics & Demand Analysis:

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

Production & Cost Analysis:

Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb- Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance

Unit III

Types of Markets & Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly

Pricing - Objectives and Policies of Pricing. Methods of Pricing

Trends in economic Environment: Inflation, GDP, Introduction to GST, Interest rates.

UNIT IV

Introduction to Financial Accounting

Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance

Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments)

UNIT V

FINANCIAL ANALYSIS

Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

Du Pont Chart analysis. Theoretical concept of Funds Flow Statements

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
3. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2014.
4. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2014.
5. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2014.



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B.Tech.ME	L	T-P-D	C
II Year - II Semester	0	0-3-0	1.5

(F2231) MATERIALS ENGINEERING LABORATORY

Course Objectives: The student will

- Understand the preparation and study of micro structures of pure metals such as Fe, Cu and Al.
- Get the knowledge of microstructures of different ferrous and non-ferrous alloys.
- Study the mechanical properties such as Impact strength, hardness etc...
- Study the Young's modulus using beams.

Course Outcomes: The student will be able to

- Observe the microstructure for pure metals such as Fe, Cu and Al.
- Find out the micro structure for steels.
- Conduct the hardness test on specimens.
- Find out the Young's modulus using beams.

LIST OF EXPERIMENTS

1. Preparation and study of the Micro Structure of pure metals such as Fe, Cu and Al.
2. Preparation and study of the Microstructure of Plain Carbon Steels such as Mild steels, Low carbon Steels and High carbon Steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Copper Alloys.
5. Study of the Micro Structures of Aluminum Alloys.
6. Tensile test on UTM.
7. Impact test.
8. Hardness test.
9. Torsion test.
10. Determination of Young's modulus using beams such as Cantilever beam and simply supported beam



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B.Tech. ME	L	T-P-D	C
II Year - II Semester	0	0-3-0	1.5

(F2232) INSTRUMENTATION AND METROLOGY LABORATORY

Course Objectives: The student will

- Understand the usage of common measurement equipment
- Equip with the basic knowledge of linear, Temperature, speed and strain measurements
- Understand the system of measurements
- Learn how to measure surface roughness of the surface
- Understand the concepts of surface finish its terminology and surface treatments

Course Outcomes: The student will be able to

- Calibrate instrument and conduct the experiments with minimum error in measurements
- Apply the basic knowledge of linear, Temperature, flow, speed and strain measurements.
- Get well acquainted with the basic knowledge of measurements.
- Calibrate the various instruments to apply in various fields
- Know various types of measuring instruments and surface roughness measuring methods.

LIST OF EXPERIMENTS

1. Calibration of LVDT for the measurement of linear displacement.
2. Calibration of Thermocouple, Thermistor, RTD for temperature measurement.
3. Study and calibration of Photo and Magnetic speed pickups for the speed measurement.
4. Calibration of strain gauge for canti lever beam.
5. Study and calibration of Rotameter for flow measurement.
6. Measurement of a lengths, Heights and diameters by Vernier calipers and micrometers.
7. Measurement of bores by internal micrometer and dial bore indicators.
8. Measurement of Spur Gear elements
9. Angle and Taper measurements by Bevel Protractor and Sinebars.
10. Thread measurement by Three Wire Method.
11. Surface roughness measurement using Talysurf.
12. Tool Makers Microscope and its Applications.



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B.Tech. ME	L	T-P-D	C
II Year - II Semester	0	0-3-0	1.5

(F2233) MANUFACTURING TECHNOLOGY LABORATORY

Course Objectives: The student will

- Have the knowledge of various machine tools and its operations
- Understand and appreciate the importance of basic principles of Production Engineering.
- Understand the application of those principles in practice
- Understand the design and manufacture of simple patterns
- Understand the Arc welding, gas welding and resistance welding equipment for the fabrication of welded joints

Course Outcomes: The student will be able to

- Design and manufacture simple patterns
- Control sand properties in foundry
- Operate arc welding, gas welding and resistance welding equipment
- Apply manufacturing methods such as casting and metal joining process for real time requirements
- Select appropriate manufacturing techniques like sheet metal processes and metal cutting processes

1. METAL CASTING :

- I** : Pattern Design and making - for one casting drawing.
- II** : Moulding Melting and Casting - 1 Exercise

2. WELDING:

- I** : ARC Welding Lap & Butt Joint - 2 Exercises
- II** : Spot Welding - 1 Exercise
- III** : TIG welding
- IV** : Gas Welding-1 Exercise
- V** : Brazing-1 Exercise
- VI** : Plasma Cutting

3 MECHANICAL PRESS WORKING :

- I** : Blanking and piercing operations, study of simple, compound and progressive press tools

4. PROCESSING OF PLASTICS

- I** : Injection Moulding
- II** : Blow Moulding

REFERENCES BOOKS:

- 1. Dictionary of Mechanical Engineering: G.H.F. Naylor, Jaico Publishing House.



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B.Tech: Mech	L	T-P-D	C
II Year -II Semester	2	0-0-0	0

(F220F) GENDER SENSITIZATION (Common to CE&ME)

Course Objectives: The students will

- Understand caste system
- Learn women's work its politics and economics aware rebuilding lives.
- Understand about relationships, responsibilities and gender identities

Course outcomes: After completing the course the students will able to:

- Describes the basic structure of caste system in India and the major four categories to which all castes could be come out of ignorance and archaic indoctrination to make the world a better place for both men and women
- Have learnt to keep them safe and alive in the face of domestic violence
- Learnt to maintain equality in gender .the student should have understand the responsibility of being good citizens overcoming socialevils
- Describes the basic structure of caste system in india and the major four categories to which all castes could be

Unit-I – Gender: Why should we study it? Socialization: Making women, Making Men.

Introduction, Preparing For Womanhood, Growing up male, First lessons in caste, Different masculinities.

Unit-II- Women’s Work: Its Politics and Economics,

Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work.

Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

Unit-III– Just Relationships: Being Together as Equals,

Mary kom and Onler, Love and acid just do not mix, Love letters.

Mothers and fathers, Further Reading: Rosa Parks – The brave heart.

Text Books:

1. Towards a world of equals by A. Suneetha Susic Tharu publication
Telugu academy Hyderabad