Course Structure of B. Tech. First Semester

SECTION-A, B & F

S. No.	PAPER TYPE CBCS/CORE/AECC/SEC ETC.	PAPER CODE	TITLE OF PAPER	CREDIT	SESSIONAL	END-TERM
1.	CORE	AS-104	Engineering Mathematics - I	04	40	60
2.	CORE	AS-102	Engineering Physics – I	03	30	45
3.	CORE	AS-103	Engineering Chemistry – I	03	30	45
4.	AECC	AS-201	Human Resource Management (HRM)	03	30	45
5.	CORE	CE-101	Basics of Civil Engineering	03	30	45
6.	CORE	AS-105	Innovative Technology & Bio-Sciences	03	30	45
7.	CBCS	EC-101	Basic of Electronics & Comm. Engineering	03	30	45
8.	**LABORATORIES**	AS-152	Engineering Physics LAB – I	01	15	10
9.		AS-153	Engineering Chemistry LAB – I	01	15	10
10.		ME-151	Workshop Practice	02	30	20

SECTION-C, D & E

S. No.	PAPER TYPE CBCS/CORE/AECC/ SEC ETC.	PAPER CODE	TITLE OF PAPER	CREDIT	SESSIONAL	END-TERM
1.	CORE	AS-104	Engineering Mathematics - I	04	40	60
2.	CORE	AS-102	Engineering Physics – I	03	30	45
3.	CORE	AS-103	Engineering Chemistry – I	03	30	45
4.	SEC	AS-101	Communication Skills	03	30	45
5.	CORE	EE-101	Basics of Electrical Engineering	01	30	45
6.	CORE	ME-101	Basics of Mechanical Engineering	03	30	45
7.	CORE	CS-201	Fundamentals of Computing	03	30	45
8.	**LABORATORIES**	AS - 152	Engineering Physics LAB – I	01	15	10
9.		AS - 153	Engineering Chemistry LAB – I	01	15	10
10.		ME-151	Workshop Practice	02	30	20
11.		ME-102	EM(Engineering Mechanics) Lab	01	15	10
12.		AS-151	Language Lab	01	15	10

Course Structure of B. Tech. Second Semester

SECTION-A, B & F

S. No.	PAPER TYPE CBCS/CORE/AECC/ SEC ETC.	PAPER CODE	TITLE OF PAPER	CREDIT	SESSIONAL	END TERM
1.	CORE	AS-204	Engineering Mathematics - II	04	40	60
2.	CORE	AS-202	Engineering Physics – II	03	30	45
3.	CORE	AS-203	Engineering Chemistry – II	03	30	45
4.	SEC	AS-101	Communication Skills	03	30	45
5.	CORE	EE-101	Basics of Electrical Engineering	01	30	45
6.	CORE	ME-101	Basics of Mechanical Engineering	03	30	45
7.	CORE	CS-201	Fundamentals of Computing	03	30	45
8.	**LABORATORIES**	AS - 552	Engineering Physics LAB – II	01	15	10
9.		AS - 253	Engineering Chemistry LAB – II	01	15	10
10.		ME-250	Engineering Graphics Lab	02	30	20
11.		ME-102	EM(Engineering Mechanics) Lab	01	15	10
12.		AS-151	Language Lab	01	15	10

SECTION-C, D & E

S. No.	PAPER TYPE CBCS/CORE/AECC/SEC ETC.	PAPER CODE	TITLE OF PAPER	CREDIT	SESSIONAL	END-TERM
1.	CORE	AS-204	Engineering Mathematics - II	04	40	60
2.	CORE	AS-202	Engineering Physics – II	03	30	45
3.	CORE	AS-203	Engineering Chemistry – II	03	30	45
4.	AECC	AS-201	Human Resource Management (HRM)	03	30	45
5.	CORE	CE-101	Basics of Civil Engineering	03	30	45
6.	CORE	AS-105	Innovative Technology & Bio-Sciences	03	30	45
7.	CBCS	EC-101	Basic of Electronics & Comm. Engineering	03	**30**	45
8.	**LABORATORIES**	AS-252	Engineering Physics LAB – II	01	15	10
9.		AS-253	Engineering Chemistry LAB – II	01	15	10
10.		ME-250	Engineering Graphics Lab	02	30	20

AS-101: COMMUNICATION SKILLS

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

AS-101.CO1	Developing the concepts of communication skills/soft skills
AS-101.CO2	Developing the syntactical concepts of grammer
AS-101.CO3	Command over professional/technical writing skills
AS-101.CO4	Developing a sense interpretation through literature and its social/political and ethical aspect
AS-101.CO5	Proficiency in language handling/delivery through english photenics and accent mechanism

Unit-I : Art of Communication

English Communication, Technical, Verbal and Non-Verbal Communication, Barriers in Communication, Reading, Writing, Listening, Speaking; Strategies to overcome challenges in effective communication.

Unit-II : Fundamentals of English Syntax

Parts of Speech, Determiners, Use of tenses, Transformation of sentences, Active- Passive; Direct-Indirect; Simple-Compound-Complex sentences, Use of Prepositions, Discourse Markers, Subject Verb Concord, Use of Conjunctions, Use of Verbs.

Unit-III : Writing

Formal and informal letters, Demand Communication, Note Making, Report writing, Book Review, Abstracts and Research Proposals, creative writing, Email correspondence, Résumé writing, Executive summary.

Unit-IV: Vocabulary and Phonetics

Word formation, foreign roots, Suffix, Prefix, Antonyms, Synonyms, Homonyms, one word substitution, Idioms and Phrases, Acronyms, IPA Symbols, Vowels and Consonants, Place and Manner of Articulations, Phonetic transcription and Accentuation.

Unit-V: Literature

Poetry

Where the Mind is Without Fear- Rabindranath Tagore
The Express- Stephan Spender
Amalkanti- Nirendranath Chkrabarti
Road Not taken- Robert Frost

Prose

Of Studies- Francis Bacon,
Vanishing Animals- Gerald Durrell

Fitin : Old man and the Sea – E Hemmingnoy
The Child- Munshi Premchand
Soapnut Leaves- Chaaso

Text/Reference Books:

1. The Joy of Reading: Orient Blackswan Pvt. Ltd, New Delhi
2. Fluency in English: Macmillan Publishers, New Delhi
3. Intermediate Grammar Usage and Composition : M.L.Tikoo and Subramanian , Orient Blackswan Pvt. Ltd, New Delhi
4. A Text Book of English Phonetics for Indian Students: T. Balasubramanian, Macmillan Publishers, New Delhi.
5. Practical English Usage: Michael Swan, Oxford University Press.
6. The Oxford Guide to effective writing and speaking skills: John Seely, Oxford University Press
7. English Pronouncing Dictionary: Daniel Jones, Cambridge University Press.
8. Technical communication Principles and Practice: Meenakshi Raman and Sangeeta Sharma, Oxford.

AS – 102: ENGINEERING PHYSICS – I

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

*AS-102.*CO1	Enhancing the concepts of Centre of Mass, Inertia, translator motion and rotator motion including Simple Harmonic Motion.
*AS-102.*CO2	Understanding the basics of optics and introduction to lasers including their applications in field
*AS-102.*CO3	Expanding the concepts of electromagnetism and its various applications
*AS-102.*CO4	Exploring the basics of quantum ideas: photoelectric effect, Compton effect, Planck's hypothesis etc.
*AS-102.*CO5	Understanding the physics of solids

Unit-I: Mechanics

Basic concept of Centre of Mass, Translational and Rotational motion, Principle of moments, Moment of Inertia, Radius of Gyration, Kinematics of rotational motion about fixed axis (Parallel axis theorem Perpendicular axis theorem), Simple harmonic motion(SHM), Mechanical and electrical simple harmonic oscillators, phasor representation of SHM, applications of SHM: Simple Pendulum and Compound Pendulum, Damped harmonic oscillator- heavy, Critical and light damping, Energy decay in damped harmonic oscillator,

quality factor, Undamped and forced Oscillations, Impedance, Steady state motion of forces damped oscillator, Power absorbed by oscillator.

Unit-II: Optics
Interference, Principle of Superposition of waves, Interference due to division of wavefront and division of amplitude, Phasor representation of waves, Young's double slit expt., Interference from parallel thin films, coloured thin films, Newton rings and derivation for calculation of wavelength of light, Michelson interferometer. Types of Diffraction: Fraunhofer and Fresnel, Fraunhofer Diffraction at a Single Slit, Fresnel Diffraction at a single slit, Dispersion of light, Spectrometer, Prism table, collimator.

Unit-III: Electrostatics and Magnetostatics
Coordinate Systems: Cartesian, Cylindrical and Spherical, Transformation of coordinate systems, Gradient of a scalar, divergence and curl of a vector; Line integral, surface integral and volume integral, Divergence Theorem, Stokes Theorem, Charge distribution(line, surface and volume), Gauss's law and its applications(Electric field due to cylinder, infinite sheet, spherical shell), Bio-Savart law and its application, Gauss`s law in magnetostatics, Displacement current, Ampere`s circuital law and its application, Equation of Continuity, Working and principle of Potentiometer, Wheatstone Bridge.

Unit-IV: Quantum Ideas
Prerequisite of Quantum theory, Black body radiation, Planck`s hypothesis, Concept of Photon, Wave particle duality, Photoelectric effect, de-Broglie hypothesis, Experimental evidence of matter waves (Davisson-Germer experiment),Compton effect, Uncertainty principle and its applications.

Unit-V: Solid State Physics
Classical free electron theory of metals and its failure, Concept of electrical conductivity, Thermal conductivity, Weidmann Franz Law, Lattice vibrations, Phonons, Maxwell, Bose Einstein and Fermi Dirac statistical distribution functions, Fermi energy of free electron in metal, Concept of average energy and total energy of free electrons, Relation between average energy and fermi energy, Bragg`s Law and X-ray diffraction.

Text Books / Reference Books:

1. Fundamentals of Physics: Halliday and Resnick
2. Introduction to Electrodynamics: David J. Griffiths
3. Optics: Ajoy Ghatak
4. Concepts of Modern Physics: Arthur Beiser
5. Elements of Electrodynamics, Mathew N. O. Sadiku
6. Electricity, magnetism and Light, W. Saslow
7. Fundamentals of Optics, Jenkins and White

AS-103: ENGINEERING CHEMISTRY – I

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: Internal Assessment:	45 Marks 30 Marks

Course Objective:

AS-103.CO1	Understanding the instrumental methods of analysis
AS-103.CO2	Exploring the chemical methods and phase rule
AS-103.CO3	Expanding the knowledge of electrochemistry and surfactants
AS-103.CO4	Understanding the mechanism, classification, properties and applications of polymers
AS-103.CO5	Understanding composites and nanomaterials

Unit I: Chemical and Instrumental Methods of Analysis

Gravimetric Analysis; Digestion and its Importance, Favorable Conditions for Precipitation, Volumetric Methods of Analysis; Expression of concentration of solutions Acid-Base (pH metry and conductometry), Redox, Precipitation and Complex metric Titrations. Chromatography; Definition and Different Types of Chromatography, Fundamentals of Spectroscopy; Principles and Applications of UV-Visible, Infra-Red and Atomic Absorption Spectrometry.

Unit II: Electrochemistry and Surfactants

Electrolytic and Galvanic cell, Electrode Potential, Standard Electrode Potential, EMF series, Nernst Equation, Cell emf Measurement, Reversible and Irreversible cell, Thermodynamic Overview of Electrochemical Processes, Conductance, Cell Constant and its Determination. Surface Active Agents, Soaps, Types and Advantages of Detergents, Critical Miceller Concentration, Hydrophilic and Hydrophobic Interactions, HLB values, Fricoohesity of Surfactant Solutions.

Unit-III: Molecular Structure and Phase Rule

Valence Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules, Molecular orbital Theory of Solids, crystal structure, Semiconductors and Superconductors. Phase Rule; Phase Rule Applications to One and Multiple Component systems, Fe-C Phase Equilibrium Diagram, Types of Alloys, Ferrous and Nonferrous Alloys.

Unit-IV: Polymers

Basics of polymer chemistry, Molecular weight, Glass transition temperature and Melting point, Methods of polymerization, Structure property relationship, Thermoplastics and Thermosets, Fabrication of polymers-Compression, Injection, Extrusion and transfer Moulding. Synthesis, Properties and uses of polyethylene, Polyvinyl Chloride, Poly Methyl Methacrylate, Urea formaldehyde resin and Melamine formaldehyde resin, Elastomers and Conducting polymers.

Unit-V: Nanomaterials and Composites
General Introduction, Fullerenes, Carbon nanotubes, Nanowires, Electronic and Mechanical properties, Synthesis of nanomaterials, Top down and Bottom up approaches, Applications of nanomaterials. Adhesives and their classification, Composites; their Compositions, Characteristics and types.

AS – 104: ENGINEERING MATHEMATICS – I

Credits: 4	4 Hours per week (L-T-P:3-1-0)	End Semester Examination: 60 Marks Internal Assessment: 40 Marks

Course Objective:

*AS-104.*CO1	Tracing the curve and understanding its behaviour at the point of infinity(Asymptote).
*AS-104.*CO2	Learning the concepts of successive differentiation and the expansion of functions in form of series.
*AS-104.*CO3	Finding maxima and minima of a function of two and more variables and the concept of eigen values.
*AS-104.*CO4	A study of ordinary differential equations and its applications.
*AS-104.*CO5	Learning the concepts of partial differential equations with applications.

Unit-I: Curve Tracing & Applications Of Definite Integrals
Two Dimensional curve tracing in Cartesian, polar and parametric forms, Double points & points of inflexion, Oblique and parallel asymptotes, Finding length, volume and surface area of the curve in Cartesian, polar and parametric forms.

UNIT-II: Techniques of One Variable Calculus & Partial Differentiations
Leibnitz's theorem; n^{th} derivative of F(x) at x=0, Maclaurin's expansion of F(x), Formation of Intrinsic and pedal equations, Partial derivatives and their geometrical interpretation, Total derivative, Total differential coefficient, change of variables i.e. use of Jacobeans.
Curvature and radius of curvature in Cartesian, polar and parametric and implicit forms, Radius of curvature at the origin, centre and chord of curvature, and evolutes of the curves.

Unit-III: Calculus of Several Variables & Linear Algebra
Taylor's expansion of a function of one & two variables, Leibnitz's rule for differentiation under the sign of integration, Maxima and minima of a function of two and more variables including Lagrange's method. Consistency of a system of simultaneous linear equations using rank, Eigen values and Eigen vectors of a square matrix, Properties of Eigen values, Applications of Cayley-Hamilton theorem and diagonalization of a matrix, vector space, basis, linear dependence and independence of vectors, Linear transformations and related problems

Unit-IV: Ordinary Differential Equations
Orthogonal and isogonal trajectories of a family of curves, Complementary function, particular integral and general solution of ordinary linear differential equations of higher order with constant and variable coefficients (Cauchy and Legendre forms). Method of variation of parameters Method of undetermined coefficients and solutions of simultaneous differential equations with constant coefficients.

Unit-V: Partial Differential Equations
Introduction to partial differentiatial equations, Change of independent variables in P.D.E., Complete solution of homogeneous and non-homogeneous L.P.D.E. of higher order with constant and variable coefficients, Solutions of one dimensional wave equation, one dimensional heat conduction equations and two dimensional Laplace (Cartesian and polar forms) equation using method of separation of variables.

Text/ Reference Books:
1. A.B. Mathur & V.P. Jaggi : A text book of "Engg. Maths. & Advanced Engg. Mathematics"
2. V.P.Mishra: "Concept of Engineering Mathematics" (Revised Edition)
3. B.S. Grewal: "Engineering Mathematics & Higher Engineering Mathematics"
4. B.V. Ramana: "Higher Engineering Mathematics".

CE–101: Elements of Civil & Environmental Engineering

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

CE-101.CO1	Understand and determine the engineering properties for metals and non-metals
CE-101.CO2	Understand the concepts of shear force, bending moment, axial force for statically determinate beams and compound beams having internal hinges and subsequently its application to draw the shear force, bending moment and axial force diagrams
CE-101.CO3	Study the behaviour of structural member under the action of axial load, bending and twisting moment
CE-101.CO4	Study the deformation of axially loaded columns having different end conditions and further evaluate the strength of these coloumns
CE-101.CO5	Learning of sources of air, water and noise pollution and their effects on human health and measures of their control

Unit-I:
Stresses & strains: Introduction, normal stress & strain shear stress & strain, relationship between stress and strain, Uniaxial tension test: Stress-Strain diagrams for different materials, Mechanical properties of materials, Uniaxial deformations: Saint Venant's principle, principle of superposition, free body diagrams, bars of uniform cross sections. Uniaxial Deformations: bars of variable cross sections, compound/composite bars, temperature stress.

Unit-II:
Analysis of stresses: tensor notations, equilibrium equations, transformation of stresses, invariants of stress tensor, Plane stress condition, principle stresses, maximum shear stress and their planes, Mohr's circle.

Unit-III:
Analysis of strains: transformation of strains, invariants of stain tensor, plane strain condition, principle strains, maximum shear strain and their planes; Strain Rosettes; Stress-Strain relationship, generalized Hooke's law, relation between elastic constants.

Unit-IV:
Basics of Environments, Adverse Effect of Environmental Pollution, Pollution Control Strategies, Air Pollution: Sources, Effects on Human Health, Vegetation and Materials, Global Warming, Acid Rains, Ozone Depletion-Causes, Effects and Control.

Unit-V:
Water Pollution, Sources of Water Pollution, Effects of Water Pollution, Water Borne Diseases, Water Quality Standards, Water Pollution Control. Noise Pollution, Indoor and Outdoor sources of noise pollution, Effects of Noise Pollution, Noise Standards, Noise Pollution controls.

ME-101: Basics of Mechanical Engineering

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: Internal Assessment:	45 Marks 30 Marks

Course Objective:

ME-101.CO1	To study and analyze the Kinematics of Rigid Bodies
ME-101.CO2	Developing a basic knowledge of Plane Motion of Rigid Bodies
ME-101.CO3	Understanding various thermodynamic systems, properties and other related concepts.
ME-101.CO4	Expanding the knowledge of reversible and irreversible cycles.
ME-101.CO5	Learning the basics of first law and second law equation and related theories with numerical

Unit-I:
Kinematics of Rigid Bodies: Translation, Rotation About a Fixed Axis, Motion of rotation with constant angular velocity and uniform angular acceleration, General Plane Motion, Absolute & Relative Velocity and Acceleration in Plane Motion, Instantaneous Centre of Rotation in Plane Motion, Analysis of Plane Motion in Terms of a Parameter. Three-Dimensional Motion of a Particle Relative to a Rotating Frame.

Unit-II:
Plane Motion of Rigid Bodies: D'Alembert's Principle, Motion of translation, centroidal rotations, non-centroidal rotations, motion of rolling bodies Axioms of the Mechanics of Rigid Bodies, Systems of Rigid Bodies, Constrained Plane Motion, Energy and Momentum Methods Principle of Work and Energy for Rigid Body, Work of Forces Acting on a Rigid Body, Conservation of Energy, Power, Principle of Impulse and Momentum for the Plane Motion of a Rigid Body.

Unit-III:
Properties, Macroscopic Versus Microscopic View point, Thermodynamic System and Control Volume, Processes and Cycles, Thermodynamic Equilibrium, Quasi-Static Process, Concept of Continuum Thermostatic, Units and Dimensions Work Transfer, P-dV Work or Displacement Work, Other Types of Work Transfer and Heat Transfer – A Path Function, Specific Heat and Latent Heat, Work Transfer. Zeroth Law of Thermodynamics, Measurement of Temperature, Ideal Gas Thermometers, Celsius Temperature Scale, Electrical Resistance Thermometer, Thermocouple.

Unit-IV:
First Law of thermodynamics for a Closed System Undergoing a process and a Cycle, Energy-A Property of the System, Different Forms of Energy, Specific Heat at Constant Volume, Enthalpy, Specific heat at Constant Pressure. Energy of an isolated system. First Law Applied to Flow Processes, Control Volume, steady Flow Process, Mass Balance and Energy Balance in a Simple and Steady Flow Processes; Comparison of S.F.E.E. with Euler and Bernoulli Equations, Numerical

Unit-V:
Second Law of Thermodynamics, Thermal reservoirs, heat pump and refrigerator, Statements of second law of thermodynamics, Kelvin Planck and Clausius statements and their equivalence, Carnot's theorem, Clausius inequality; Numerical

Text books/Reference books:

1. Vector Mechanics for Engineers: Statics and Dynamics, Tenth Edition: by Ferdinand P. Beer, E. Russell Johnston, Jr., David F. Mazurek, and Phillip J. Cornwell, Tata McGraw Hill
2. Engineering Thermodynamics by: P. K. Nag, TMH.

3. Fundamental of classical thermodynamics by: Wan- Wylen & Sontag, John Wiley & sons.
4. Engineering thermodynamics by: Spalding & code.
5. Engineering Mechanics: Statics and Dynamics: by J. L. Meriam and L. G. Kraige, John Wiley & Sons, Inc.
6. Engineering Mechanics: Dynamics: 12th Edition by R. C. Hibbeler, Prentice Hall
Engineering Mechanics: by K.L. Kumar, Tata Mc Graw Hill.

EE-101: Basics of Electrical Engineering

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

EE-101.CO1	Learn to analyse circuit systems using direct application of Kirchhoff current and voltage laws along with Ohms law
-*EE-101*.CO2	To understand basic concept of "*j*" operator, RLC series circuit, reactive power, true power and apparent power
EE-101.CO3	To prepare the students to have basic knowledge of transformers, the equivalent circuit model of single phase transformers, transformer parameters using open circuit and short circuit tests, compute transformer efficiency and voltage regulation
EE-101.CO4	Construction and understanding of working principles of DC generators and motors
EE-101.CO5	The ability to select a suitable measuring instrument for a given application like PMMC and MI

Unit-I:
Fundamentals of electric circuits, Kirchhoff's laws, mesh analysis, node analysis, delta-star and star-delta conversion, classification of network elements, Thevenin's theorem, Norton's theorem maximum power transfer theorem, superposition theorem.

Unit-II:
Single phase AC circuits, average and effective values of sinusoids, solution of R,L,C series circuits, the j operator, complex representation Of impedances, phasor diagram, concept of power factor, power factor improvement, power in complex notation, solution of parallel and series-parallel circuits, resonance. Introduction to balance three phase AC circuits.

Unit-III:
Ampere's circuital law, B-H curve, solution of magnetic circuits, hysteresis and eddy current losses. Relays as an application of magnetic force. Transformers- construction, e.m.f. equation, ratings, phasor diagram for no load and full load, equivalent circuit, regulation and efficiency calculations, open circuit and short circuit tests, Introduction to Auto-Transformer.

Unit-IV:
Introduction to Electromechanical Energy Conversion, DC motors- construction, e.m.f. and torque equations, characteristics of DC generators and motors, speed control of DC motors. DC motor starter- working principle, ratings. Introduction to three phase induction motor, Introduction to alternator and synchronous motor and their applications.

Unit-V:
PMMC instruments, shunts and multipliers, multi-meters, moving iron ammeters and voltmeters, dynamometer wattmeter, AC watt-hour meters, extension of instrument ranges.

Text/Reference Book:

1. D.C. Kulshrestha, "Basic Electrical Engineering", Tata McGraw Hill.
2. T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering", Edition 2008, Oxford University Press.
3. 1.V. Del Torro, Electrical Engineering Fundamentals, Second Edition, Prentice Hall of India Pvt. Ltd.
4. E. Hughes, Electrical Technology, English Language Book Society Publication with Longman.
5. H. Cotton, Advanced Electrical Technology, Issae Pitman, London.

ME-151: Workshop Practice

Credits: 2	4 Hours per week (L-T-P:0-0-4)	End Semester Examination: Internal Assessment:	30 Marks 20 Marks

Course Objective:

ME-151.CO1	To instil fundamentals of materials, properties, various tools and their specifications employed in various shops/trades
ME-151.CO2	To understand science and engineering of every task and tool employed in each shop/trade
ME-151.CO3	To understand the drawing and specification of various tasks/jobs; plan, operate and acquire tools to make jobs as per specifications
ME-151.CO4	Encourage student to use web/computing resources and relate the completed task with real life processes
ME-151.CO5	Educate them for safety and security while performing assigned tasks in group of small size, prepare the record of tasks and submit

Unit-I:-Foundry
Mould cores, core prints, gates runner, risers, chaplets, common defects in casting, defects due to mould, metal pouring, solidification.

Unit-II:-Metal Joining
Oxy acetylene gas welding equipment, types of flame, electric arc and contact welding, electrodes and equipments for AC and DC welding, electrode coating functions and constitutes, common welding defects.

Unit-III:-Metal Cutting Operation and Tools
Common metal cutting machine like lathe, milling, shaper, slotter and drill, lathe operations like turning, chamfering, facing, taper turning and knurling, material for lathe tools and other tools, bench grinder and use.

List of Experiments
1. Gas welding: simple joint like joint.
2. Electric Arc Welding: Simple joints like butt joint.
3. Tin Smithy: Mechanical joining, jobs like box, tray, funnel and soldering ofjoints.
4. Turning: Plane turning, taper turning, threading, knurling, facing and chamfering on the same job.
5. Shaping: Surface finishing at right angles.
6. Milling: Making a slot two or three surface finishing at angles of 1200C.
7. Drilling: Making drilled holes in plates or flats and grinding the corner of a plate to round.

Text/ reference books:
1. Elements of Workshop Technology by, Choudhary Vol. I & 2. Media promoters and publisher, 1996.
2. Workshop Technology, Vol. 1-3 by W A J Chapman, ELB. S

AS-201: Human Resource Management

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: Internal Assessment:	45 Marks 30 Marks

Course Objective:

AS-201.CO1	Forming a foundation of human resource management
AS-201.CO2	Understanding the procedure of acquisition of human resources
AS-201.CO3	Making clear the importance of appraisals and evaluation in human resource
AS-201.CO4	Learning importance of training and development of human resource

*AS-201.*CO5	Analysing the management of job stress and employee health and well being

Unit-I: Foundation of Human Resource Management (HRM):
Meaning, definition, nature and scope, characteristic, objectives, Opportunities and challenges in HRM, HRM functions.

Unit-II: Acquisition of Human Resources –
Human Resource Planning (HRP): need, objectives, determinates, HRP models, HRP process, type of HRP, benefits; *Job Analysis (JA)*: sources, methods, process, uses, importance; job description, job specification; *Recruitment and selection:* sources, process, barriers, objectives, objectives of selection, selection tests, interview, induction, placement and employee socialization.

Unit-III: Appraising and Evaluating Human Resources –
Performance Appraisal (PA) and feedback: approaches, methods/techniques of PA, process of PA, interview, elements, designing and conducting PA; *Job Evaluation (JE):* principles, process, methods of JE, importance and limitations.

Unit-IV: Development of Human Resources –
Human Resource Development (HRD): functions, benefits, importance, barriers to HRD; *Training and Development*: models, methods, training process, training evaluation and barriers.

Unit-V: Employees Health & Well being
Job stress and Job Burnout: Nature, Causes and consequences; *Stress:* Nature, Causes and consequences; *Management of Stress:* Personal and organizational based strategies; *Burnout:* Nature, symptoms, causes, relationship with stress, burnout and job satisfaction management of burnout.

Text/Reference Books:

1. Gary Dessler (2015), Human Resource Management, Person Prentice Hall of India, New Delhi
2. VSP Rao, Human Resource Management, Text & Cases (2nd edition), Excel Books, New Delhi
3. Tapomony Deb, (2009), Managing Human Resource and Industrial Relations (First edition), Excel Books, New Delhi
4. John M. Ivancevich (2005), Human Resource Management 93rd edition) Tata McGraw Hill Publishing Co. Ltd., New Delhi

Lab Exercises:
1. Administration of relevant tests as per requirement of the content of unit. Such as job satisfaction & Personality tests, Job stress tests etc.

2. Group activities; such as case studies as per topic of the unit.

AS-202: Engineering Physics-II

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

*AS-202.*CO1	Learn to apply relativity in describing physics of motion
*AS-202.*CO2	Appreciate the importance of lasers and grasp the physical bases
*AS-202.*CO3	Learn the calculation methods of quantum theory
*AS-202.*CO4	Apply quantum ideas to explain behaviour of materials
*AS-202.*CO5	Appreciate physics conservation laws and be acquainted with new areas

Unit-I : Relativity

Inertial and Non-inertial frame of reference, Idea of Ether, Michelson Morley Experiment, Galilean transformations and Galilean invariance, Postulates of special theory of relativity, Lorentz transformations, Einstein velocity addition theorem, Time dilation, Length contraction, Relativistic mass, momentum and energy, Relativistic Doppler Effect.

Unit-II: Lasers

Introduction of Laser, General characteristics of lasers, Applications of lasers, Principle of laser action, Concept of Population Inversion, Einstein's transition probabilities, Lifetime of transitions, Rate equation for atomic transition, Rate equations for 3-level and 4-level laser systems, Optical resonators, Working and Principle of Ruby laser, He-Ne laser, Argon-ion laser.

Unit-III: Electromagnetism

Faraday`s law, Differential form of Faraday`s law, Expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic field. Maxwell`s equations, Integral and differential forms of Maxwell equations and their physical significance, EM waves in free space, Wave equation; relation between electric and magnetic fields of an EM waves, Flow of energy and Poynting vector.

Unit-IV: Quantum Mechanics

Introduction to Quantum Mechanics, Wave function and its significance, properties of wave function: Normalization, Orthogonal and probabilistic interpretation. Operators (position, momentum and energy), Eigen values and eigen functions, Expectation value of position, momentum and energy, Derivation of Schrodinger time dependent and independent equation

for wave function and energy eigen values. One-dimensional problem - confinement of particle in a box.

Unit-V : Physics of Materials

Basic of semiconductors, Concept of doping in semiconductors, Intrinsic and Extrinsic semiconductors, p-type and n-type semiconductors, Effective mass and law of mass action, Carrier concentration, Electrical conductivity and mobility of charge carriers in semiconductors, Hall`s Effect, Expression for mobility of charge carriers, Hall Coefficient, Band theory of solids, Origin of energy gap, Kroning Penney model, PN junction, Zener Diode, Tunnel Diode and Light Emitting Diode.

Text Books / Reference Books:

1. Concepts of Modern Physics: Arthur Beiser
2. Introduction to Electrodynamics: David J. Griffiths
3. Optics, A. Ghatak
4. Principles of Lasers: O. Svelto
5. Fundamentals of Physics: Halliday and Resnick

AS–203: Engineering Chemistry & Environmental Science

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

AS-203.CO1	Understanding importance of use of water in industries, softening methods and problems on water treatment
AS-203.CO2	Understanding basis of fuels analysis and their combustion
AS-203.CO3	Exploring the corrosion and protection
AS-203.CO4	Understanding environment and pollution
AS-203.CO5	Understanding environmental biochemistry

Unit-I: Water Treatment

Water Quality Parameters (BIS & WHO Standards), types of hardness, Units, Determination of hardness by EDTA method, Alkalinity of water & its significance, Numerical problems, Problems with boiler feed water and its treatment; Scale & Sludge formation, Boiler corrosion, Caustic Embrittlement, Priming & foaming, Softening methods; Lime-soda, Zeolite & Ion Exchange processes, Numerical problems, Chlorination of water, Coagulation, Sedimentation and Desalination.

Unit-II: Energy Resources

Types of fuels, Calorific values, (HCV & LCV) and determinations by Bomb and Boys gas calorimeter, Numerical problems, Coal; Types of coal, Analysis of coal, Liquid Fuel; Refining of petroleum, Knocking, Octane and Certance Values, Pollution from fossil fuels, Combustion and Problems. Renewable; (Solar Cells, Rechargeable Batteries, Fuel Cells) and Non-renewable of energy; (Wind Energy, Geothermal Energy, Ocean Energy) resources of Energy.

Unit-III: Corrosion and Its Protection

Corrosion; Definition and its scope, Chemical Corrosion, Electrochemical Corrosion, Mechanism of Chemical and Electrochemical Corrosion, Types of Corrosion; Intergranular Corrosion, Soil Corrosion, Waterline Corrosion, Differential Aeration Corrosion, Galvanic and Concentration Cell Corrosion, Factors affecting corrosion, Protection of corrosion.

Unit-IV: Environmental Chemistry

Environment and its Segments, Zones of Atmosphere, Air Pollution: Air pollutants and their resources; Aerosol and its Types, RSPM, SPM, Acid rain, Green House Effect, Global warming, Ozone Layer Depletion, Water Pollution; Sources of water pollution, Sewage Treatment, Determination and Significance of COD, BOD, TOC. Noise Pollution, Soil Pollution, Radioactive Pollution and e-Waste.

Unit-V: Environmental Biotechnology

Biotechnology and its applications, fermentation, production of alcohol and vitamins, Biotechnology for environmental Protection, Biological indicators, biosensors, bioremediation, Phytoremediation, bio-pesticides, bio-fertilizers, bioreactors, Social issues, biodiversity and its conservation.

AS-204: Engineering Mathematics – II

Credits: 4	4 Hours per week (L-T-P:3-1-0)	End Semester Examination: 60 Marks Internal Assessment: 40 Marks

Course Objective:

*AS-204.*CO1	Tracing of 3D curves and evaluation of multiple integrals by change of variables/change of order of integration.
*AS-204.*CO2	Learning the concepts of non-linear ordinary and partial differential equations.
*AS-204.*CO3	Study of analytical functions, residues and conformal mapping.
*AS-204.*CO4	Solutions of system of differential equations, integral equation, Integro-differential equations, difference equations using Laplace transformation.
*AS-204.*CO5	Theory of Fuzzy Mathematics with its applications.

Unit-I: Solid Geometry & Multiple Integrals

Formation of equations of cylinder and cone under the given geometrical conditions, Tracing of some quadric (or Conicoids) three dimensional surfaces.
Evaluation of multiple integrals by change of order of integration, Change of variables i.e. Use of Jacobian & Applications of multiple integrals in finding plane area, mass, centre of gravity, centre of pressure, moment of inertia, product of inertia, curved surface area and volume.

Unit-II: Ordinary & Partial Differential Equations
Ordinary point and regular singular point, Series solutions of ordinary differential equations of second order with variable coefficients (polynomials) by the method of Frobenius; Lagrange's method of undetermined multipliers for the solution of linear partial differential equations of first order solution of non-linear partial differential equations of first order by means of transformations and Charpits methods.

Unit-III: Complex Analysis
Analytical function, C-R equations in Cartesian and polar forms, Geometrical representation of $\omega=F(z)$, Determination of conjugate harmonic function, Milne – Thomson meyhod and related problems; Evaluation of complex integrals using Cauchy's integral theorem, Cauchy's integral formula for the nth order derivative of an analytic function.
Taylor series, Maclaurin series and Laurent series expansions of functions, Conformal mapping, sufficient condition for conformality of $W=f(z)$, some standard transformations; zeros, singularities and residues of an analytic function, Application of Cauchy's residue theorem in solving contour integrals and evaluation of real definite integrals using residue method.

Unit-IV: Laplace Transform & Its Applications
Laplace and inverse Laplace transforms of some well-known elementary functions and Special functions, Change of scale property, First and second shifting theorems, Laplace transforms of Derivative, Integral, tnf(t), f(t)/t, Convolution theorem & Periodic function.
Applications of Laplace and inverse Laplace transform in finding the particular solutions of ordinary linear differential equations with constants and variables coefficients, system of differential equations, integral equation, Integro-differential equations, difference equations and, conversion of differential equations into integral equations & vice versa.

Unit-V: Fuzzy Mathematics
Fuzzy set, elements of Fuzzy logic, Relations including operations, reflexivity, symmetry and transivity, Pattern classification based on fuzzy relations, fuzzy analysis including metric spaces, distance between fuzzy sets, area perimeter, height, width of fuzzy subsets, continuity & integrals.

Text/ Reference Books
1. A.B. Mathur & V.P. Jaggi: "Engineering. Mathematics & Advanced Engineering Mathematics" (two volume)

2. V.P.Mishra: “Concept of Engineering Mathematics” (Revised Edition)
3. B.S. Grewal: “Engineering Mathematics & Higher Engineering Mathematics”,43rd Edition
4. B.V. Ramana: “Higher Engineering Mathematics”.
5. R.K. Jain and S.R.K. Iyengar : “Advanced Engineering Mathematics” 4th Edition

EC-101: Basics of Electronics & Communication Engineering

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

EC-101.CO1	Studying semiconductor diodes and their various characteristics
EC-101.CO2	Expanding the ideas: construction and working of BJTs and introducing JFET
EC-101.CO3	Exploring various types of operational amplifiers
EC-101.CO4	Understanding the idea of feedback and thus studying various electronic instruments
EC-101.CO5	Introduction to various parameters of communication systems

Unit-I: Semiconductor Diodes
P-N junction diode, V-I characteristics, static and resistance, linear and non-linear applications of diodes; half wave, full wave and bridge rectifiers, zener diode, characteristics and its use as a voltage regulator, AND, OR, NAND, NOR and Ex-OR gates.

Unit-II: Transistors (BJT & JFET)
Bipolar junction transistor (BJT) , biasing and amplifier action, load line analysis of transistor amplifier, BJT amplifier configurations and their comparison using small signal h-parameter model, Junction field Effect transistor (FET), biasing and amplifier action.

Unit-III: Operational Amplifier
Op-am- basics, practical op-amp circuits, inverting and non-inverting amplifier, summing amplifier, integrators and differentiators.

Unit-IV: Feedback and Electronic Instruments, Feedback concept, Barkhausen Criteria of oscillation, Wein Bridge and phase shit oscillator, cathode Ray oscilloscope (CRO), electronics multimeters.

Unit-V: Communication Systems
Introduction to modulation, amplitude modulation generation of AM waves, demodulation of AM wave, introduction to FM.

CS- 201: Fundamental of Computing

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

CS-101.CO1	Students will able to understand the basics of computer, generation & types of computer, its components and number system
CS-101.CO2	Student will able to understand the concept of algorithms, flowchart and c programming language
CS-101.CO3	Student will able to develop c programs for string manipulation, sorting and searching techniques
CS-101.CO4	Students will able to describe the functions, structure and different types of operating systems
CS-101.CO5	Students will able to understand basics of networking, internet and database management systems

Unit-I: Basics of Computers

Computer fundamentals, Bits and Bytes, CPU, Memory, Types of memory, Input and output devices, I/O devices, Operating system, applications software's, system software. Number system, decimal number system, Binary number system, octal number system, hexadecimal number system. Generation of computer, Classification of computer,

Unit-II: C Programming

Algorithms, flow chart, The C character set, constants, variable, keywords, operator and expressions, decision controls, if and else, conditional operator, for loop, while loop and do-while loop,, switch case, user defined functions, call by value and by reference, array, and single dimensional, 2D matrix, multidimensional arrays

Unit-III: Searching and Sorting

Strings, library string functions, pointers and structures, searching and sorting, linear search, binary search, sorting techniques: bubble sort, selection sort

Unit-IV: Operating System

OS definition, role of OS in computer system, multi programming, time sharing OS, multitasking OS, multiprocessing OS, real time system OS , client server computing, distributed OS, function of OS (user interface, GUI, program execution, I/O management, Resource management,

Unit-V: Networking & DBMS

Network, communication models, transmission media, connection topologies, LAN, WAN, MAN, ISO-OSI model of networking, Internet, ISP, WWW, Email, URL, Web browsers, websites, intranet, DBMS, DBMS applications, Advantage of DBMS, Data abstraction.

Text/Reference Books:

1. "Computer Fundamentals & Programming in C", Reema Thareja, Oxford University Press
2. Ashok Kamthane, "Programming with C ".
3. M N Doja, "Introduction to Computers and Information Technology"
4. C Programming by Yaswant Kanetkar

ME-250: Engineering Graphics Lab

Credits: 2	4 Hours per week (L-T-P:0-0-4)	End Semester Examination: 20 Marks Internal Assessment: 30 Marks

Course Objective:

*ME-250.*CO1	Student will able to understand basics of drawing and design of engineering components
ME-250 .CO2	Student will able to understand scaling of designs
ME-250 .CO3	Student will able to understand the different view of any object
ME-250 .CO4	Student will able to understand detail construction of any object
ME-250 .CO5	Student will able to understand sheet metal work

Unit-I: Orthographic Projection

Conversion of pictorial/ isometric views into orthographic views of machine block. Identification of surface in orthographic views. Some practice on auto-Cad package.

Unit-II: Isometric Projection

Isometric scale, isometric projection of solids, missing line and missing views. Isometric view of simple objects when their orthographic views are given. Preparation of isometric views using, Auto-Cad package.

Unit-III: Sectioning

Conventional representation in section of engineering materials. Methods of sectioning, sectional views of machine components, brackets, bushed bearing and foot step bearing.

Unit-IV: Fasteners

Sketches of different types of threads, permanent fasteners (riveted and welded joints), temporary fasteners (nut and bolt assembly, studs, keys. etc.)

Unit-V: Building Drawings

Symbols of electrical and sanitary items. Terminology used in building drawing, plan and elevation of 2/3- rooms building using Auto-CAD package, from corrosion, refractories, their manufacturer and properties: neutral, acid and basic refractors; glass its types and manufacture.

Text/Reference Books:

1. A.N. Siddiqui, Z.A. Khan and Mukhtar, Engineering Graphics with Primer on Autocad
2. N.D. Bhutt, Engineering Drawing

AS-105: Innovative Technology & Bio-Science

Credits: 3	3 Hours per week (L-T-P:2-1-0)	End Semester Examination: 45 Marks Internal Assessment: 30 Marks

Course Objective:

AS-105.CO1	Understanding the concept of nanotechnology
AS-105.CO2	Learning the applications of nanotechnology in multiple disciplines
AS-105.CO3	Understanding the concepts of biological sciences, genetics, biological indicators and biosensors
AS-105.CO4	Exploring the field of advanced biological sciences and biotechnology
AS-105.CO5	Exploring nano-biotechnology and its various applications

Unit-I: Introduction to Nanotechnology

Introduction to Nanotechnology, Theoretical Basis of nanotechnology, Quantum confinement and size effect, Classification of Nanomaterials: Nanowires, Quantum Well and Quantum Dots, Properties of Nanomaterials, Carbonaceous Nanomaterials and their examples. Molecular Nanotechnology, Green Nanotechnology.

Unit-II: Applications of Nanotechnology

Microelectromechanical Systems (MEMS) & Nanoeletromechanical Systems (NEM S), Nanorobotics, Nanofluidics, Micro-gears and Nano-gears, Nanocomposites and their applications, Nanomaterials for Civil Engineers, Nano-paints, Light and flexible Civil Engg. Structures based on carbon Nanomaterials, Nano-memories. Nano-sensors. Nano-transistors, Introduction to organic electronics.

Unit-III: Introduction to Biological Sciences

Introduction to the cell as a unit of life, Principles involved in the maintenance of life processes, Ultra-structure and function of cellular components-Prokaryotic and Eukaryotic cells, cell wall, plasma membrane, endoplasmic reticulum, Biomolecules- Carbohydrates. Lipids, Amino Acids, proteins, Nucleic Acids, Tissue Systems. Metabolism, Chromosomes and Cell Division. Basic Genetics-biological indicators, bio-sensors, Mutation-causes. types and effect.

Unit-IV: Advanced Biological Sciences

Introduction to microbiology, Industrial microbiology, introduction to immunology, Introduction to molecular genetics, Structure of RNA aid DNA, Concept of Gene, Gene regulation, Basic concepts of biotechnology: Totipotency and cell manipulation, Classifications of biotechnologies.

Unit-V: Nanobiotechnology

Introduction to Nanobiotecnology, Nanobiotechnology in medicine: regenerative medicine, Targeted drug delivery. Nanotechnology in pharmacy, Nanobiotechnology in Ayurveda, Alternative medicines. Nanobiotechnology in Agricultural, industrial Nanobiotechnology, Nanoimaging, Cancer treatment using Nanotechnology.

AS-153: Engineering Chemistry Lab-I

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: Internal Assessment:	10 Marks 15 Marks

Course Objective:

AS-153.CO1	Determination of concentration of analyte by volumetric analysis
AS-153.CO2	Determination of rate constant of 1st order reaction
AS-153.CO3	Preparation of thermosetting polymer
AS-153.CO4	Determination of concentration of analyte using various analyrical instruments
AS-153.CO5	Determination of proprties of a material

List of Experiments

1. To determine the amount of Cu in a given copper ore Solution, iodometrically.
2. To find out the percentage composition of a mixture of (a) sodium Chloride (NaCl) and Sodium Hydroxide (NaOH) & (b) Potassium Chloride (KCl) and Potassium Hydroxide (KOH).
3. To determine rate constant (K) for the hydrolysis of ethyl acetate, catalyzed by hydrochloric acid.
4. To prepare a fresh sample of urea formaldehyde polymer.
5. To determine concentration of HCl solution using N/10 NaOH solution pH metrically.
6. To estimate the strength of a strong acid conductometrically.
7. To find out the concentration of a given cobalt chloride solution using visible spectrophotometer.
8. To determine the surface tension of a given liquid at room temperature, using Stalagmometer.
9. To find out the amount of sulphate ions in a given water Sample, using Nephlometer.
10. To determine flash and fire point of a lubricating oil sample, using Pensky Martin`s apparatus.

AS-253: Engineering Chemistry Lab-II

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: Internal Assessment:	10 Marks 15 Marks

Course Objective:

AS-253.CO1	Understanding importance of use of water in industries, softening methods and problems on water treatment
AS-253.CO2	Understanding basis of fuels analysis and their combustion
AS-253.CO3	Exploring the corrosion and protection
AS-253.CO4	Understanding environment and pollution
AS-253.CO5	Understanding environmental biochemistry

List of Experiments

1. To determine the temporary, permanent and total hardness of a given water sample by versenate method.
2. To determine calcium and magnesium hardness of a given water sample, separately.
3. To determine dissolved oxygen contents of a given water sample by Winkler`s method.
4. To determine the amount of total chlorine residual in a given water sample by iodometric method.
5. To determine alkalinity of a given water sample.
6. To determine chloride ions in a given water sample by Argentometric method (Mohr's method).
7. To determine the capacity of a cation exchange resin supplied in column No. CAT-1
8. To determine the capacity of an anion exchange resin supplied in column No. AN-1
9. To determine viscosity of a given lubricating Oil sample using Redwood Viscometer.
10. To determine moisture, volatile & ash contents in given Coal sample by proximate analysis.

AS-152: Engineering Physics Lab-I

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: Internal Assessment:	10 Marks 15 Marks

Course Objective:

AS-152.CO1	Learn characteristics of laser light
AS-152.CO2	Investigate behaviour of diodes and LEDs
AS-152.CO3	Observe features of photoelectric effect
AS-152.CO4	Use semiconductor devices, particularly amplifier circuits
AS-152.CO5	Decipher characteristics of measuring instruments in electric circuits

List of Experiment

1. To find the acceleration due to gravity (g) and to determine radius of gyration (K) of a bar pendulum
2. To find the value of acceleration due to gravity (g) using Kater's pendulum (by plotting graph)
3. To determine the spring constant (k) of a given spring by static method
4. To determine the spring constant (k) of a given spring by dynamic method
5. To find the moment of inertia (I) of solid metallic objects such as cube, cone, cylinder, sphere using moment of inertia (M.I.) table
6. To verify parallel axis theorem using M.I. table
7. To determine the M.I. and energy lost per revolution of the given fly wheel by measuring time interval.
8. To determine the wavelength (A) of sodium light by Newton's ring arrangement
9. To determine the value of Planck's constant (h) using LED
10. To plot the characteristics curve of a Zener diode.
11. To find the frequency of Tuning Fork using Melde's experiment.
12. To determine spring constant (k), effective mass (n.) of the spring, damping factor (a) and viscosity (n) of water using damped harmonic oscillator

AS-252: Engineering Physics Lab-II

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: 10 Marks Internal Assessment: 15 Marks

Course Objective:

*AS-252.*CO1	Learn to apply relativity in describing physics of motion
*AS-252.*CO2	Appreciate the importance of lasers and grasp the physical bases
*AS-252.*CO3	Learn the calculation methods of quantum theory
*AS-252.*CO4	Apply quantum ideas to explain behaviour of materials
*AS-252.*CO5	Appreciate physics conservation laws and be acquainted with new areas

List of Experiment

1. Measurement of the diameter (d) of hair using the phenomenon of diffraction. b) To measure the divergence of a laser beam.
2. Draw the characteristics curve of PN-Junction and forward bias and reverse bias
3. PN-Junction: To determine temperature coefficient of junction voltage and energy band gap (E_g)
4. To study the characteristics of a pnp / npn transistor in Common Emitter (CE) configuration
5. To determine the energy band gap (E_g) of a semiconducting material using Four-probe method
6. To determine Hall Coefficient (R_H) and numbers of charge carriers per unit volume (n) in a semi conductor sample.

7. To determine Plank's constant using photocell.
8. To determine the refractive index (u) of the material of a prism for the given wavelengths of light
9. Verification of emfs of two cells using Potentiometer
10. To determine the resistance per unit length (B = R/L) of Potentiometer wire
11. To convert Galvanometer into Ammeter (range: 0-100 mA)
12. To convert Galvanometer into Ammeter (range: 0-250 mV)

ME-102: Engineering Mechanics Lab.

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: Internal Assessment:	10 Marks 15 Marks

Course Objective:

List of Experiments
1. To determine the co-efficient of friction between various surfaces on an Horizontal plane apparatus.
2. To determine the co-efficient of friction between various surfaces on an inclined plane apparatus.
3. To determine the mechanical advantage, Velocity ratio and efficiency of the Differential wheel and Axle apparatus.
4. To determine the mechanical advantage, Velocity ratio and efficiency of Double purchase winch crab apparatus and plot the curves (i) Effort VS Load (ii) Efficiency VS Load
5. To determine the mechanical advantage, Velocity ratio and efficiency of Worm & worm wheel apparatus and plot the curves (i) Effort VS Load (ii) Efficiency VS Load
6. To determine the mechanical advantage, Velocity ratio and efficiency of Screw jack and plot the curves (i) Effort VS Load (ii) Efficiency VS Load
7. To determine the beam reactions in Simply supported beams for different loads using parallel beam apparatus.
8. To verify the law of moments using Bell crank lever.
9. To verify the triangular law of forces using polygon law of Forces apparatus.

ME-151: Workshop Practice Lab

Credits: 2	2 Hours per week (L-T-P:0-0-4)	End Semester Examination: Internal Assessment:	20 Marks 30 Marks

Course Objective:

*ME-151.*CO1	To instill fundamentals of materials, properties, various tools and their specifications employed in various shops/trades

ME-151.CO2	To understand science and engineering of every task and tool employed in each shop/trade
ME-151.CO3	To understand the drawing and specification of various tasks/jobs; plan, operate and acquire tools to make jobs as per specifications
ME-151.CO4	Encourage student to use web/computing resources and relate the completed task with real life processes
ME-151.CO5	Educate them for safety and security while performing assigned tasks in group of small size, prepare the record of tasks and submit

List of Experiments

Fitting Shop

1. To make a job of mild steel plate according to the given drawing by using Fitting shop's toolsand operations.

Pattern Making Shop

2. To make a job of soft wood according to the given drawing by using Pattern making shop'stools and operations.

Foundry Shop

3. To prepare a mould with given pattern by using Foundry shop's tools and operations.

Welding Shop

4. To make a job by joining mild steel plates according to the given drawing by using ElectricArc welding.

Lathe Machine (Machine Shop)

5. To make a job according to the given drawing by machining of work piece on the LatheMachine.

Shaper Machine (Machine Shop)

6. To make a job according to the given drawing by machining of work piece on the shaperMachine.

AS-151: Language Lab

Credits: 1	2 Hours per week (L-T-P:0-0-2)	End Semester Examination: 10 Marks Internal Assessment: 15 Marks

Course Objective:

AS-151.CO1	Understanding concepts of grammar
AS-151.CO2	Team work through group discussion/debates/interviews
AS-151.CO3	Analysis of strength and weakness of individuals and interpretation through written/audio/video source
AS-151.CO4	Development of overall personality
AS-151.CO5	Practical understanding of accent/tone and phonological

	mannerisms

Grammar (Software Aided Practice)
Group Activities (Active Listening & Viewing), Storytelling, Quiz, Open forum
Review of resource videos & audio
Individual strength and weakness assessment
Personality Development and Soft Skills
English Phonetics, word stress and intonation (practice)
Group Discussions,
Debates,
Simulated Conversations (formal & informal)
Seminars,
Personal Interviews,
Presentations,
Extempore,
JAM