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## 1. SUMMARY OF THE SYLLABUS

Semester	No of Theory Papers	No of Laboratory Papers	No of Sessional Papers	Semester Weightage (%)	Weekly contact Hours	Total marks	Total Credits
1 <sup>st</sup>	5+1*	3	2	6%	37	1000	25
2 <sup>nd</sup>	6	3	1	6%	34	1000	25
3 <sup>rd</sup> to 8 <sup>th</sup>	<b>To be introduced later on</b>						

**\* Marks for this paper (Non credit) will not be reflected in total marks for the semester**

## 2. TERMINOLOGY

- a) L-T-P: Indicates Lecture Periods, Tutorial Periods and Practical periods.
- b) **Credits:** Weightage of a subject depending on its weekly lectures / practical hours and expressed in terms of Credits.

**Semester- I (Common for all)**  
**Semester Weightage: 6%**

Sl. No	Paper Code	Name of the Paper	Periods/Week			Credits	Full Marks	Comments
			L	T	P			
<b>Theoretical Papers:</b>								
1	HS 101	Technical English (Non-credit paper)*	3	0	0	0	100	For all Branches
2	M 101	Engineering Mathematics-1	3	1	0	3	100	
3	CSE 101	Concept of Programming	3	1	0	3	100	
4a	ECE 101	Basic Electronics	3	1	0	3	100	For CSE, IT ,CE
5a	CH 101	Engineering Chemistry	3	0	0	3	100	
6a	PH 101	Engineering Physics	3	1	0	3	100	
4b	ME 101	Basic Mechanical Engineering	3	1	0	3	100	For ECE, AEIE, EE
5b	HS 102	Environmental Science	3	0	0	3	100	
6b	EE 101	Basic Electrical Engineering	3	1	0	3	100	
<b>Practical/Sessional papers:</b>								
7	CSE 151	Concepts of Programming Laboratory	0	0	3	2	100	For all Branches
8	ME 181	Engineering Drawing	0	0	3	2	100	
9a	ECE 151	Basic Electronics Laboratory	0	0	3	2	100	For CSE, IT ,CE
10a	PH 151	Engineering Physics Laboratory	0	0	3	2	100	
11a	ME 182	Workshop Practice	0	0	3	2	100	
9b	ME 151	Basic Mechanical Engineering Laboratory	0	0	3	2	100	For ECE, AEIE, EE
10b	EE 151	Basic Electrical Engineering Laboratory	0	0	3	2	100	
11b	HS 181	Professional Communication	0	0	3	2	100	
		<b>Sub Total</b>	<b>18</b>	<b>04</b>	<b>15</b>	<b>25</b>	<b>1000</b>	(Consider 1,2,3, 7, 8, and either 4a,5a,6a,9a,10a 11a <b>OR</b> 4b,5b,6b,9b,10b,11b)
		<b>Total:</b>	<b>37</b>			<b>25</b>	<b>1000</b>	

**\* Marks for this paper will not be reflected in total marks for the semester**

**Semester- II (Common for all)**

**Semester Weightage: 6%**

Sl. No	Paper Code	Name of the Paper	Periods/Week			Credits	Full Marks	Comments
			L	T	P			
<b>Theoretical Papers:</b>								
1	M 201	Engineering Mathematics- II	3	1	0	3	100	For all Branches
2	HS 201	Economics and Accountancy	2	1	0	2	100	
3	CSE 201	Programming and Data Structure	3	1	0	3	100	
4a	ME 201	Basic Mechanical Engineering	3	1	0	3	100	For CSE, IT ,CE
5a	HS 202	Environmental Science	3	0	0	3	100	
6a	EE 201	Basic Electrical Engineering	3	1	0	3	100	
4b	ECE 201	Basic Electronics	3	1	0	3	100	For ECE, AEIE, EE
5b	CH 201	Engineering Chemistry	3	0	0	3	100	
6b	PH 201	Engineering Physics	3	1	0	3	100	
<b>Practical/Sessional papers:</b>								
7	CSE 251	Programming and Data Structure Laboratory	0	0	3	2	100	For all Branches
8a	ME 251	Basic Mechanical Engineering Laboratory	0	0	3	2	100	For CSE, IT ,CE
9a	EE 251	Basic Electrical Engineering Laboratory	0	0	3	2	100	
10a	HS 281	Professional Communication	0	0	3	2	100	
8b	ECE 251	Basic Electronics Laboratory	0	0	3	2	100	For ECE, AEIE, EE
9b	PH 251	Engineering Physics Laboratory	0	0	3	2	100	
10b	ME 282	Workshop Practice	0	0	3	2	100	
		<b>Sub Total</b>	<b>17</b>	<b>05</b>	<b>12</b>	<b>25</b>	<b>1000</b>	(Consider 1,2,3,7 and either 4a,5a,6a, 8a, 9a,10a <b>OR</b> 4b, 5b,6b,8b, 9b, 10b)
		<b>Total:</b>	<b>34</b>			<b>25</b>	<b>1000</b>	

## SEMESTER-I

**Paper Name: Technical English**

**Paper Code: HS 101**

**Weekly Load: L: 3 T: 0 P: 0**

**Credits: 0**

**Total Marks: 100**

UNIT	Detailed Description	Lecture / Tutorial Period
1.	Grammar and Vocabulary Development: Word formation: Prefix and Suffixes Verbs: Auxiliaries, Finite & Non Finites, Concord (Verb Agreement) ,Time and Tense, Active & Passive Voice, Conditional Sentences, Adjectives and Degrees of Comparison, Adverbs, Conjunctions, Prepositions, Articles, Narration, Parts of speech Basic Grammar - Structural Pattern	10L
2.	Common Error, Comparison	2L
3.	Synonyms, Antonyms, Idioms, Confusables, One word Substitute, Editing ,Homonyms, Eponyms, Phrasal Verbs, Nouns, Gerunds, Infinitives, Sentence, Building (Vocabulary)	8L
4.	Précis, Essay, Story. Paragraph Writing & Comprehension	10L
5.	Official Correspondence, Memorandum, Official letter writing and Email, Technical Proposal & Report writing ,Writing a Book Review, Resume	12L
	<b>TOTAL:</b>	<b>42L</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. English Grammar- N.D. Turton, ABC of Common Grammatical Error for learners & Teachers.
2. English Grammar- Dr. D. Thakur
3. English Grammar- Dr. K.K. Ramchandranetal; Business Communication.
4. Technical English- Sharon j Gerson and Steven M Gerson
5. Angela Burt, Quick Solutions to common Error in English.
6. W. Foulsham, The Complete letter writer.
7. John East wood- Oxford guide to English Grammar.
8. Personality Development and Soft skills By Barun K. Mitra, Oxford University Press
9. Technical Communication Principles and Practice By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press
10. Fundamental Of Technical Communication By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press.
11. Communication in English for Technical Student- Orient Longman.
12. G. Nagroj, English Language Teaching.
13. N. Saraswati, English language Teaching; Principles & Practices.
14. English for Engineers- Orient Blackswan

**Paper Name: Engineering Mathematics-I**

**Paper Code: M 101**

**Weekly Load: L: 3 T: 1 P :0**

**Credits: 3**

**Total Marks: 100**

<b>Unit</b>	<b>Detailed Description</b>	<b>Lecture / Tutorial Period</b>
1.	<b>Three Dimensional coordinate geometry:</b> Direction cosines, Equation of planes, Equation of straight lines, shortest distance and its equation; Equation of sphere, Cone, Cylinder; Standard equation of conicoids (Paraboloid, Ellipsoid, Hyperboloid)	7L+3T
2.	<b>Vector Algebra and Calculus:</b> Derivatives of vector, Directional derivatives, Gradient, Divergence, Curl, Laplacian; Geometrical and physical interpretation of the vector operators. Applications to the geometry and engineering mechanics; Differentiation of integrals with variable limits; Rectification, Multiple integrals; Line Integral, Surface integral, Volume integral, Applications, Change of variables in double integrals, Jacobian of transformations, Integrals dependent on parameters, Applications; Theorems of Green, Gauss and Stokes' and their Applications, Vector algebra in regular and curvilinear co-ordinates.	14L+4T
3.	<b>Differential and Integral Calculus and Applications:</b> Successive Derivatives, Leibnitz's Theorem, Rolle's Theorem, Cauchy's Mean Value Theorem, Geometrical interpretations, Taylor's and Maclaurin's Theorems with remainders, Points of inflexion, Concavity and Convexity, Curvature and Asymptotes; Fundamental theorem of integral calculus, Mean value theorem, Simple reduction formulae, Convergence of Improper Integrals, Tests of convergence, Beta and Gamma functions, Elementary properties, Application of definite integral to find area, volume, surface area, curve length, moment of inertia and centre of gravity of a body bounded by surface of revolution	13L+4T
4.	<b>Multivariate analysis:</b> Limit, Continuity and Differentiability of functions of several variables, Partial Derivatives and their geometrical interpretation, increments and differentials, derivatives of composite and implicit functions, Derivatives of higher orders and their commutativity, Euler's Theorem on homogeneous functions, Jacobian, Taylor's and Maclaurin's expansion, Maxima and Minima, Lagrange's method of multipliers.	8L+3T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. A Text Book of Analytical Geometry by M.C.Chaki, Calcutta Publishers.
2. Complex Variables by Spiegel, Schaum's Series.
3. Mathematical Analysis by Malik & Arora, New Age International Publishers.
4. Integral Calculus by Shanti Narayan, S. Chand.
5. Differential Calculus by Shanti Narayan, S. Chand.
6. Advanced Engineering Mathematics by E. Kreyszig, Wiley

**Paper Name: Concepts of Programming**

**Paper Code: CSE 101**

**Weekly Load: L: 3 T : 1 P :0**

**Credits: 3**

**Total Marks: 100**

Unit	Detailed Description	Lecture / Tutorial Period
1.	<b>Fundamentals:</b> Introduction to Number System, Binary number system, Octal number system, Hexadecimal number system, Conversion between different type of Number System; Introduction to Programming Languages, Different Types of Programming Languages (Assembly, Machine, High-level, Low-level), Compilers, Interpreters, Assemblers; Algorithms, Flow Chart.	4L+1T
2.	<b>Introduction to C Programming:</b> The character set identifiers and keywords, data type & sizes, variable names, constants, storage class, declaration, comments; Operators & Expressions: Arithmetic operators, relational and logical operators, type conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation.	4L+1T
3.	<b>Input- Output Operations:</b> Standard input and output- scanf and printf, Other formats of input and output operations.	3L+1T
4.	<b>Flow of Control:</b> Statement and blocks; if - else, switch-case, conditional (?:) operator; Loops - while, for, do while; break and continue; goto and labels.	5L+2T
5.	<b>Arrays and Strings:</b> One dimensional arrays, multidimensional arrays, row and column major order representation of matrices, Sparse matrices, declaring and initializing string variable, input and output operation of string, string-handling function.	7L+3T
6.	<b>User Defined Function:</b> Basic of functions, function types, function prototypes, function call, function definition, functions returning values, functions not returning values, auto, external, static and register variables, nesting of functions, passing parameter, recursion, C preprocessor.	9L+3T
7.	<b>Structures and Union:</b> Basic of structures, type def, structures and functions, arrays of structures, union.	4L+1T
8.	<b>Searching:</b> Sequential and Binary search.	3L+1T
9.	<b>Sorting:</b> Bubble, Selection and Insertion sort.	3L+1T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. B.W. Kerninghan, D.M. Ritchie, The C Programming Language, Prentice-Hall India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill.
3. B. Gottfried, J. Chhabra, Programming with C, Schaum Series, Tata McGraw Hill.
4. S. G. Kochan, Programming in C, Developer's Library.
5. S. Lipschutz, Data Structures, Schaum Series, Tata McGraw Hill.
6. Y. Langsam, M. Augenstein and A. M. Tenenbaum, Data Structures Using C and C++, Prentice-Hall India.
7. R. L. Kruse, B. P. Leung, C. L. Tondo, Data Structures and Program Design in C: Prentice-Hall India.
8. G. L. Heileman, Data Structure, Algorithms and Object Oriented Programming, Tata McGraw Hill.
9. M. Radhakrishnan and V. Srinivasan, Data Structures Using C, BPB.
10. D. Ravichandran, Programming in C, New Age International.
11. C. Xavier, C Language & Numerical Methods, New Age International.
12. Y. Kanetkar, Let us C, BPB.
13. K. R. Venugopal, S. R. Prasad, Mastering C, Tata McGraw Hill.

**Paper Name : Basic Electronics**  
**Paper Code : ECE 101**  
**Weekly Load : L: 3 T: 1 P: 0**  
**Credits: 3**  
**Total Marks : 100**

Unit	Detailed Description	Lecture / Tutorial Period
01.	<b>Introduction:</b>	1L
02.	Introduction to Semiconductor, Insulator and Metals with crystalline/amorphous structure and band theory.	2L
03	Formation of P-N junction, Fermi level, biasing of P-N junction and V-I characteristics of P-N junctions.	2L
04.	<b>Diode:</b> Different types of diodes and its Characteristics, Normal diode, Zener diode, LED, Solar cell, Gunn Diode. <b>Applications of diodes:</b> Wave shaping, Rectifiers, clippers, clampers, regulators	4L+2T
05.	<b>BJT:</b> Basics, Characteristics <b>Mode of operation( AC) :</b> CE, CB, CC amplifiers, frequency response of amplifiers. <b>Applications of BJT:</b> BJT as an amplifier and switch.	6L+2T
06.	<b>FET family:</b> Types of FET (JFET, MOSFET) and its Device structure and operation, Volt-amp characteristics. <b>Applications of FETs:</b> FET as an amplifier and switch.	6L+2T
07.	<b>Differential and operational amplifiers:</b> Characteristics of differential amplifiers, Ideal operational amplifiers (OP-AMP), OP-AMP parameters &, Characteristics. Inverting and non-inverting configuration, Common OPAMP ICs, CMRR and Slew rate. <b>Operations using Op-AMP:</b> Inverting, Non-Inverting amplifiers; Summer, difference Amplifier, Integrators, Differentiators; Comparators, Logarithmic amplifier, Instrumentation amplifier.	6L+3T
08.	<b>Feedback amplifiers and oscillators:</b> Basic concepts, operation, Hartley, colpitt and phase shift, wien bridge, crystal oscillators	6L+2T
09.	<b>Introduction to Digital Electronics:</b> Logic Gates, Truth Table and K- Map. Combinational and Sequential Logic Circuits (SR, JK master slave flip-flops, Counters).	6L+2T
10.	<b>Application Specific ICs:</b> Multi-vibrators, 555 timer as Astable and Monostable multivibrators .	3L+1T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

**Text/Reference Books:**

1. Electronic Principle by Malvino
2. Electronic Devices and Circuit theory – Boylestead and Nashlesky – PHI/Pearson Education
3. Integrated Electronics, Millman and Halkias – TMH Op Amp and Linear Ics.
4. Micro-Electronics by Mottershed.
5. Foundations of Electronics by Chattopadhaya and Rakshit
6. Fundamental of digital circuits by A.Anand Kumar (PHI).
7. Digital design by M. Mano (Pearson).



**Paper Name** : Engineering Chemistry  
**Paper Code** : CH 101  
**Weekly Load** : L: 3 T: 0 P: 0  
**Credits** : 3  
**Total Marks** : 100

Unit	Detailed Description	Lecture/ Tutorial Period
01	<b>Thermodynamics:</b> Concept of Thermodynamic system, Internal energy, Enthalpy, Heat Capacity, Reversible and Irreversible processes, different laws of thermodynamics, Joule Thomson effect, Entropy, Work function and free energy, Maxwell's Expression, Gibbs, Helmholtz equation.	5L
02	<b>Electrochemistry:</b> Ionic conductivity and its measurements. Conductivity of electrolytes, Kohlrausch's law. Galvanic cell, electrode potential, Nernst equation, galvanic series, Fuel cells.	5L
03	<b>Solid State:</b> Space lattice, Unit cell, Lattice energy, radius ratio rule, Bragg's equation. Crystal defects, band theory, Semiconductor, Role of silicon and germanium in the field of semiconductor.	5L
04	<b>Surface Chemistry:</b> Adsorption and Absorption, Mechanism of Adsorption, Types of Adsorption, Catalysis. Colloid state, Sols, Gels, Micelles.	5L
05	<b>Chemical bonding:</b> Ionic bonding, Factors which governs ionic bonding. Lattice energy, Born-Haber cycle. Covalent bond Hybridisation, VSEPR theory, bond order, bonding in coordination compounds. Molecular orbital theory of homo- and hetero-nuclear diatomic molecules. Bonding in coordination compound, Ligand field theory and crystal field theory.	5L
06	<b>Chemical kinetics:</b> Reaction rates, order of reaction, molecular of reaction, first and second order reaction, pseudo order reaction. Reversible reaction, consecutive reactions and parallel reaction. Homogeneous and heterogeneous catalysts and its applications in chemical industries.	5L
07	<b>Structure and reactivity of Organic molecule:</b> Hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations and substitution reactions with stereochemistry.	5L
08	<b>Instrumental Techniques:</b> Fundamentals of Spectroscopy; Principles and applications of UV-visible, IR & NMR.	2L
09	<b>Polymerization:</b> Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, Preparation, structure and use of some common polymers: plastic (PE: HDPE, LDPE, LLDPE, UHMWPE), rubber (natural rubber, SBR), fibre (nylon 6.6). Vulcanization, Biodegradable polymers.	5L
10	<b>Fuel:</b> Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number.	4L
11	<b>Corrosion and corrosion control:</b> Corrosion, Factors Influencing the Rate of Corrosion, types of corrosion, corrosion control.	2L
12	<b>Water treatment:</b> Hardness of water, units of water, disadvantage of hard water, scale and sludge formation in boilers, caustic- embrittlement, boiler corrosion. Priming and foaming in boilers, softening methods. Desalination of Brackish water.	4L
13	<b>Dye &amp; Pigments:</b> Colour and constitution, Classification of Dyes, Nitro Dyes, Nitroso Dyes, Azo Dyes, Acridine dyes, Quinoline Dyes, Vat dyes, Fluorescent brightening agent.	2L
14	<b>Green chemistry:</b> Introduction, Significance, utilities.	2L
	<b>Total</b>	<b>42L</b>
	<b>Total week required</b>	<b>14</b>
	<b>No. of week reserved</b>	<b>02</b>

## Text/Reference Books:

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcafe & Eddy.
3. Engineering Chemistry By O P Aggarwal, Khanna Publishers
4. Engineering Chemistry By P C Jain & M Jain, Dhanpat Rai Publishing Company
5. A Text Book Of Engineering Chemistry By Dr Sunita Rattan, S K Kataria & Sons.
6. A Text Book Of Engineering Chemistry By Shasai Chawla, Dhanpat Rai Publishing Company
7. Physical Chemistry By P. C. Rakshit, Sarat Book House
8. Fuels and Combustion By S. Sarkar, Taylor & Francis
9. Polymer Science and Technology By Joel R. Fried, Pearson Education
10. Organic Chemistry By L. Finar, Addison Wesley Longman, Inc

**Paper Name: Engineering Physics****Paper Code: PH 101****Weekly Load: L: 3 T: 1 P:0****Credits: 3****Total Marks: 100**

Unit	Detailed Description	Lecture / Tutorial Period
1	<b>Oscillations &amp; Waves:</b> Overview on SHM: Formation of differential equation for free and damped SHM and their solutions; concepts of under-damping, critical damping and over-damping. Equivalence of electrical and mechanical resonant circuit. Forced Vibration and Resonance (Amplitude, Velocity and Power resonance), Sharpness of Resonance and Quality factor. Superposition of Harmonic Oscillations: Linear superposition principle, Lissajous figures (Graphical method). Standing waves; Group Velocity and Phase velocity.	8L+2T
2	<b>Introduction to vector calculus:</b> Gradient, Divergence and Curl; Line Integral, surface integral and volume integral; Divergence theorem and Stokes theorem.	2L+1T
3	<b>Electromagnetics:</b> Gauss's Law of electrostatics and its differential form; continuity equation. Ampere's circuital law and its differential form. Faraday's law of electro-magnetic induction and its differential form. Displacement current density Maxwell's field equations. E-M wave equation and its solution. Transverse nature of E-M wave. Boundary conditions of Electric and magnetic fields across an interface, Reflection & Refraction of EM waves.	6L +2T
4	<b>Physical Optics</b> <b>Interference of light waves:</b> Nature of Light waves; Wave front; Classification of wave front, Huygens Principle, Overview of classical experiments of interference (Young's Double slit, Fresnel's Biprism & Lloyd's mirror). Stokes law, thin film interference: wedge-shaped film interference, fringes of equal inclination and equal thickness. Newton's ring (Lens in contact with a plate), Interferometer principles (Michelson's interferometry), multiple internal reflections (Fabry-Pérot interferometer).	6L+2T

	<b>Diffraction of light waves:</b> Definition and its difference with interference; Classification– Fresnel and Fraunhofer diffraction, Fraunhofer diffraction: - Single Slit experiment; Plane Transmission Grating; intensity and width of the principle maxima and secondary maxima and minima.	4L+2T
	<b>Polarisation of light:</b> Types of polarisation (plane, circular, elliptical), linear polarisers; Malus' Law of Polarization, Brewster's law; Double refraction: Ordinary and Extraordinary rays. Nichol prism, Polaroid, wave plates, Babinet compensator, Optical activity, Polarimeter.	6L+1T
5	<b>Quantum Theory</b> De Broglie waves, Wave particle Duality and Uncertainty Principle; Double slit experiment; concept of wave function and probability density; Time Dependent/Independent Schrödinger equation for free particle and for a particle in a potential well. Stationary states; Postulates of quantum mechanics, Energy Eigen values of a particle in box. Potential well and steps, Introduction to nano-physics.	8L+2T
6	<b>Lasers</b> Spontaneous and Stimulated emission of radiation; Principles, Einstein A, B coefficients. The basic requirement of a laser; Gas, Lasers and Solid state lasers, semiconductor laser, Applications.	2L+2T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. The Physics of Waves and Oscillations, N. K. Bajaj, Tata McGraw-Hill Education
2. Electricity And Magnetism, D Chattopadhyay, New Central Book Agency (P) Limited
3. Optics, Ajay Ghatak, Tata McGraw-Hill Education
4. Geometrical and Physical Optics Paperback, P. K. Chakrabarti, New Central Book Agency
5. Solid State Physics, S. O. Pillai, New Age International
6. Solid State Physics, P. K. Palanisamy, Scitech Publication (India) Pvt. Ltd.
7. Quantum Mechanics, V. K. Thankappan, New Age International
8. Fundamentals of Quantum Mechanics, Statistical Mechanics & Solid State Physics, S. P. Kuila, Books And Allied (P) Ltd.
9. A Text Book of Optics, N. Subrahmanyam, BrijLal and M. N. Avadhanulu, S. Chand Limited
10. F K Ritchmayer, E H Kenuard & T Lauritsen: Introduction to Modern Physics, McGraw Hill
11. Theory and Problems of Vector Analysis: And an Introduction to Tensor Analysis, Murray R. Spiegel, McGraw-Hill
12. A Beiser: Perspective in Modern Physics, McGraw Hill

**Paper Name: Basic Mechanical Engineering.**

**Paper Code: ME 101**

**Weekly Load: L: 3 T: 1 P: 0**

**Credits : 3**

**Total Marks: 100**

Unit	Detailed Description	Lecture / Tutorial Period
1.	<b>Introduction to Engineering Mechanics;</b> Statics: Fundamental idealization: Particle and Rigid body concept, vector and scalar quantities, Definition of force and force as vector, System of forces, Resultant of a system of forces, Transmissibility of a force, Resolution of forces, Free body diagram, Condition of equilibrium and related problems, Lami's theorem, Concept of moment, Varignon's principle of moment, Concept of couple.	4L+2T
2.	<b>Introduction to Vector Algebra:</b> Vector operations, Parallelogram law, Free vector, Linearly dependent and independent vector, Bound vector, Representation of forces and moments in terms of i,j,k, Cross product and Dot product and their applications.	3L+1T
3.	<b>Friction:</b> Concept of friction, law's of friction, Coefficient of friction, Angle of friction. Limiting angle of friction, Angle of repose, Cone of friction, Problems involving friction.	3L+1T
4.	<b>Analysis of structure:</b> Simple trusses and frames, Assumptions made in case of simple truss, Tension and Compression member, Analysis of trusses by Method of Joints and Method of Sections, Simple problems on plane trusses.	4L+1T
5	<b>Virtual work:</b> Principle of virtual work, Positive and Negative work, Problems on applications of principle of virtual work.	2L+1T
6	<b>Distributed forces:</b> Centre of gravity, Centroids of areas and lines, First moment of area, Second moment of area, Polar moment of inertia, Radius of gyration of an area, Parallel axis theorem, Mass moment of inertia of symmetrical bodies e.g cylinder, sphere rod etc.	4L+1T
7	<b>Introduction to Dynamics:</b> Kinetics of particles: Path, Velocity, Acceleration, Rectilinear motion of particles, Determination of position, Velocity and Acceleration (under uniform and non uniform accelerated rectilinear motion), Relative motion, Construction of x-t, v-t, a-t graphs (simple problems), Plane curvilinear motion of particles: Projectiles: simple problems.	3L+1T
8	<b>Kinematics of Rigid bodies:</b> Translation, Rotation about a fixed axis, Motion in general plane.	3L+1T
9	<b>Kinetics of Particles and Rigid bodies:</b> Newton's laws of motion, Dynamic equilibrium, D'Alembert's principle, linear momentum, Angular momentum, Principle of Work Energy and Impulse Momentum, Principle of Conservation of energy, power, Simple problems.	4L+1T
10	<b>Mechanics of simple machines:</b> Simple machines, M.A,V.R and efficiency, Effect of friction, law of machine, Screw jack.	3L+1T
11	<b>Transmission of power through Belt:</b> Velocity ratio, Simple and Compound belt drive, Slip of belt, length of belt for an Open and Cross belt drive, Power transmission, Ratio of tension, Centrifugal tension and its effects, Maximum stress developed, Condition for maximum power transmission and the corresponding belt speed, Initial tension.	4L+1T
12	<b>Introduction to Mechanics of Deformable bodies:</b> Engineering Materials and their selection, Mechanical properties of materials, Concept of stress and strain, stress- strain diagram for ductile and brittle material, Elastic limit, Hooke's law, Modulus of elasticity, Poisson's ratio, Working Stress, Yield Point stress, Ultimate stress, Factor of safety, Shear stress and strain, Modulus of rigidity. Simple problems on composite bars, relation between different elastic constants, thermal stresses and strains. Solving one dimensional bar problem using Finite Element Method	5L+2T
	<b>TOTAL:</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. Engineering Mechanics By S Timoshenko & D H Young, Macgraw Hill Publishers Ltd.
2. Engineering Mechanics Statics & Dynamics By L H Shames, Pearson Publishers
3. Engineering Mechanics By S S Bhavikatti & K G Rajashekarappa, New Age International Publishers Ltd
4. Applied Mechanics Statics & Dynamics By I B Prasad, Khanna Publishers
5. Engineering Mechanics By Meriam & Kraige. ( Vol I & II ), Jhon Wiley & Sons, Inc
6. Element Of Strength of Materials By Timoshenko & Young, Macgraw Hill Publishers Ltd.
7. Strength Of Material By R K Rajput, S. Chand
8. Strength Of Material By R S Khurmi, S. Chand

**Paper Name** : **Environmental Science**  
**Paper Code** : **HS 102**  
**Weekly Load** : **L: 3 T: 0 P: 0**  
**Credits** : **3**  
**Total Marks** : **100**

Unit	Detailed Description	Lecture/ Tutorial Period
01	<b>General concepts of ecosystem and environment:</b> Concepts of Environmental Science and engineering, structure and functions in ecosystem, Energy flow in ecosystem in context of first law and second law of thermodynamics, Impact of anthropogenic activities on environment, Pollution as undesirable by product of development	5L
02	<b>Environmental physics:</b> Greenhouse gases and global warming, climate change mechanism due to greenhouse gases, Global warming potential, Energy-source and distribution in India, renewable and non-renewable energy resources, conventional vs nonconventional energy, nuclear power and solar energy, noise pollution –source , effects, types, measuring instruments and control methods	5L
03	<b>Environmental chemistry:</b> Chemical composition air, water and soil, water quality analysis in context of BOD and COD. Environmental monitoring; brief idea on air and water, soil quality parameters and their estimation.	5L
04	<b>Environmental modelling:</b> Air pollution modelling –Gaussian pollution model for estimation of GLC, numerical problem related to it. Streeter-Phelps simulation and first order BOD rate equation.	5L
05	<b>Environmental Biology:</b> Bioaccumulation and biomagnifications of toxic discharges, Threats to biodiversity. Bioremediation and phyto -remediation in reducing toxic contamination.	5L
06	<b>Environmental technology and management:</b> Solid waste management, radioactive waste –its treatment and management, Waste water treatment procedure, Air pollution (Both particulate and gaseous) management by technological innovation. ISO :14001	5L
07	<b>Disaster management:</b> Remote sensing and GIS as tool of disaster management.	5L
08	<b>Environmental Impact analysis:</b> Definition, need, objectives, methods, preparation of EIA report.	2L
	<b>Total</b>	<b>42L</b>
	<b>Total week required</b>	<b>14</b>
	<b>No. of week reserved</b>	<b>02</b>

Text/Reference Books:

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcafe & Eddy.
3. Fundamentals of Environment and Ecology by Debapriya De and Debasish De S Chand & Comp.Ltd
4. Basic Environmental Engineering and elemental biology by Patra and Singha Aryan Pub. House

**Paper Name: Basic Electrical Engineering**

**Paper Code : EE 101**

**Weekly Load : L: 3 T: 1 P: 0**

**Credits : 3**

**Total Marks : 100**

<b>Unit</b>	<b>Detailed Description</b>	<b>Lecturer/ Tutorial Period</b>
01	<b>D.C. circuits:</b> Ohm's law, Kirchoff's laws, Resistors, Independent sources, Transformation, Dependent sources, Analysis of simple circuits-node method, mesh method, star-delta Transformation.	5L+ 2T
02	<b>Network theorems:</b> Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem.	7L+2T
03	<b>Magnetic circuits:</b> MMF, Reluctance, Flux, Magnetic circuit concept, Simple magnetic circuit calculations, Magnetically coupled circuits.	5L+2T
04	<b>A.C. single-phase circuits:</b> Phasor representation sinusoids, RMS values, Power, Power factor and reactive power, Impedance and admittance, R-L, R-C and R-L-C circuits, Phasor diagrams.	5L+2T
05	<b>Transients with D.C. excitation:</b> Transients in R-L, R-C and R-L-C circuits.	3L+1T
06	<b>A.C. polyphase circuits:</b> Simple 3-phase balanced and unbalanced circuits star and delta connected load calculations.	5L+2T
07	<b>DC Machines:</b> Construction, Basic concepts of winding (Lap and wave). <b>DC generator:</b> Principle of operation, EMF equation, characteristics (open circuit, load). <b>DC motors:</b> Principle of operation, SpeedtorqueCharacteristics (shunt and series machine), starting (by 3 point starter), speed control (armaturevoltage and field control).	5L+1T
08	<b>Single phase transformer:</b> Core and shell type construction, EMF equation, no load and on loadoperation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests,regulation and efficiency calculation.	5L+1T
09	<b>General structure of electrical power system:</b> Power generation to distribution through overhead lines and underground cables with single lone diagram, modeling of transmission line.	1L+1T
10	<b>Introduction to AC machines</b>	1L
	<b>Total</b>	<b>42L+14T</b>
	<b>Total week required</b>	<b>14</b>
	<b>No of week reserved</b>	<b>02</b>

Text/Reference Books:

1. Network Analysis, M.E.VanValkenburg (Prentice Hall), 3rd Edition.
2. Engineering Circuit Analysis, W.H.Hayt, J.E.Kenmerly, S.M.Durbin,(TMH), 6th Edition, 2002.
3. Network and Systems, Ashfaq Husain,(Khanna Book Publisher), 2000.
4. Network and Systems, D.Roychowdhury,(New Age International) ,2001.
5. Modern Netwok Analysis, F.M.Reza&S.Seely, McGraw Hill.

**Paper Name: Concepts of Programming Laboratory**

**Paper Code: CSE 151**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

**List of Experiments:** [Exercises should include but not limited to]

<b>Unit</b>	<b>Detailed Description</b>	<b>Practical Period</b>
01	Programming assignments covering operators, input and output.	6
02	Programs to demonstrate control structure: if-else, nested if, switch-case, while, do- while, for, use of break and continue.	9
03	Programs involving the use of arrays and strings.	9
04	Programs involving functions and recursion.	9
05	Programs on Sequential Search and Binary Search.	3
06	Programs on Bubble Sort, Insertion Sort and Selection Sort.	6
<b>Total</b>		<b>42P</b>
<b>Total week required</b>		<b>14</b>
<b>No. of week reserved</b>		<b>02</b>

Text/Reference Books:

1. B.W. Kerninghan, D.M. Ritchie, The C Programming Language, Prentice-Hall India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill.
3. B. Gottfried, J. Chhabra, Programming with C, Schaum Series, Tata McGraw Hill.
4. S. G. Kochan, Programming in C, Developer's Library.
5. S. Lipschutz, Data Structures, Schaum Series, Tata McGraw Hill.
6. Y. Langsam, M. Augenstein and A. M. Tenenbaum, Data Structures Using C and C++, Prentice-Hall India.
7. R. L. Kruse, B. P. Leung, C. L. Tondo, Data Structures and Program Design in C: Prentice-Hall India.
8. G. L. Heileman, Data Structure, Algorithms and Object Oriented Programming, Tata McGraw Hill.
9. M. Radhakrishnan and V. Srinivasan, Data Structures Using C, BPB.
10. D. Ravichandran, Programming in C, New Age International.
11. C. Xavier, C Language & Numerical Methods, New Age International.
12. Y. Kanetkar, Let us C, BPB.
13. K. R. Venugopal, S. R. Prasad, Mastering C, Tata McGraw Hill.
14. H. Ellis and S. Sahni, Fundamentals of Data Structures, Computer Science Press.
15. A. Agarwal, Data Structure Through C, Cybertech Publication.

**Paper Name: Engineering Drawing**

**Paper Code: ME 181**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

**Introduction and Sheet Layout:** Basics of Engineering Drawing, Requirement of Engineering Drawing for the engineers, Drawing Instruments and their uses, Drawing sheet size, layout, margin, title block, Scale of drawing, Symbol of projection

**Lines, Lettering and Dimensioning:** Different types of lines, Use of different types of pencils, Application of different types of lines Lettering: Single-stroke letters, Upper case and Lower case letters, Gothic letters Use of dimensioning, General rules of dimensioning

**Scales:** Concept of scale in engineering drawing, Representative fraction, Plane scale, Diagonal scale, Comparative Scale, Vernier scale, Scale of chords

**Geometrical Construction and Curves:** Drawing lines of different relation among them, Dividing lines and angles in equal sectors, Lengths of arcs, Lines and circles in contact, Construction of polygons in different methods Generation of Conic sections, Different methods of drawing Ellipse, Parabola, Hyperbola, Cycloid, Involute and Archimedean Spiral, Tangents and normals to conics

### **Projection**

**Projection of Points:** Concept of projection, First angle and Third angle projection, Projection of points situated in different quadrants

**Projection of Straight Lines:** Lines contained and parallel to principal planes, Lines inclined to one and both the planes, Trace of a Straight lines, Determination of true length and true inclinations, other illustrative problems.

**Projection of Planes:** Types of planes, Different types of planes (circle, polygons) contained and parallel to principal planes, Different types of planes inclined to one and both the planes, Trace of a Plane

**Projection of Solids:** Types of Solids, Projection of different types of solids inclined to one and both the planes, different illustrative problems

**Isometric view and Isometric projection:** Isometric axis, Isometric Scale, Isometric graph, Isometric drawing of planes, Isometric drawing of solids

**Development of Surfaces:** Introduction, Developments of lateral surfaces of right solids (cube, prism, cylinder, pyramids), Developments of lateral surfaces of cone and sphere (Zone and Lune method), Developments of lateral surfaces of truncated solids

Text/Reference Books:

1. Engineering Drawing By N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Engineering Graphics By K Venugopal & V Prabhu Raja, New Age Publishers.
3. Engineering Drawing By S C Bera & B Bhattacharyya, I.K. International.
4. Engineering Drawing and Graphics + AutoCAD by K Venugopal, New Age Publishers.
5. Engineering Drawing by P S Gill, Katson Books
6. Engineering Graphics & Drafting By P S Gill, S K Katria & Sons



**Paper Name : Basic Electronics Laboratory**  
**Paper Code : ECE 151**  
**Weekly Load : L: 0 T: 0 P: 3**  
**Credits : 2**  
**Total Marks : 100**

**List of Experiments:**

1. Familiarization with Electronic components such as Resistors, Capacitors, Diodes, Transistors etc.
2. Familiarization with electrical devices and measuring equipment like DC power supply, Millimeter, Trainer kit etc.
3. Familiarization with measuring and testing equipment like CRO, Signal generator.
4. Study on V-I characteristics of Junction Diode.
5. Study on V-I characteristics of Zener Diode.
6. Study on Half Wave and Full Wave rectifiers.
7. Characteristics Curve for common base emitter & common collector transistors.
8. Study on characteristics of Field Effect Transistors.
9. Determination of Input offset voltage, Input Bias current, Slew rate of Op-Amp.
10. Determination of *Common Mode Rejection Ratio*, Bandwidth, Offset null of Op-Amp.
11. Familiarization of Logic Gates.

**Paper Name: Engineering Physics Laboratory**  
**Paper Code: PH 151**  
**Weekly Load: L: 0 T: 0 P : 3**  
**Credits: 2**  
**Total Marks: 100**

**List of Experiments:**

1. Determination of the Specific Resistance of the material of a wire by a Meter Bridge.
2. Measurement of current flowing in a circuit by measuring the potential drop across a resistance using a potentiometer
3. Determination of the variation of the Magnetic Induction Vector B with respect to distance x from the centre along the axis of the Solenoid i.e., B vs. x curve.
4. Determination of Refractive Index of the material of a Prism by Spectrometer using Minimum Deviation method.
5. Determination of the unknown wavelength of a Monochromatic Light by the Newton's Ring Method
6. Determination of the wavelength of an unknown line with a plane Transmission Grating.
7. To determine the wave length of laser light (Red light) using Grating.

**Text/Reference Books:**

1. An Advanced Course in Practical Physics, D. Chattopadhyay, P. C. Rakshit, New Central Book Agency.
2. Physics Laboratory Experiments, Jerry D. Wilson, Cecilia A. Hernández-Hall Cengage Learning,
3. B.Sc Practical Physics, C.L.Arora, S. Chand Limited

**Paper Name: Workshop Practice**

**Paper Code: ME 182**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

### **Sheet Metal**

**Theory:** Definition of Sheet Metal and its use in present days, Tools and Machines used in Training Institutes and in Industries, Concept of development, Making out of Metal Sheets, Joining methods of Metal Sheets

**Practice:** Making out of metal Sheets cutting by snips, Sheet metal joints, Wiring of Sheet- edges

**Safety:** General warnings needed in the shop floor

### **Electric Arc Welding**

**Theory:** Advantages of Arc Welding over the other metal joining method, Different types of Electric welding machines and their working Principles, Details about Flux Coated Electrode and other electrodes, Details about metallic Arc welding, Making understand the use of Tools

**Practice:** Formation Of Arc with the Flux coated MS Electrode, Making Straight Beads in the Flat position, Making Butt joints in the flat position

**Safety:** General warnings needed in the shop floor

### **Electrical Wiring:**

**Theory:** Description of various types of wires and insulations, Necessity of joining, Use of electric soldering iron and blow lamp

**Practice:** Various types of wire joints, soldering use of flux, Cleat wiring system, PVC casing and capping, Batten and conduit wiring system

**Safety:** IE Rules & regulations, IS specifications followed by various types of wiring, Safety rules, Testing of Installations

### **Fitting:**

**Theory:** Types of chisels, Use of chisels & grinding of chisels, Different types of Files, Filing by different files, Uses of marking tools, surface plates, V blocks, marking gauges etc, Different types of saws and Use of Saws, Description of drills, their uses, care and maintenance, Uses of drilling machines, setting of drill, chuck, sizes of drills and holding of jobs for drilling, Practical use of taps and dies, Coolant for different jobs, Uses of precision tools and gauges, Uses of sine bar and filler gauges, Uses of GO & NOT GO gauges, Finishing of Jobs

**Practice:** Chipping and filing on a given job, Sawing, Drilling, Taping

**Safety:** General warnings needed in the shop floor

### **Carpentry:**

**Theory:** Various timber available in India, Different types of hand tools, saws, chisels used in carpentry, Use of marking gauges, Use of glue and its application, Elementary practical knowledge of operation of circular saw, band saw, wood turning lathe and grinder

**Practice:** Sawing and planning, Halving and Dovetailed joint, framing joint

**Safety:** General warnings needed in the shop floor

### **Text/Reference Books:**

1. Elements of Workshop Technology (Vol I & II) by S K Hazra Choudhury, Media Promoters & Publishers Pvt Ltd.
2. A Course In Workshop Technology (Vol I & II) By B S Raghuwanshi, Dhanpat Rai & Comp.
3. Workshop Practice By Swaran Singh, S K Kataria & Sons
4. Manufacturing Practice By Swaran Singh, S K Kataria & Sons

**Paper Name: Basic Mechanical Engineering laboratory.**

**Paper Code: ME 151**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

**List of Experiments:**

Graphical analysis of problems on statics

Experiments based on principles of statics and dynamics Experiments on Simple lifting machines

**Computer Aided Drafting:**

**Introduction:** AutoCAD, Concepts of coordinates system, Applications of CAD, Benefits of CAD, Limitations of CAD, Different CAD software/Solid works

**AutoCAD:** Units, Title Block and Layout, Concepts of Layers, Different Drawing tools and editing tools, Block, display and setting menu, Drawing and Editing Commands, Text and Dimensioning, Object selection methods, 2D and 3D figures, Illustrative problems, Printing and Plotting

**Paper Name : Basic Electrical Engineering Laboratory**

**Paper Code : EE 151**

**Weekly Load : L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks : 100**

**List of Experiments:**

1. Verification of network Theorems, Coupled-circuits.
2. Study of series and parallel resonance.
3. Current loci of R-L and R-C circuits.
4. Characteristics of tungsten and carbon lamps.
5. Characteristics of fluorescent lamp.
6. Calibration of energy meter.
7. Use of oscilloscope.

**Paper Name: Professional Communication**

**Paper Code: HS 181**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

**1. Communication Skills**

Importance of Communication

Process of Communication: (i) Verbal (ii) Non-verbal

Levels Of Communications, The Flow Of Communication

## **2. Listening and Speaking: Its importance & Barriers**

(i) Active Listening (ii) Effective Speaking (iii) Conversational and Dialogues (iv) Formal Presentation

## **3. Speaking English in Formal Situations**

(i) Interview (ii) At the Bank (iii) At the Airport (iv) At the police station (v) Customer Care (vi) At the Embassy

(vii) Greetings (viii) Making a Telephone Call (ix) Making apology (x) At college (xi) At the Doctor's (xii) Outside the class (xiii) Introducing self and other

## **4. Speaking English in informal Situations**

(i) At a dinner party (ii) Booking a room at a hotel (iii) At a travel agency (iv) At the hospital (v) Ask for a opinion

## **5. Effective Reading Skills**

## **6. Phonetics:**

(i) Sound of English (Vowels, short, Vowels, Long Vowels & consonants)

(ii) Phonetic chart, Syllables, Stress, Accent , Rythm, Pitch & Intonation,

Text/Reference Books:

1. Technical Communication Principles and Practice By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press

2. Personality Development and Soft skills By Barun K. Mitra, Oxford University Press.

3. Fundamental Of Technical Communication By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press

4. Communication Skill for Effective Management By dr Anjali Ghanekar, Everest Publishing House

5. Technical communication for Engineers By Shalini Verma, Vikas Publishing House

## SEMESTER-II

**Paper Name: Engineering Mathematics-II**

**Paper Code: M 201**

**Weekly Load: L: 3 T: 1 P: 0**

**Credits: 3**

**Total Marks: 100**

Unit	Detailed Description	Lecture/ Tutorial Period
01	Introduction to ordinary differential equations, Exact, Linear and Bernoulli's form, Second order non-homogeneous linear differential equations with constant coefficients, Euler's equations, System of differential equations, Applications to physical and technical problems Linearly independent solutions of ODE, Solutions of second and higher order linear differential equations with variable coefficients; Series solution of ODE, Introduction to Bessel and Legendre polynomials. Solution of partial differential equations of first and second order, Classification and Canonical forms; Applications, Solution of Laplace equation, Heat equation and Wave equation by variable separation method.	13L+4T
02	Series with constant terms; infinite series, Definition of convergence and divergence of infinite series, Various tests of convergence of infinite series like D'Alembert's ratio test, Cauchy's root test, Raabe's Test, Gauss's test, Integral test; Alternating series, Leibnitz Theorem, Absolute and conditional convergence.	7L+3T
03	<b>Solution of system of linear equations:</b> Consistency, Gauss elimination method for finding general solution of a system of linear equations, Cramer's rule and its use to find solution of a system of linear equations, solution by matrix inverse method. Applications of linear equations and matrices to electrical circuits, Markov Chains, linear economic models.	3L+1T
04	Fourier series and applications; Fourier integral formula, Fourier transform, Fourier sine and cosine transforms, Linearity, Scaling, Frequency shifting and time shifting properties, Convolution theorem, Application to boundary value problems, Brief introduction of Fast Fourier Transform, Wavelet Transform.	3L+1T
05	<b>Laplace Transform (L.T.):</b> Definition, Linearity property, Condition of existence of L.T., First and second shifting properties, Unit step functions, L.T. of derivatives and integrals; Convolution theorem, inversion, L.T. of periodic functions, Evaluation of integrals by L.T.; Solution of boundary value problems	4 L+1T
06	<b>Vector Space:</b> Definition, Basis of vector space and elementary properties, Subspace, Linearly dependent and independent vectors, Basis and Dimension, definition of rank as the no. of linearly independent vectors, Linear operators, nullity and Kernel of an operator	4L+1T
07	<b>Eigen values and Eigen vectors:</b> Definition, Matrix polynomial, Cayley-Hamilton theorem and its application to evaluate the inverse of a non-singular matrix, Applications of Eigen values and Eigen vectors to the Fibonacci sequence, differential equations, dynamical systems, quadratic forms, conic sections, quadratic surfaces	8L+3T
<b>Total</b>		<b>42L+14T</b>
<b>Total week required</b>		<b>14</b>
<b>No. of week reserved</b>		<b>02</b>

Text/Reference Books:

1. Higher Algebra: Abstract and Linear by S.K.Mapa, Sarat Book House
2. Advanced Higher Algebra by Ghosh & Chakraborty, U. N. Dhur & Sons.
3. Differential equations with special functions by J. N. Sharma & R. K. Gupta, Krishna Prakashan Mandir.
4. Ordinary Differential equations by G. Birkhoff & G. C. Rota, Wiley.
5. Engineering Mathematics by Bali & Goyal, Laxmi Publication Pvt Ltd.

**Paper Name** : Economics and Accountancy

**Paper Code** : HS 201

**Weekly Load** : L : 2 T: 1 P: 0

**Credits** : 2

**Total Marks** : 100

Unit	Detailed Description	Lecture / Tutorial Period
1	<b>Definition of Economics</b> Concept of economic activities and economic agents, the concept of market as an institution, distinction between micro and macro theory, the basic concept of price.	1L+1T
2	<b>The concept of consumption and demand</b> Marshallian and indifference curve theory -- basic concepts-- derivation of law of demand- demand function, market demand curve – elasticity of demand – different form of elasticity of demand – relation between elasticity, expenditure, ARSMR	4L+1T
3	<b>The theory of production</b> Isoquant and isocost function – AP, MP, AC, MC curves. Their relationship – concept of short run and long run cost consume – law of variable proportion and returns to scale.	3L+2T
4	<b>Concept of product pricing</b> Profit maximization objective – short run long run equilibrium conditions of firm and industry, the industry supply curve and its relation with externalities, price determination, Monopoly, equilibrium condition, concept of monopoly power, oligopoly : basic concept of non callusives forms.	4L+1T
5	<b>Behavioristic goals by firm: sales maximization</b>	1L+!T
6	<b>National income and accounting analysis</b> Concept of GDP, GNP and NNP, Methods of measuring national income.	1L+!T
7	Consumption and saving function, investment, determination of equilibrium national income, concept of multiplier and accelerator.	4L+1T
8	Concept of inflationary gap, demand pull and cost push inflation : anti- inflationary policies, basic idea	1L+1T
9	Principles of banking, Central bank, Commercial Banks	1L+1T

10	<b>Basic accounting concepts&amp; Recording of the primary books</b> Fundamental concepts of Accounting, Principle of double entry, Basic Financial statements, Journal, Ledger, Cash book, Trial balance, Bank Reconciliation Statement, Accounting for Depreciation(preliminary concepts)	3L+2T
11	Preparation of Final Accounts	3L+1T
12	<b>Financial Management(Basic Concepts)</b> Objective of Financial Management, Basic decision areas of Financial Management, Concept of Time value of money, Concepts of Risk and Return, Analysis and interpretation of some important financial ratios	2L+1T
	<b>Total:</b>	<b>28L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. of Week Reserved:</b>	<b>02</b>

### Text / Reference Books:

1. Hasengreen: Introduction to Accounting.
2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
3. Modern Micro Economic Theory – H.L. Ahuja, S.Chand.
4. Advance Economic Theory – M.L. Jhingan, Konark publication.
5. Engineering Economics – Sullivan, Wicks, Koelling – Pearsons.
6. Financial Management by Rajiv Shrivastava and Anil Mishra – Oxford publication
7. Stonier & Hague – A text book of economic theory, Pearson.
8. Microeconomic Theory – J Sarkhel,Syndicate Pvt. Ltd.
9. Macroeconomic Theory - J Sarkhel,Syndicate Pvt. Ltd.
10. Modern Accountancy- Hanif & Mukherjee.TMH Pub.
11. Financial Management - Khan & Jain,TMH Pub.

**Paper Name : Programming and Data Structure**

**Paper Code : CSE 201**

**Weekly Load : L: 3 T: 1 P: 0**

**Credits : 3**

**Total Marks : 100**

Unit	Detailed Description	Lecture/ Tutorial Period
01	<b>Pointers:</b> Understanding pointer, declaration and initialization to a pointer, arithmetic operation in pointer, array handling using pointer, array of pointers, pointers and structure, pointers and functions.	9L+3T
02	<b>Files:</b> Defining a file, opening and closing a file, input/output operation on files, error handling during I/O operation, command line arguments.	6L+2T
03	<b>Introduction to Data Structure:</b> definition, types of data structures, Asymptotic notations, concept of abstract data type, introduction to algorithm, basics of complexity of algorithm.	3L+1T
04	<b>Linked List:</b> Introduction, concepts of dynamic memory allocation in 'C', null pointer, memory representation, garbage collection, basic operations on linked list, linear single and double linked list using pointer and array, circular linked list and circular double linked list; Applications: polynomial operations, sparse matrices.	7L+2T

05	<b>Stack:</b> Introduction to stack and its operations, stack using array and pointer; Applications: polish notation conversion and evaluation, recursion.	5L+2T
06	<b>Queue:</b> Introduction to queue, queue using array and pointer, dequeue, circular queue, priority queue; Applications on queue.	5L+2T
07	<b>Tree:</b> Basic terminologies, generalized tree, binary tree creation, insertion of a node, deletion of a node, tree traversal, threaded binary tree, Binary Search Tree(BST), searching in a BST, insertion of a node and deletion of a node in BST.	7L+2T
<b>Total</b>		<b>42L+14T</b>
<b>Total week required</b>		<b>14</b>
<b>No. of week reserved</b>		<b>02</b>

Text/Reference Books:

1. B.W. Kerninghan, D.M. Ritchie, The C Programming Language, Prentice-Hall India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill.
3. B. Gottfried, J. Chhabra, Programming with C, Schaum Series, Tata McGraw Hill.
4. S. G. Kochan, Programming in C, Developer's Library.
5. S. Lipschutz, Data Structures, Schaum Series, Tata McGraw Hill.
6. Y. Langsam, M. Augenstein and A. M. Tenenbaum, Data Structures Using C and C++, Prentice-Hall India.
7. R. L. Kruse, B. P. Leung, C. L. Tondo, Data Structures and Program Design in C: Prentice-Hall India.
8. G. L. Heileman, Data Structure, Algorithms and Object Oriented Programming, Tata McGraw Hill.
9. M. Radhakrishnan and V. Srinivasan, Data Structures Using C, BPB.
10. D. Ravichandran, Programming in C, New Age International.
11. C. Xavier, C Language & Numerical Methods, New Age International.
12. Y. Kanetkar, Let us C, BPB.
13. K. R. Venugopal, S. R. Prasad, Mastering C, Tata McGraw Hill.
14. H. Ellis and S. Sahni, Fundamentals of Data Structures, Computer Science Press.
15. A. Agarwal, Data Structure Through C, Cybertech Publication.

**Paper Name: Basic Mechanical Engineering.**

**Paper Code: ME 201**

**Weekly Load: L: 3 T: 1 P: 0**

**Credits : 3**

**Total Marks: 100**

Unit	Detailed Description	Lecture/ Tutorial Period
1.	<b>Introduction to Engineering Mechanics</b> Statics: Fundamental idealization: Particle and Rigid body concept, vector and scalar quantities, Definition of force and force as vector, System of forces, Resultant of a system of forces, Transmissibility of a force, Resolution of forces, Free body diagram, Condition of equilibrium and related problems, Lami's theorem, Concept of moment, Varignon's principle of moment, Concept of couple.	4L+2T
2.	<b>Introduction to Vector Algebra</b> Vector operations, Parallelogram law, Free vector, Linearly dependent and independent vector, Bound vector, Representation of forces and moments in terms of i,j,k, Cross product and Dot product and their applications.	3L+1T
3.	<b>Friction</b> Concept of friction, law's of friction, Coefficient of friction, Angle of friction. Limiting angle of friction, Angle of repose, Cone of friction, Problems involving friction.	3L+1T



4.	<b>Analysis of structure</b> Simple trusses and frames, Assumptions made in case of simple truss, Tension and Compression member, Analysis of trusses by Method of Joints and Method of Sections, Simple problems on plane trusses.	4L+1T
5	<b>Virtual work</b> Principle of virtual work, Positive and Negative work, Problems on applications of principle of virtual work.	2L+1T
6	<b>Distributed forces</b> Centre of gravity, Centroids of areas and lines, First moment of area, Second moment of area, Polar moment of inertia, Radius of gyration of an area, Parallel axis theorem, Mass moment of inertia of symmetrical bodies e.g cylinder, sphere rod etc.	4L+1T
7	<b>Introduction to Dynamics</b> Kinetics of particles: Path, Velocity, Acceleration, Rectilinear motion of particles, Determination of position, Velocity and Acceleration (under uniform and non uniform accelerated rectilinear motion), Relative motion, Construction of x-t, v-t, a-t graphs (simple problems) Plane curvilinear motion of particles: Projectiles: simple problems.	3L+1T
8	<b>Kinematics of Rigid bodies</b> Translation, Rotation about a fixed axis, Motion in general plane.	3L+1T
9	<b>Kinetics of Particles and Rigid bodies</b> Newton's laws of motion, Dynamic equilibrium, D'Alembert's principle, linear momentum, Angular momentum, Principle of Work Energy and Impulse Momentum, Principle of Conservation of energy, power, Simple problems.	4L+1T
10	<b>Mechanics of simple machines</b> Simple machines, M.A,V.R and efficiency, Effect of friction, law of machine, Screw jack.	3L+1T
11	<b>Transmission of power through Belt</b> Velocity ratio, Simple and Compound belt drive, Slip of belt, length of belt for an Open and Cross belt drive, Power transmission, Ratio of tension, Centrifugal tension and its effects, Maximum stress developed, Condition for maximum power transmission and the corresponding belt speed, Initial tension.	4L+1T
12	<b>Introduction to Mechanics of Deformable bodies</b> Engineering Materials and their selection, Mechanical properties of materials, Concept of stress and strain, stress- strain diagram for ductile and brittle material, Elastic limit, Hooke's law, Modulus of elasticity, Poisson's ratio, Working Stress, Yield Point stress, Ultimate stress, Factor of safety, Shear stress and strain, Modulus of rigidity. Simple problems on composite bars, relation between different elastic constants, thermal stresses and strains. Solving one dimensional bar problem using Finite Element Method	5L+2T
	<b>TOTAL:</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. Engineering Mechanics By S Timoshenko & D H Young, Macgraw Hill Publishers Ltd.
2. Engineering Mechanics Statics & Dynamics By L H Shames, Pearson Publishers
3. Engineering Mechanics By S S Bhavikatti & K G Rajashekarappa, New Age International Publishers Ltd
4. Applied Mechanics Statics & Dynamics By I B Prasad, Khanna Publishers
5. Engineering Mechanics By Meriam & Kraige. ( Vol I & II ), Jhon Wiley & Sons, Inc
6. Element Of Strength of Materials By Timoshenko & Young, Macgraw Hill Publishers Ltd.
7. Strength Of Material By R K Rajput, S. Chand
8. Strength Of Material By R S Khurmi, S. Chand.

**Paper Name** : Environmental Science  
**Paper Code** : HS 202  
**Weekly Load** : L: 3 T: 0 P: 0  
**Credits** : 3  
**Total Marks** : 100

Unit	Detailed Description	Lecture/ Tutorial Period
01	<b>General concepts of ecosystem and environment:</b> Concepts of Environmental Science and engineering, structure and functions in ecosystem, Energy flow in ecosystem in context of first law and second law of thermodynamics, Impact of anthropogenic activities on environment, Pollution as undesirable by product of development	5L
02	<b>Environmental physics:</b> Greenhouse gases and global warming, climate change mechanism due to greenhouse gases, Global warming potential, Energy-source and distribution in India, renewable and non-renewable energy resources, conventional vs nonconventional energy, nuclear power and solar energy, noise pollution –source, effects, types, measuring instruments and control methods	5L
03	<b>Environmental chemistry:</b> Chemical composition air, water and soil, water quality analysis in context of BOD and COD. Environmental monitoring: brief idea on air and water, soil quality parameters and their estimation.	5L
04	<b>Environmental modelling:</b> Air pollution modelling –Gaussian pollution model for estimation of GLC, numerical problem related to it. Streeter-Phelps simulation and first order BOD rate equation.	5L
05	<b>Environmental Biology:</b> Bioaccumulation and biomagnifications of toxic discharges, Threats to biodiversity. Bioremediation and phyto -remediation in reducing toxic contamination.	5L
06	<b>Environmental technology and management:</b> Solid waste management, radioactive waste –its treatment and management, Waste water treatment procedure, Air pollution (Both particulate and gaseous) management by technological innovation. ISO :14001	5L
07	<b>Disaster management:</b> Remote sensing and GIS as tool of disaster management.	5L
08	<b>Environmental Impact analysis:</b> Definition, need, objectives, methods, preparation of EIA report.	2L
	<b>Total</b>	<b>42L</b>
	<b>Total week required</b>	<b>14</b>
	<b>No. of week reserved</b>	<b>02</b>

**Text/Reference Books:**

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcalf & Eddy.
3. Fundamentals of Environment and Ecology by Debapriya De and Debasish De S Chand & Com. Ltd
4. Basic Environmental Engineering and elemental biology by Patra and Singha Aryan Pub. House

**Paper Name: Basic Electrical Engineering**

**Paper Code : EE 201**

**Weekly Load : L: 3 T: 1 P: 0**

**Credits : 3**

**Total Marks : 100**

<b>Unit</b>	<b>Detailed Description</b>	<b>Lecturer/ Tutorial Period</b>
01	<b>D.C. circuits:</b> Ohm's law, Kirchoff's laws, Resistors, Independent sources, Transformation, Dependent sources, Analysis of simple circuits-node method, mesh method, star-delta Transformation.	5L+ 2T
02	<b>Network theorems:</b> Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem.	7L+2T
03	<b>Magnetic circuits:</b> MMF, Reluctance, Flux, Magnetic circuit concept, Simple magnetic circuit calculations, Magnetically coupled circuits.	5L+2T
04	<b>A.C. single-phase circuits:</b> Phasor representation sinusoids, RMS values, Power, Power factor and reactive power, Impedance and admittance, R-L, R-C and R-L-C circuits, Phasor diagrams.	5L+2T
05	<b>Transients with D.C. excitation:</b> Transients in R-L, R-C and R-L-C circuits.	3L+1T
06	<b>A.C. polyphase circuits:</b> Simple 3-phase balanced and unbalanced circuits star and delta connected load calculations.	5L+2T
07	<b>DC Machines:</b> Construction, Basic concepts of winding (Lap and wave). <b>DC generator:</b> Principle of operation, EMF equation, characteristics (open circuit, load). <b>DC motors:</b> Principle of operation, Speedtorque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control).	5L+1T
08	<b>Single phase transformer:</b> Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.	5L+1T
09	<b>General structure of electrical power system:</b> Power generation to distribution through overhead lines and underground cables with single line diagram, modeling of transmission line.	1L+1T
10	<b>Introduction to AC machines</b>	1L
	<b>Total</b>	<b>42L+14T</b>
	<b>Total week required</b>	<b>14</b>
	<b>No of week reserved</b>	<b>02</b>

Text/Reference Books:

1. Network Analysis, M.E.VanValkenburg (Prentice Hall), 3rd Edition.
2. Engineering Circuit Analysis, W.H.Hayt, J.E.Kenmerly, S.M.Durbin,(TMH), 6th Edition, 2002.
3. Network and Systems, Ashfaq Husain,(Khanna Book Publisher), 2000.
4. Network and Systems, D.Roychowdhury,(New Age International) ,2001.
5. Modern Network Analysis, F.M.Reza&S.Seely, McGraw Hill.

**Paper Name : Basic Electronics**  
**Paper Code : ECE 201**  
**Weekly Load : L: 3 T: 1 P: 0**  
**Credits : 3**  
**Total Marks : 100**

Unit	Detailed Description	Lecture / Tutorial Period
01.	<b>Introduction:</b>	1L
02.	Introduction to Semiconductor, Insulator and Metals with crystalline/amorphous structure and band theory.	2L
03	Formation of P-N junction, Fermi level, biasing of P-N junction and V-I characteristics of P-N junctions.	2L
04.	<b>Diode:</b> Different types of diodes and its Characteristics, Normal diode, Zener diode, LED, Solar cell, Gunn Diode. <b>Applications of diodes:</b> Wave shaping, Rectifiers, clippers, clampers, regulators	4L+2T
05.	<b>BJT:</b> Basics, Characteristics <b>Mode of operation( AC) :</b> CE, CB, CC amplifiers, frequency response of amplifiers. <b>Applications of BJT:</b> BJT as an amplifier and switch.	6L+2T
06.	<b>FET family:</b> Types of FET (JFET, MOSFET) and its Device structure and operation, Volt-amp characteristics. <b>Applications of FETs:</b> FET as an amplifier and switch.	6L+2T
07.	<b>Differential and operational amplifiers:</b> Characteristics of differential amplifiers, Ideal operational amplifiers (OP-AMP), OP-AMP parameters &, Characteristics. Inverting and non-inverting configuration, Common OPAMP ICs, CMRR and Slew rate. <b>Operations using Op-AMP:</b> Inverting, Non-Inverting amplifiers; Summer, difference Amplifier, Integrators, Differentiators; Comparators, Logarithmic amplifier, Instrumentation amplifier.	6L+3T
08.	<b>Feedback amplifiers and oscillators:</b> Basic concepts, operation, Hartley, colpitt and phase shift, wien bridge, crystal oscillators	6L+2T
09.	<b>Introduction to Digital Electronics:</b> Logic Gates, Truth Table and K- Map. Combinational and Sequential Logic Circuits (SR, JK master slave flip-flops, Counters).	6L+2T
10.	<b>Application Specific ICs:</b> Multi-vibrators, 555 timer as Astable and Monostable multivibrators .	3L+1T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

**Text/Reference Books:**

1. Electronic Principle by Malvino
2. Electronic Devices and Circuit theory – Boylestead and Nashlesky – PHI/Pearson Education
3. Integrated Electronics, Millman and Halkias – TMH Op Amp and Linear Ics.
4. Micro-Electronics by Mottershed.
5. Foundations of Electronics by Chattopadhaya and Rakshit
6. Fundamental of digital circuits by A.Anand Kumar (PHI).
7. Digital design by M. Mano (Pearson).

**Paper Name** : Engineering Chemistry  
**Paper Code** : CH 201  
**Weekly Load** : L: 3 T: 0 P: 0  
**Credits** : 3  
**Total Marks** : 100

Unit	Detailed Description	Lecture/ Tutorial Period
01	<b>Thermodynamics:</b> Concept of Thermodynamic system, Internal energy, Enthalpy, Heat Capacity, Reversible and Irreversible processes, different laws of thermodynamics, Joule Thomson effect, Entropy, Work function and free energy, Maxwell's Expression, Gibbs, Helmholtz equation.	5L
02	<b>Electrochemistry:</b> Ionic conductivity and its measurements. Conductivity of electrolytes, Kohlrausch's law. Galvanic cell, electrode potential, Nernst equation, galvanic series, Fuel cells.	5L
03	<b>Solid State:</b> Space lattice, Unit cell, Lattice energy, radius ratio rule, Bragg's equation. Crystal defects, band theory, Semiconductor, Role of silicon and germanium in the field of semiconductor.	5L
04	<b>Surface Chemistry:</b> Adsorption and Absorption, Mechanism of Adsorption, Types of Adsorption, Catalysis. Colloid state, Sols, Gels, Micelles.	5L
05	<b>Chemical bonding</b> Ionic bonding, Factors which governs ionic bonding. Lattice energy, Born-Haber cycle. Covalent bond Hybridisation, VSEPR theory, bond order, bonding in coordination compounds. Molecular orbital theory of homo- and hetero-nuclear diatomic molecules. Bonding in coordination compound, Ligand field theory and crystal field theory.	5L
06	<b>Chemical kinetics:</b> Reaction rates, order of reaction, molecular of reaction, first and second order reaction, pseudo order reaction. Reversible reaction, consecutive reactions and parallel reaction. Homogeneous and heterogeneous catalysts and its applications in chemical industries.	5L
07	<b>Structure and reactivity of Organic molecule:</b> Hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations and substitution reactions with stereochemistry.	5L
08	<b>Instrumental Techniques:</b> Fundamentals of Spectroscopy; Principles and applications of UV-visible, IR & NMR.	2L
09	<b>Polymerization:</b> Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Polydispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, Preparation, structure and use of some common polymers: plastic (PE: HDPE, LDPE, LLDPE, UHMWPE), rubber (natural rubber, SBR), fibre (nylon 6.6). Vulcanization, Biodegradable polymers.	5L

10	<b>Fuel:</b> Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number.	4L
11	<b>Corrosion and corrosion control:</b> Corrosion, Factors Influencing the Rate of Corrosion, types of corrosion, corrosion control.	2L
12	<b>Water treatment:</b> Hardness of water, units of water, disadvantage of hard water, scale and sludge formation in boilers, caustic- embrittlement , boiler corrosion. Priming and foaming in boilers, softening methods. Desalination of Brackish water.	4L
13	<b>Dye &amp; Pigments:</b> Colour and constitution, Classification of Dyes, Nitro Dyes, Nitroso Dyes, Azo Dyes, Acridine dyes, Quinoline Dyes, Vat dyes, Fluorescent brightening agent.	2L
14	<b>Green chemistry:</b> Introduction, Significance, utilities.	2L
	<b>Total</b>	<b>42L</b>
	<b>Total week required</b>	<b>14</b>
	<b>No. of week reserved</b>	<b>02</b>

Text/Reference Books:

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcafe & Eddy.
3. Engineering Chemistry By O P Aggarwal, Khanna Publishers
4. Engineering Chemistry By P C Jain & M Jain, Dhanpat Rai Publishing Company
5. A Text Book Of Engineering Chemistry By Dr Sunita Rattan, S K Kataria & Sons.
6. A Text Book Of Engineering Chemistry By Shasai Chawla, Dhanpat Rai Publishing Company
7. Physical Chemistry By P. C. Rakshit, Sarat Book House
8. Fuels and Combustion By S. Sarkar, Taylor & Francis
9. Polymer Science and Technology By Joel R. Fried, Pearson Education
10. Organic Chemistry By L. Finar, Addison Wesley Longman, Inc

**Paper Name: Engineering Physics**

**Paper Code: PH 201**

**Weekly Load: L: 3 T:1 P:0**

**Credits: 3**

**Total Marks: 100**

Unit	Detailed Description	Lecture / Tutorial Period
1	<b>Oscillations &amp; Waves:</b> Overview on SHM: Formation of differential equation for free and damped SHM and their solutions; concepts of under-damping, critical damping and over-damping.	8L+2T

	Equivalence of electrical and mechanical resonant circuit. Forced Vibration and Resonance (Amplitude, Velocity and Power resonance), Sharpness of Resonance and Quality factor. Superposition of Harmonic Oscillations: Linear superposition principle, Lissajous figures (Graphical method). Standing waves; Group Velocity and Phase velocity.	
2	<b>Introduction to vector calculus:</b> Gradient, Divergence and Curl; Line Integral, surface integral and volume integral; Divergence theorem and Stokes theorem.	2L+1T
3	<b>Electromagnetics:</b> Gauss's Law of electrostatics and its differential form; continuity equation. Ampere's circuital law and its differential form. Faraday's law of electromagnetic induction and its differential form. Displacement current density Maxwell's field equations. E-M wave equation and its solution. Transverse nature of E-M wave. Boundary conditions of Electric and magnetic fields across an interface, Reflection & Refraction of EM waves.	6L +2T
4	<b>Physical Optics</b> <b>Interference of light waves:</b> Nature of Light waves; Wave front; Classification of wave front, Huygens Principle, Overview of classical experiments of interference (Young's Double slit, Fresnel's Biprism & Lloyd's mirror). Stokes law, thin film interference: wedge-shaped film interference, fringes of equal inclination and equal thickness. Newton's ring (Lens in contact with a plate), Interferometer principles (Michelson's interferometry), multiple internal reflections (Fabry-Pérot interferometer).	6L+2T
	<b>Diffraction of light waves:</b> Definition and its difference with interference; Classification- Fresnel and Fraunhofer diffraction, Fraunhofer diffraction: - Single Slit experiment; Plane Transmission Grating; intensity and width of the principle maxima and secondary maxima and minima.	4L+2T
	<b>Polarisation of light:</b> Types of polarisation (plane, circular, elliptical), linear polarisers; Malus' Law of Polarization, Brewster's law; Double refraction: Ordinary and Extraordinary rays. Nicol prism, Polaroid, wave plates, Babinet compensator, Optical activity, Polarimeter.	6L+1T
5	<b>Quantum Theory:</b> De Broglie waves, Wave particle Duality and Uncertainty Principle; Double slit experiment; concept of wave function and probability density; Time Dependent/Independent Schrödinger equation for free particle and for a particle in a potential well. Stationary states; Postulates of quantum mechanics, Energy Eigen values of a particle in box. Potential well and steps, Introduction to nano-physics.	8L+2T
6	<b>Lasers :</b> Spontaneous and Stimulated emission of radiation; Principles, Einstein A, B coefficients. The basic requirement of a laser; Gas, Lasers and Solid state lasers, semiconductor laser, Applications.	2L+2T
	<b>Total</b>	<b>42L+14T</b>
	<b>Total Week Required:</b>	<b>14</b>
	<b>No. Of Week Reserved:</b>	<b>02</b>

Text/Reference Books:

1. The Physics of Waves and Oscillations, N. K. Bajaj, Tata McGraw-Hill Education
2. Electricity And Magnetism, D Chattopadhyay, New Central Book Agency (P) Limited
3. Optics, Ajay Ghatak, Tata McGraw-Hill Education
4. Geometrical and Physical Optics Paperback, P. K. Chakrabarti, New Central Book Agency

5. Solid State Physics, S. O. Pillai, New Age International
6. Solid State Physics, P. K. Palanisamy, Scitech Publication (India) Pvt. Ltd.
7. Quantum Mechanics, V. K. Thankappan, New Age International
8. Fundamentals of Quantum Mechanics, Statistical Mechanics & Solid State Physics, S. P. Kuila, Books And Allied (P) Ltd.
9. A Text Book of Optics, N. Subrahmanyam, BrijLal and M. N. Avadhanulu, S. Chand Limited
10. F K Ritchmayer, E H Kenuard & T Lauritsen: Introduction to Modern Physics, McGraw Hill
11. Theory and Problems of Vector Analysis: And an Introduction to Tensor Analysis, Murray R. Spiegel, McGraw-Hill
12. A Beiser: Perspective in Modern Physics, McGraw Hill

**Paper Name : Programming and Data Structure Laboratory**

**Paper Code : CSE 251**

**Weekly Load : L : 0 T: 0 P: 3**

**Credits: 2**

**Total Marks : 100**

**List of Experiments: [Exercises should include but not limited to]**

Unit	Detailed Description	Practical Period
01	Programs using pointers.	6
02	Programs using file operations and Command Line Arguments.	6
03	Programs on Linked lists: Creation, Insertion, Deletion, Traversal and Searching on Single & Double Linked List;	9
04	Programs on Stacks: Implementation of stack using array and linked lists; Polish notation conversion and evaluation.	9
05	Programs on Queue: Implementation of queue using array and linked lists.	6
06	Programs on Binary Search Trees: Creation, Insertion, Deletion and Traversal.	6
<b>Total</b>		<b>42P</b>
<b>Total week required</b>		<b>14</b>
<b>No. of week reserved</b>		<b>02</b>

Text/Reference Books:

1. B.W. Kerningham, D.M. Ritchie, The C Programming Language, Prentice-Hall India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill.
3. B. Gottfried, J. Chhabra, Programming with C, Schaum Series, Tata McGraw Hill.
4. S. G. Kochan, Programming in C, Developer's Library.
5. S. Lipschutz, Data Structures, Schaum Series, Tata McGraw Hill.
6. Y. Langsam, M. Augenstein and A. M. Tenenbaum, Data Structures Using C and C++, Prentice-Hall India.
7. R. L. Kruse, B. P. Leung, C. L. Tondo, Data Structures and Program Design in C: Prentice-Hall India.
8. G. L. Heileman, Data Structure, Algorithms and Object Oriented Programming, Tata McGraw Hill.
9. M. Radhakrishnan and V. Srinivasan, Data Structures Using C, BPB.
10. D. Ravichandran, Programming in C, New Age International.
11. C. Xavier, C Language & Numerical Methods, New Age International.
12. Y. Kanetkar, Let us C, BPB.
13. K. R. Venugopal, S. R. Prasad, Mastering C, Tata McGraw Hill.
14. H. Ellis and S. Sahni, Fundamentals of Data Structures, Computer Science Press.
15. A. Agarwal, Data Structure Through C, Cybertech Publication.



**Paper Name: Basic Mechanical Engineering laboratory.**

**Paper Code: ME 251**

**Weekly Load: L: 0, T: 0, P: 3**

**Credits: 2**

**Total Marks: 100**

**List of Experiments:**

Graphical analysis of problems on statics

Experiments based on principles of statics and dynamics Experiments on Simple lifting machines

**Computer Aided Drafting: Introduction:** AutoCAD, Concepts of coordinates system, Applications of CAD, Benefits of CAD, Limitations of CAD, Different CAD software/Solid works

**AutoCAD:** Units, Title Block and Layout, Concepts of Layers, Different Drawing tools and editing tools, Block, display and setting menu, Drawing and Editing Commands, Text and Dimensioning, Object selection methods, 2D and 3D figures, Illustrative problems, Printing and Plotting

**Paper Name : Basic Electrical Engineering Laboratory**

**Paper Code : EE 251**

**Weekly Load : L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks : 100**

**List of Experiments:**

1. Verification of network Theorems, Coupled-circuits.
2. Study of series and parallel resonance.
3. Current loci of R-L and R-C circuits.
4. Characteristics of tungsten and carbon lamps.
5. Characteristics of fluorescent lamp.
6. Calibration of energy meter.
7. Use of oscilloscope.

**Paper Name: Professional Communication**

**Paper Code: HS 281**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits : 2**

**Total Marks: 100**

**1. Communication Skills**

Importance of Communication

Process of Communication: (i) Verbal (ii) Non-verbal

Levels Of Communications, The Flow Of Communication

**2. Listening and Speaking: Its importance & Barriers**

(i) Active Listening (ii) Effective Speaking (ii) Conversational and Dialogues (iii) Formal Presentation

**3. Speaking English in Formal Situations**

(i) Interview (ii) At the Bank (iii) At the Airport (iv) At the police station (v) Customer Care (vi) At the Embassy

(vii) Greetings (viii) Making a Telephone Call (ix) Making apology (x) At college (xi) At the Doctor's (xii) Outside the class (xiii) Introducing self and other

#### **4. Speaking English in informal Situations**

(i) At a dinner party (ii) Booking a room at a hotel (iii) At a travel agency (iv) At the hospital (v) Ask for a opinion

#### **5. Effective Reading Skills**

#### **6. Phonetics:**

(i) Sound of English (Vowels, short, Vowels, Long Vowels & consonants)  
(ii) Phonetic chart, Syllables, Stress, Accent , Rythm, Pitch & Intonation,

Text/Reference Books:

1. Technical Communication Principles and Practice By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press
2. Personality Development and Soft skills By Barun K. Mitra, Oxford University Press.
3. Fundamental Of Technical Communication By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press
4. Communication Skill for Effective Management By dr Anjali Ghanekar, Everest Publishing House
5. Technical communication for Engineers By Shalini Verma, Vikas Publishing House

**Paper Name : Basic Electronics Laboratory**  
**Paper Code : ECE 251**  
**Weekly Load : L: 0 T: 0 P: 3**  
**Credits : 3**  
**Total Marks : 100**

#### **List of Experiments**

1. Familiarization with Electronic components such as Resistors, Capacitors, Diodes, Transistors etc.
2. Familiarization with electrical devices and measuring equipment like DC power supply, Millimeter, Trainer kit etc.
3. Familiarization with measuring and testing equipment like CRO, Signal generator.
4. Study on V-I characteristics of Junction Diode.
5. Study on V-I characteristics of Zener Diode.
6. Study on Half Wave and Full Wave rectifiers.
7. Study on characteristics of Field Effect Transistors.
8. Determination of Input offset voltage, Input Bias current, Slew rate of Op-Amp.
9. Determination of *Common Mode Rejection Ratio*, Bandwidth, Offset null of Op-Amp.
10. Characteristics Curve for common base emitter & common collector transistors.
11. Familiarization of Logic Gates.

**Paper Name: Engineering Physics Laboratory**

**Paper Code: PH 251**

**Weekly Load: L: 0 T: 0 P : 3**

**Credits: 2**

**Total Marks: 100**

**List of Experiments;**

1. Determination of the Specific Resistance of the material of a wire by a Meter Bridge.
8. Measurement of current flowing in a circuit by measuring the potential drop across a resistance using a potentiometer
9. Determination of the variation of the Magnetic Induction Vector B with respect to distance x from the centre along the axis of the Solenoid i.e., B vs. x curve.
10. Determination of Refractive Index of the material of a Prism by Spectrometer using Minimum Deviation method.
11. Determination of the unknown wavelength of a Monochromatic Light by the Newton's Ring Method
12. Determination of the wavelength of an unknown line with a plane Transmission Grating.
13. To determine the wave length of laser light (Red light) using Grating.

**Text/Reference Books:**

1. An Advanced Course in Practical Physics, D. Chattopadhyay, P. C. Rakshit, New Central Book Agency.
2. Physics Laboratory Experiments, Jerry D. Wilson, Cecilia A. Hernández-HallCengageLearning,
3. B.Sc Practical Physics, C.L.Arora, S. Chand Limited

**Paper Name: Workshop Practice**

**Paper Code: ME 282**

**Weekly Load: L: 0 T: 0 P: 3**

**Credits: 2**

**Total Marks: 100**

**Sheet Metal**

**Theory:** Definition of Sheet Metal and its use in present days, Tools and Machines used in Training Institutes and in Industries, Concept of development, Making out of Metal Sheets, Joining methods of Metal Sheets

**Practice:** Making out of metal Sheets cutting by snips, Sheet metal joints, Wiring of Sheet- edges

**Safety:** General warnings needed in the shop floor

**Electric Arc Welding**

**Theory:** Advantages of Arc Welding over the other metal joining method, Different types of Electric welding machines and their working Principles, Details about Flux Coated Electrode and other electrodes, Details about metallic Arc welding, Making understand the use of Tools

**Practice:** Formation Of Arc with the Flux coated MS Electrode, Making Straight Beads in the Flat position, Making Butt joints in the flat position

**Safety:** General warnings needed in the shop floor

**Electrical Wiring:**

**Theory:** Description of various types of wires and insulations, Necessity of joining, Use of electric soldering iron and blow lamp

**Practice:** Various types of wire joints, soldering use of flux, Cleat wiring system, PVC casing and capping, Batten and conduit wiring system

**Safety:** IE Rules & regulations, IS specifications followed by various types of wiring, Safety rules, Testing of Installations

**Fitting:**

**Theory:** Types of chisels, Use of chisels & grinding of chisels, Different types of Files, Filing by different files, Uses of marking tools, surface plates, V blocks, marking gauges etc, Different types of saws and Use of Saws, Description of drills, their uses, care and maintenance, Uses of drilling machines, setting of drill, chuck, sizes of drills and holding of jobs for drilling, Practical use of taps and dies, Coolant for different jobs, Uses of precision tools and gauges, Uses of sine bar and filler gauges, Uses of GO & NOT GO gauges, Finishing of Jobs

**Practice:** Chipping and filing on a given job, Sawing, Drilling, Taping

**Safety:** General warnings needed in the shop floor

**Carpentry:**

**Theory:** Various timber available in India, Different types of hand tools, saws, chisels used in carpentry, Use of marking gauges, Use of glue and its application, Elementary practical knowledge of operation of circular saw, band saw, wood turning lathe and grinder

**Practice:** Sawing and planing, Halying and Dovetailed joint, framing joint

**Safety:** General warnings needed in the shop floor

Text/Reference Books:

1. Elements of Workshop Technology (Vol I & II) by S K Hazra Choudhury, Media Promoters & Publishers Pvt Ltd.
2. A Course In Workshop Technology (Vol I & II) By B S Raghuwanshi, Dhanpat Rai & Comp.
3. Workshop Practice By Swaran Singh, S K Kataria & Sons
4. Manufacturing Practice By Swaran Singh, S K Kataria & Sons