

**Suggested plan of study for I Year B.E
(Common to all Branches)**

I Semester			Physics Group
Sl. No.	Course Code	Course Title	Course Credit
1	MA100	Engineering Mathematics – I	4
2	EE100	Basic Electrical Engineering	4
3	PH100	Engineering Physics	4
4	PH101	Engineering Physics Lab	1.5
5	ME100	Engineering Graphics – I	2
6	ME101	Elements of Mechanical Engineering	4
7	ME102	Workshop Practice Lab	1.5
8	CV100	Engineering Mechanics	4
9	HU101	Kannada	Audit
Total Credits			25

I Semester			Chemistry Group
Sl. No.	Course Code	Course Title	Course Credit
1	MA100	Engineering Mathematics – I	4
2	EC100	Basic Electronics	4
3	CY100	Engineering Chemistry	4
4	CY101	Engineering Chemistry Lab	1.5
5	CS100	Programming Fundamentals with C	4
6	CS101	Programming Fundamentals with C Lab	1.5
7	ME100	Engineering Graphics – I	2
8	HU100	Functional English	Audit
9	HU102	Constitution of India & Professional Ethics	
10	HU103	Environmental Science	
Total Credits			21

II Semester Physics Group

Sl. No.	Course Code	Course Title	Course Credit
1	MA150	Engineering Mathematics – II	4
2	EE150	Basic Electrical Engineering	4
3	PH150	Engineering Physics	4
4	PH151	Engineering Physics Lab	1.5
5	ME150	Engineering Graphics – II	2
6	ME151	Elements of Mechanical Engineering	4
7	ME152	Workshop Practice Lab	1.5
8	CV150	Engineering Mechanics	4
9	HU151	Kannada	Audit
Total Credits			25

II Semester Chemistry Group

Sl. No.	Course Code	Course Title	Course Credit
1	MA150	Engineering Mathematics – II	4
2	EC150	Basic Electronics	4
3	CY150	Engineering Chemistry	4
4	CY151	Engineering Chemistry Lab	1.5
5	CS150	Programming Fundamentals with C	4
6	CS151	Programming Fundamentals with C Lab	1.5
7	ME150	Engineering Graphics – II	2
8	HU150	Functional English	Audit
9	HU152	Constitution of India & Professional Ethics	
10	HU153	Environmental Science	
Total Credits			21

Total credits for I year: 46

MA100

ENGINEERING MATHEMATICS – I

(4-0-0) 4

- 1) **Differential Calculus:** Determination of n^{th} derivative of standard functions, Leibnitz' theorem (without proof) Polar curves and angle between the Polar curves, Pedal equation for polar curves. **6 Hrs.**
- 2) **Partial Differentiation:** Partial Derivatives, Euler's theorem. Total differentiation. Differentiation of composite and implicit functions. Jacobians and their properties. Errors and approximations. **6 Hrs.**
- 3) **Integral Calculus:** Reduction formulae for integration of $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ and evaluation of these integrals with standard limits. Tracing of standard curves in Cartesian form, Parametric form and Polar form. **6 Hrs.**
- 4) **Application of Integral Calculus:** Derivative of arc length. Application to find area, length, volume and surface area of solid of revolution. Differentiation under integral sign (only with constant limits). **6 Hrs.**
- 5) **Differential Equations:** Solution of first order and first degree differential equations, variable separable, Homogeneous, Exact, Linear and reducible to these types. Orthogonal trajectories of Cartesian and Polar curves. **7 Hrs.**
- 6) **Infinite Series:** Convergence, divergence and oscillation of an infinite series. Comparison test, p-series, test, D'Alembert's ratio test, Raabe's test, Cauchy's root test, Cauchy's integral test, (all tests without proof) for series of positive terms. Alternating series. Absolute and Conditional convergence. Leibnitz's test (without proof) and problems. **7 Hrs.**
- 7) **Analytical Geometry in three dimensions:** Direction cosines and direction ratios, Planes, Straight lines, Angle between planes/ straight lines. Coplanar lines. Shortest distance between skew lines (No derivations). **7 Hrs.**
- 8) **Vector Calculus:** Vector differentiation, vector point function, Gradient, divergence, Curl, Laplacian, Solenoidal, and irrotational vector – problems. **5 Hrs.**

Books:

- 1) Higher Engg. Mathematics by B.S. Grewal (36th Edn. July 2001).
- 2) Advanced Engineering Mathematics by Peter V Oniel, Thompson Learning Publications
- 3) Calculus and Analytical Geometry by: C.B. Thomas and Finney: 8th Edn., Narosa Publications.
- 4) Advanced Engineering Mathematics by: Kreyszig
- 5) Engineering Mathematics by S .S. Sastry Vol. I

- 1) **D.C Circuits:** KCL & KVL, loop equations, Node equations mesh & nodal analysis (maximum 3 Loops), solutions using Kramer's rule [matrix method] excluding current & dependent sources), Super position theorem- Statement & Examples. **8 Hrs.**
- 2) **Single phase AC Circuits:** Review of AC fundamentals– definitions of RMS, Average Values, form factor, phasor algebra, j-operator, Concept of active, reactive & apparent power. R, L, C, Series, parallel, Series, Parallel RLC Circuits. Analysis with phasor diagram, examples including power calculations, Power factor improvement. **8 Hrs.**
- 3) **Three phase Circuits:** Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced supply and load. Obtaining the relationship between line and phase values for balanced star and delta connections. Power in balanced three-phase circuits. Illustrative examples. **8 Hrs.**
- 4) **DC Machines:** Construction, working principle and EMF equation of DC Generator, back EMF and torque equations of DC motors, simple problems, characteristics and applications of DC Motors. **4 Hrs.**
- 5) **Single phase transformer:** principle, types & construction, expression for induced Emf, transformation ratio, losses and efficiency, examples **4 Hrs.**
- 6) **Synchronous Generator:** Principle of operation, types & constructional features, EMF equation, illustrative examples. **4 Hrs.**
- 7) **Three Phase Induction Motors:** Concept of rotating magnetic field, principle of operation, constructional features, application of squirrel cage and slip ring motors, star - delta starter, problems only. On slip calculations. **4 Hrs.**
- 8) **Concept of Power Generation:** Conventional & Non conventional energy sources (PV & wind). Energy conservation concepts. Low tension power supply, single line diagram, pole mounted transformer units, concept of lightening arrester, Circuit Breaker. **4 Hrs.**
- 9) **Domestic Wiring:** Present trends in wiring, load calculation, Working of Fluorescent tube & CFL & comparison Safety – Earthing & their types. **4 Hrs.**
- 10) **Measuring Instruments:** Review of working principles of Ammeter, Voltmeter & two-coil wattmeter. Induction type Energy meter – construction & working principle, Comparison of induction type Energy meter with digital energy meter (qualitative treatment only) **5 Hrs.**

Books:

- 1) Electrical Technology by E. Hughes, 8th edition, Pearson – 2006
- 2) Principle of Electrical Engineering Vincent Del Toro

- 3) Estimation & Wiring - Gangadhar Rao
- 4) Electrical Measurements, Instruments & Instrumentation – A.K. Sawhney.

PH100/PH150

ENGINEERING PHYSICS

(4-0-0) 4

- 1) **Modern Physics:** Introduction to Blackbody radiation spectrum, Photoelectric effect and Compton effect, Wave particle Dualism, de-Broglie hypothesis- de-Broglie wavelength. Extension to electron particle - Davisson and Germer experiment. Matter waves and their characteristic properties. Phase velocity, group velocity and particle velocity. Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Expression for de Broglie wavelength using group velocity concept. **6 Hrs.**
- 2) **Quantum Mechanics:** Heisenberg's uncertainty principle and its physical significance (no derivation). Applications of uncertainty principle (non-existence of free electron in the nucleus and broadening of spectral lines). Wave function, properties and physical significance of a wave function. Probability density and normalization of wave function, setting up of 1-dimensional time independent Schrödinger wave equation. Applications of Schrödinger wave equation – energy eigen values for a free particle and energy eigen values of a particle in a potential well of infinite depth. **6 Hrs.**
- 3) **Electrical properties of Metals:** Introduction, Classical free electron theory, drift velocity, mean collision time, mean free path, Relaxation time. Expression for drift velocity, expressions for electrical conductivity and thermal conductivity in metals, Wiedemann Franze's law, failures of classical free electron theory, Quantum free electron theory, Fermi-Dirac statistics, Fermi energy-Fermi factor. Density of states (explanation). Expression for electrical resistivity/conductivity Merits of quantum free electron theory. **7 Hrs.**
- 4) **Band theory of solids:** Electron in a periodic field of a crystal, Brillouin Zones, Motion of electrons in a 1-dimensional periodic potential. Distinction between metals, insulators and intrinsic semiconductors. **6 Hrs.**
- 5) **Lasers:** Basic principle of Laser action (absorption, spontaneous emission, stimulated emission, optical pumping expression for energy density, population inversion, metastable state, resonant cavity), types of lasers, Construction and working of semiconductor laser. Applications of Lasers-Laser welding, Cutting and drilling, Measurement of atmospheric Pollutants, Holography-Principle of recording and reconstruction of 3-d images and its applications. **6 Hrs.**
- 6) **Superconductivity and optical fibers:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner's effect), Type I & Type II superconductors, temperature dependence of critical field, BCS theory(qualitative), High temperature superconductors, Applications of

superconductors-Superconducting magnets, MAGLEV vehicles and SQUIDS. Propagation mechanism in optical fibers: Angle of acceptance, Numerical aperture, Types of Optical fibers and modes of propagation, Attenuation, Applications-communication, biomedical (gyroscope). **7 Hrs.**

7) **Crystal Structure:** Space lattice. Bravais lattice – Unit cell, primitive cell. Lattice parameters. Crystal systems. Directions and planes in a crystal. Miller indices. Expression for inter-planar spacing. Co-ordination number. Atomic packing factor. Bragg’s law. Determination of crystal structure by Bragg’s spectrometer. Crystal structures of CsCl, Graphite and Diamond. **6 Hrs.**

8) **Materials Science:** Concepts of quantum plane, quantum wire and quantum dot. Variation in the properties from bulk to nano through thin films – a qualitative approach. Properties of different nano materials like carbon nano tubes in detail and their applications in different fields. Concept of scaling, applications of nano materials like molecular manufacturing, nanomechanical bearings, NEMS, etc. **6 Hrs.**

Books:

- 1) Solid State Physics S.O. Pillai, New Age International - Fifth Edition
- 2) Engineering Physics Gaur & S.L.Gupta Dhanpathrai & Sons, New Delhi 7th edition
- 3) Nanosystems – Molecular Machinery, Manufacturing and Computation Eric Drexler John Wiley & Sons 2005 Ed.
- 4) Fundamentals and Applications of Ultrasonic Waves J David N Cheeke & Cheeke N Cheeke CRC Press.
- 5) A Text Book of Engineering Physics, M.N. Avadhanulu and P.G. Kshirsagar, S. Chand & Company Ltd.

PH101/PH151

ENGINEERING PHYSICS LAB

(0-0-3) 1.5

- 1) Determination of the value of Young’s modulus of the given bar by single cantilever.
- 2) Determination of the wavelength of spectral lines in the Hg spectrum using plane diffraction grating.
- 3) To draw the input and output characteristic curves of the given transistor and determination of its. (a) input resistance, (b) knee voltage and (c) α and β factors.
- 4) To study the I – V Characteristics of Zener Diode and Determination of knee voltage.
- 5) To study the frequency response of Series and Parallel LCR Circuits and Determination of the resonant frequency, band width and Q factor.
- 6) Determination of the energy loss of the specimen using B – H Curve.
- 7) Determination of the Fermi Energy of a given material.

- 8) Verification of Stefan's Law.
- 9) Determination of the Planck's constant using LED or using the principle of Photoelectric effect.
- 10) Determination of the electrical resistivity (Four Probe Method).
- 11) Determination of energy gap of a given Semiconductor.
- 12) Determination of dielectric constant by charging and discharging method.

ME100

ENGINEERING GRAPHICS – I

(1-0-2) 2

1) Geometrical Constructions

- a. Equilateral and isosceles triangle
- b. Square-One side horizontal, one side inclined at 45
- c. Pentagon - One side horizontal, one side vertical
- d. Hexagon- One side horizontal, one side vertical
- e. Tangent
 - 1) From a external point to a circle
 - 2) Common to two circles of different diameters (internal and external tangents)
 - 3) Tangential circles
 - 4) Tangential arcs to two lines
- f. Dimensioning

Two term work sheets on above

6 Hrs.

- 2) **Principles of projections** – Principle planes 1st, 2nd 3rd and 4th angle
Projection systems, Projection of points. **2 Hrs.**

3) **Projection of straight lines**

- a) Line parallel to both reference planes
- b) Line perpendicular to one plane
- c) Line parallel to one plane inclined to other plane
- d) Line inclined to both reference planes
- e) Given the views of a line determining the true length and true inclination

One term work sheet on Section d & e above (min 4 problems)

9 Hrs.

- 4) **Projection of plane figures:** such as square, pentagonal, hexagonal, circular lamina and combination. Two term work sheets on above (min 6 problems).

9 Hrs.

- 5) **Projection of Solids:** such as prism, cylinder, pyramid, cone when base/ axis inclined to both reference planes. One term work sheet on above (min 4 problems)

12 Hrs.

- Note:**
- 1) The entire syllabus to be taught in drawing hall only
 - 2) All students shall work using drawing instruments.

Books:

- 1) Engineering Drawing by N.D. Bhat & V.M.Panchal, Charotar Publishers, Anand, Gujarat.
- 2) Machine Drawing by N.D.Bhat & V.M.Panchal, Charotar Publishers, Anand, Gujarat.
- 3) Engineering Graphics by K.R.Gopalkrishna, Subhas Stores, Bangalore.
- 4) Machine Drawing by K.R.Gopalkrishna, Subhas Stores, Bangalore.

ME101/ME151	ELEMENTS OF MECHANICAL ENGINEERING	(4-0-0) 4
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- 1) **Basic Concepts of Thermodynamics:** Microscopic and Macroscopic approaches, Definitions of system, surroundings and universe, type of systems, Properties, Thermodynamic state, change of state, path and process, cyclic process, Types of Equilibrium, Quasi-Static Process, Zeroth law of Thermodynamics, Temperature scales, International temperature scale, Thermometers, Numerical problems, Quasi static process. **5 Hrs.**
- 2) **Steam and Boilers:** Steam formation, Quality of steam, Steam properties, Enthalpy, Internal Energy, Specific Volume, Numerical problems, Classification of boilers, Cochran boiler, Babcock and Wilcox boiler, Boilers mountings and accessories. (Functions and application). **5 Hrs.**
- 3) **I. C. Engines:** Classification of I.C. engines, Basic terminology, Working of S.I. and C.I. engines (both 2-stroke and 4-stroke), Performance terminology, Comparison of petrol & Diesel engines, Comparison of 2-stroke & 4-stroke engines, Applications of I.C. engines, Simple Numerical problems. **6 Hrs.**
- 4) **Refrigeration & Air conditioning:** Principle of refrigeration, Unit of Refrigeration, COP, Description and working of Domestic V.C. Refrigerator with p-h diagram, Refrigerants and application, Requirements of ideal refrigerant, Air cooling and Air conditioning, Principle of operation of Window air conditioner. Applications of refrigeration and Air conditioning. **4 Hrs.**
- 5) **Lathe and Drilling Machines:** Machine tool, Principle of turning operation, Terminology such as cutting speed, feed, depth of cut. Types of Lathes, Brief description and working of Centre lathe, Specifications of lathe, Operations on lathe, Taper turning by Compound rest method and taper turning attachment. Applications of the important operations. Types of drilling machines, Principle of drilling operation, Brief description and working of Bench drilling m/c and Radial drilling m/c, Operations on drilling m/c., Specification of Radial drilling m/c. Applications of the important operations. **7 Hrs.**

- 6) **Milling m/c and Grinding m/c:** Principle of milling, Types of milling, Classification of Milling machines, Description and working of Horizontal and Vertical milling machines, operations on milling machine. Applications of the important operations Principle of grinding, Types of grinding machines. Description and working of Cylindrical and Surface grinding machines, Common Abrasives and Bonding materials Applications of the operations. **7 Hrs.**
- 7) **Welding, Soldering and Brazing:** Description and working of Electric arc welding and Oxy-acetylene gas welding devices. Soldering and Brazing, Fluxes, Welding defects, Applications of welding, soldering and brazing. **4 Hrs.**
- 8) **Fasteners:** Hexagonal and Square headed bolts and nuts, keys, Metric and Whitworth screw threads, Flanged couplings. **2 Hrs.**
- 9) **Power Transmission:** Types of drives, Open and Cross belt drives, Ratio of tensions, Velocity ratio, Power transmitted, Slip and creep, Simple Numerical problems. Types of Gears and their applications. Simple and compound gear trains, Velocity Ratio, Numerical problems. **5 Hrs.**
- 10) **Lubrication and Bearings:** Introduction of Lubrication, Types and properties of lubricants, Lubricators- Splash lubrication, Tell-Tale lubricator, Glass-bottle needle lubricator and Full pressure lubrication. Introduction of Bearings, Classification, Solid and Bushed bearings, Plummer block, Foot step bearing, Ball and Roller bearings. **5 Hrs.**

Books:

- 1) Basic and Applied Thermodynamics by P. K. Nag, TMH Publishing Co.Ltd, Revised and enlarged 2nd edition, year 2002.
- 2) Elements of Mechanical Engineering by K.R.GoplaKrishna, 26th Edition, Subhas stores and Publishers, Avenue Road, Bangalore, year 2006.
- 3) Elements of Mechanical Engg. by K.P.Roy, S.K. Hazra Choudhary and A.K.Hazra Choudhary, 6th edition, Media Promoters and Publishers, Mumbai, year 2003.
- 4) Machine Drawing by K. R. Gopal Krishna, Subhas stores and Publishers, Avenue Road, Bangalore, year 2005.

Tables:

- 1) Steam Tables (S.I Units) by P. N. Maskara and Satish Chand, Technical Publishers of India, Subhash Nagar, Allahabad – 211002, year 1985.

ME102/ME152

WORKSHOP PRACTICE

(0-0-3) 1.5

- 1) **General Introduction to the workshop** **3 Hrs.**
- 2) **Fitting:** Study of fitting tools, Study of fitting operations and joints, Two jobs have to be completed. **3 Hrs.**
- 3) **Welding:** Study of electric arc welding tools and equipments **2 Hrs.**
- 4) **Two jobs have to be completed** **6 Hrs.**
- 5) **Sheet Metal and Soldering:** Study of sheet metal and soldering tools
Development of lateral surface of prism, pyramid, cylinder, cone – full and truncated. Two jobs have to be completed **8 Hrs.**
- 6) **Demonstration:** Carpentry, Study of carpentry hand tools and power tools
Assembling and disassembling: Small objects such as sub assembly of bicycle.
Electrical Connections: House wiring - controlling single lamp using single switch and two way switch, fuse connections. **10 Hrs.**

Books:

- 1) Elements of Workshop by S.K.H.CHOUDHRY, A.K.H.CHOUDHRY, NIRJHAR ROY 11th edition, Media Technology – voM Promoters & Publishers Mumbai, 2001.
- 2) Workshop Technology – R.SKHURMI, J.K.GUPTHA, S. Chand, New Delhi – 2001
- 3) Workshop Practice Manual by Prof Ravi, Best Publishers, Bangalore.

CV100/CV150

ENGINEERING MECHANICS

(4-0-0) 4

- 1) **Introduction to Engineering Mechanics:** Concept of Force and force systems. Definition, classification, concept of rigid and deformable body. Principle of transmissibility, composition and resolution of coplanar force systems. Types of loads and supports: Free Body Diagram, Geometrical meaning of moment, Varignon's Theorem, Conditions of equilibrium. Problems on coplanar, concurrent and non-concurrent force systems. Support reactions. **18 Hrs.**
- 2) **Geometrical Properties of Planar Elements:** Determination of Centroid, Moment of Inertia and Radius of Gyration for rectangular, circular, triangular, semi-circular, quadrant and their simple combinations **8 Hrs.**
- 3) **Friction:** Types of friction, laws of dry friction, problems on block, wedge and ladder friction, belt friction. **7 Hrs.**
- 4) **Forces in Space** - Related problems on concurrent forces only **7 Hrs.**

- 5) **Work, Power and Energy:** Work, Power, Energy related problems, Law of conservation of energy. **6 Hrs.**
- 6) **Kinetics:** Linear momentum of a particle, conservation of linear momentum, D'Alemberts, principle, circular motion **6 Hrs.**

Books:

- 1) Mechanics for Engineers: Statics by Ferdinand P. Beer and E. Russel Johnston Jr., McGraw-Hill Book Company, New York.
- 2) Mechanics for engineers: Dynamics – Ferdinand P. Beer and E. Russel Johnston Jr., McGraw-Hill Book Company, New York
- 3) Engineering Mechanics by F.L. Singer, Harper and Row publishers, New York
- 4) Engg. Mechanics by S.S. Bhavikatti & K.G. Rajashekarappa, New Age International (P) Ltd.
- 5) Engineering Mechanics by Timoshenko and Young, McGraw-Hill Book Company, New Delhi.

HU101/HU151

KANNADA KALI

Audit

Part - I

- 1) **Introducing each other:** Personal Pronouns, Possessive forms, Interrogative words.
- 2) **Introducing each other:** Personal Pronouns, Possessive forms, Yes/No Type Interrogative
- 3) **About Ramayana:** Possessive forms of nouns, dubitive question, Relative nouns
- 4) **Enquiring about a room:** Predicative forms, locative case
- 5) **Enquiring about the college:** Qualitative and quantitative adjectives
- 6) **Vegetable Market:** Dative case, basic numerals.
- 7) **About Medical college:** Ordinal numerals, plural markers.
- 8) **In a cloth shop:** Color adjectives, defective verbs
- 9) **Plan to go for a picnic:** Imperative, permissive and hortative.
- 10) **Enquiring about one's family:** Verb iru, and corresponding.
- 11) **Plan to go for a movie:** Comparative, non-past tense, instrumental and ablative case.
- 12) **Conversation between Doctor and Patient:** Potential forms, accusative case
- 13) **Enquiring about friends family:** Past tense -d- and -t- & negation
- 14) **Conversation between friends:** Past tense -k- -D- and --id, negation, verbalnoun.
- 15) **Routine activities of a Student:** About children's Education: Continuous, Perfect tenses and negations
- 16) **Halebid - Belur:** Relative participale, negation and Participale nouns.

- 17) **About Children's education:** Continuous perfect tenses and negations
- 18) **Discussing about Examination and future plan:** Conditional and negative conditions.
- 19) Karnataka (Lesson for reading)
- 20) bEku bEDagaLu (lesson for reading)

Part-II

ಪಾಠ್ಯ ಪಠ್ಯ

1. ಉಪಯುಕ್ತ (ಪಾಠ್ಯ - 2 ನೇ ಭಾಗ) ಉಪಯುಕ್ತ
2. ಕೆಲವು ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ - J.J.E. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
3. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ - 2 ನೇ ಭಾಗ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
4. ಕೆಲವು ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ - ಪಾಠ್ಯ ಉಪಯುಕ್ತ
5. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ (« ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
6. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ (« ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ) ©.f. J. i. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
7. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ K/A/P/A ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
8. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ (ಪಾಠ್ಯ - ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
9. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ CAPA § ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ | .
10. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ (ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
11. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
12. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
13. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
14. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
15. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
16. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ
17. ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ ಉಪಯುಕ್ತ

EC100/EC150	BASIC ELECTRONICS	(4-0-0) 4
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- 1) **Semiconductor Diodes And Applications:** p-n junction diode, Characteristics, DC load line, Zener diodes, Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier- Center tapped and Bridge rectifier circuits, Capacitor filter, Shunt capacitor –Approximate analysis of filters, Zener diode voltage regulators-with and without load, Numerical examples as applicable. (1-2.1, 2.2, 2.4, 2.9; 4-20.1- 20.4, 20.7, 20.8; 1-3.6) **9 Hrs.**
- 2) **Transistors:** Bipolar Junction transistor, Voltages and currents, Amplification, Common Base, Common Emitter and Common Collector Characteristics, DC Load and Bias Point, Biasing methods: Base bias, Collector to base bias, Voltage divider Bias, Bias circuit design. (1-4.1- 4.6; 5.1- 5.5, 5.7). **9 Hrs.**
- 3) **Amplifiers & Oscillators:** Decibels and Half power points, Single Stage CE Amplifier and Capacitor coupled two stage CE amplifier (Qualitative discussions only), Series voltage negative feedback and additional effects of Negative feed back (Qualitative discussions only), basics of power amplifiers: class A and class

B (Qualitative analysis only), The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley, Colpitts and Crystal oscillator (Qualitative discussions only) Numerical problems as applicable. (1-8.2; 12.1, 12.3; 13.1, 13.7, 18.1, 18.2; 4-17.15-17.19) **8 Hrs.**

4) **Introduction To Operational Amplifiers:** Ideal OPAMP, Saturable property of an OPAMP Inverting and Non inverting OPAMP circuits, need for OPAMP, Characteristics and applications- voltage follower, addition, subtraction, integration, differentiation; instrumentation amplifier, Numerical examples as applicable, Cathode ray oscilloscope. (1- 14.1 to 14.8, 16.7; 4- 17.11; 3:24.10-24.17) **8 Hrs.**

5) **Communication Systems:** Block diagram, Modulation, Need for modulation, Amplitude modulation, Frequency modulation, Comparison of AM and FM, Radio Receivers: Tuned radio-frequency receiver, Superheterodyne radio receiver. (5- 1.1 to 1.3, 3.1, 5.1, 6.1) **8 Hrs.**

6) **Basics Of Digital Circuits:** Brief introduction to number system, Binary number system, Octal number system, Hexadecimal number system, Addition and Subtraction, Fractional number, Binary Coded Decimal numbers, Boolean algebra, Logic gates, Half adder, Full adder, Half subtractor and Full subtractor, Parallel Binary Adder (2- 2.1 to 2.6, 3.2, 5.1 to 5.8, 7.1 to 7.5) **8 Hrs.**

Books:

- 1) Electronic Devices and Circuits, David A. Bell, PHI New Delhi, 4th Edition 2006.
- 2) Fundamentals of Digital Circuits, A. Anand Kumar, PHI New Delhi 2001.
- 3) Principles of Electronics, V. K. Mehta, S. Chand & Company Ltd., Delhi
- 4) Electronic Devices and Circuits, Jacob Millman and Christos C. Halkias, TMH, 1991.
- 5) Electronic Communication Systems, George Kennedy and Bernard Davis, TMH, 4th Edition.

CY100/CY150

ENGINEERING CHEMISTRY

(4-0-0) 4

- 1) **Electrochemistry:** Introduction, Electrode potential & its origin, Standard electrode potential, Derivation of Nernst equation for electrode potential; Electrochemical conventions-representation of electrode potential as reduction potential, Sign of the electrode potential, representation of electrode & cell, electrode reaction and cell reaction, calculation of cell potential; Numerical problems on $E, E^0, E^0_{cell}, E_{cell}, [M^{n+}]$; Types of electrodes—metal metal ion, metal metal salt, amalgam, redox and ion selective; Reference electrodes—requirements, limitations of SHE, advantages of secondary reference electrodes; Construction, working & applications of Calomel electrode, measurement of single electrode potential using calomel electrode; Ion-

selective electrodes—classification; Glass electrode— Construction & derivation of electrode potential, Measurement of pH of a solution using glass electrode; Concentration cells— electrode and electrolyte, Numerical problems on E_{cell} , $[M^{n+}]$ and valency of ion(n). **7 Hrs.**

- 2) **Battery Technology:** Introduction, Classification -- Primary & Secondary; Reserve batteries; Characteristics (cell potential, current, capacity, electricity storage density, energy density, power density, energy efficiency, shelf life & cycle life); Construction, working & applications of Lead-acid battery, Ni-MH battery and Li-MnO₂ battery; Fuel cells— introduction, difference between conventional cell and a fuel cell, limitations, advantages; Construction & working of H₂-O₂ fuel cell. **6 Hrs.**
- 3) **Water Technology:** Introduction, sources and impurities of water; Hardness – Types, Units; Boiler feed water, Boiler troubles - scale and sludge, priming and foaming & boiler corrosion (due to dissolved O₂, CO₂ and acids from dissolved salts with remedies); Treatment of boiler feed water-- External methods— Lime-soda process & Ion-exchange method, Internal methods— Phosphate, Colloidal & Calgon conditioning; Desalination of water - Multistage flash evaporation, Reverse osmosis, Electro dialysis—simple and ion selective. **6 Hrs.**
- 4) **Chemical Energy Sources:** Fuels--Introduction, Classification, Calorific value, Determination of calorific value using Bomb calorimeter, Numerical problems, Cracking—Thermal and catalytic(fixed bed & moving bed), disadvantages of fixed bed catalytic and advantages of moving bed catalytic cracking, Fluidized bed catalytic cracking; Reforming of petrol—significance & reactions; Knocking & its mechanism--Gasoline knocking & Diesel knocking; anti knocking agents; unleaded petrol; Octane number; Cetane number and Power alcohol. **6 Hrs.**
- 5) **Corrosion and its Control:** Introduction, Chemical & Electrochemical theories of corrosion; Factors affecting corrosion rate (Nature of the metal, relative areas of anode and cathode, nature of the corrosion product, Nature of the medium--conductivity, pH & temperature); Types of corrosion- galvanic, differential aeration(waterline), intergranular, pitting & stress; Corrosion control-design and selection of material, protective coatings - metal coatings(anodic & cathodic), inorganic coatings(anodized & phosphate), cathodic protection (sacrificial & impressed current methods)& anodic protection. **6 Hrs.**
- 6) **Metal Finishing:** Introduction, Technological importance, Polarisation, Decomposition potential and Over voltage.
Electroplating: Theory of electroplating, Characteristics of good deposit; Factors influencing the nature of deposit--current density, metal ion and metal salt concentration, pH, temperature, agitation, Additives- complexing agents, brighteners, structure modifiers, levelers, wetting agents; throwing power & conductivity of the electrolyte; Metal surface preparation—cleaning—solvent, alkali, mechanical, pickling & electro polishing; Electroplating of nickel (from watt's bath) and chromium (decorative & hard) & their applications.

Electro less plating: Principle, composition of bath, advantages, limitations; Comparison of electroplating and electro less plating; Electroless plating of copper & its applications. **7 Hrs.**

- 7) **High Polymers:** Introduction—monomer, functionality of monomer, polymerization, degree of polymerization; Types of polymerization – Addition and condensation; Mechanism of polymerization - Free radical taking ethylene as a monomer; Structure-property relationships--strength, crystallinity, elasticity & chemical resistivity; Glass Transition temperature, factors influencing T_g – flexibility, inter molecular forces, branching and cross-linking, molecular mass, stereo regularity and presence of plasticizers; Significance of T_g ; Synthesis, properties & applications of polymethylmethacrylate & polyurethanes; Elastomers - introduction, synthesis, properties & applications of neoprene rubber; Adhesives--introduction, synthesis, properties & applications of epoxy resins; Conducting polymers- Introduction, mechanism of p & n doping of polyacetylene, applications of conducting polyacetylene. **7 Hrs.**
- 8) **Instrumental Methods of Analysis:** Introduction, Advantages and disadvantages, Types of Instrumental methods of analysis-Conductometry, Potentiometry & Colorimetry (Principle, working and applications). **5 Hrs.**

Books:

- 1) Puri B.R., Sharma L.R. and M.S. Pathania, Principles of Physical Chemistry, S.N. Chand & Co., Jalandhar.
- 2) J.C. Kuriacose, J. Rajaram, Chemistry in Engineering and Technology, Volume I & II, Tata McGraw-Hill Publishing Company Limited, New Delhi.
- 3) R. Narayan & B. Vishwanathan, Chemical and Electrochemical Energy Systems, Universities Press (India) Limited.
- 4) Jain P.C. & Monika Jain, Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- 5) Mars G. Fontana, Corrosion Engineering, McGraw-Hill International Edition.

CY101/CY151

ENGINEERING CHEMISTRY LAB

(0-0-3) 1.5

Volumetry:

- 1) Estimation of total hardness of the given sample of water by EDTA method
- 2) Estimation of calcium in the given sample of cement solution by rapid EDTA method.
- 3) Estimation of percentage of copper in the given sample of brass by iodometric method
- 4) Estimation of amount of iron in the given sample of haematite solution by external indicator method
- 5) Estimation of chloride in the given sample of water by Mohr's method

Instrumental

- 1) Estimation of hydrochloric acid & acetic acid from their mixture conductometrically
- 2) Estimation of FAS potentiometrically
- 3) Estimation of copper colorimetrically
- 4) Determination of pK_a of weak acid using pH-meter
- 5) Determination of viscosity coefficient of a given liquid using Ostwald's viscometer

Books:

- 1) Vogel A.I., Text Book of Quantitative inorganic Analysis, ELBS Publication
- 2) O. P. Varmani & A. K. Narula, Applied Chemistry, New Age International Publishers
- 3) J.B. Yadav, Advanced practical physical chemistry, Goel Publishing House

CS100/CS150	PROGRAMMING FUNDAMENTALS WITH C	(4-0-0) 4
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- 1) **Introduction:** Logical Organization of Computer, Stored program concept. **1Hrs.**
- 2) **Programming Process:** Life Cycle of a Software Project, Importance of adhering to Standards, Using Algorithms to Solve Problems, Different Patterns in Algorithms, Flow Charts. **4 Hrs.**
- 3) **Introduction to C Language:** Structure of a C program with example, Character Set, C Tokens, Data types, Arithmetic operators, Expressions – Evaluation of an expression, Assignment statements – increment and decrement operators, compound assignment operators, Nested assignments, Simple Input and output, Type conversions, Simple Macros. **6 Hrs.**
- 4) **Selective Structure:** Relational Operators, Logical operators, Bitwise Operators Conditional Statement, Nested conditional statement, Multi-way conditional statement, Constant Multi-way conditional Statement, (switch statement), break statement, go to statement, The ? operator. **4 Hrs.**
- 5) **Repetitive structure:** While, do – while, for, nested loops, loop interruption – break and continue, null statement, comma operator. **4 Hrs.**
- 6) **Functions:** To understand the need to use functions, the advantages of functions, Function definition, function call, function prototypes, storage classes, Parameter passing techniques, arrays as function arguments. **5 Hrs.**
- 7) **Arrays:** One Dimensional arrays- declaration and initialization, Two Dimensional arrays - declaration and initialization. Arrays as function arguments **6 Hrs.**
- 8) **Pointers and Strings:** Introduction to pointers, how to declare pointers, how to access values through pointers, Pointer arithmetic, the relationship between

arrays and pointers. Array of pointers, Command line arguments Declaration and initialization of strings, the memory representation of strings, pointers and strings, various string functions: strlen (), strcat(), strcpy(), strcmp(), Parameter passing techniques. **12 Hrs.**

- 9) **Structures and Unions:** Basics of structures, Structures and arrays, Basics of Unions. **6 Hrs.**

Books:

- 1) Programming in ANSI C by E Balagurusamy, TMH third Edition
- 2) The programming languages C by Brian W. Kernighan & Dennis M. Ritchie, 2nd Edition PHI 2004
- 3) How to solve it by computer by Dromey R. G, PHI 2001
- 4) The Practice of Programming by Brain W. Kernighan and Rob Pike, PEI 2004

CS101/CS151 PROGRAMMING FUNDAMENTALS WITH C LAB (0-0-3) 1.5

Suggested Plat forms:

- 1) Visual Studios 6, Windows.
- 2) Vi editor, Linux (Any one)
- 3) Eclipse, Fedora 4

All programs should be:

- 1) Written keeping coding standards in the mind
- 2) More generic
- 3) Written with Exception handling
- 4) Tested for different test cases

Guide lines for the lab practices:

- 1) Simple programs using I/O Statements, which helps the students understand, precedence of operators, usage of special operators, and size of the data types, different ways of declaring structured data type.
- 2) Programs that targets the under standing of selective structures, IF, IF-ELSE, ELSE-IF ladder, SWITCH-CASE, GOTO, BREAK.
- 3) Programs that targets the under standing of iterative structure like WHILE, DO-WHILE, FOR, their usage in array declaration NESTED versions of each, Loop Interruption using BREAK and CONTINUE.
- 4) Programs on searching and sorting techniques
- 5) Programs on strings handling
- 6) Programs that help the to appreciate modular approach, developing functions, passing parameters by argument and by values, passing arrays as arguments,
- 7) Programs that help the students to appreciate how the program complexity reduces and becomes more readable through better data representation using structures, like representing employee record and so on.
- 8) Programs using pointers

Note: Lab exercises to be designed to develop

- 1) Code writing ability
- 2) Code reviewing Skills
- 3) Code debugging Skills

HU100/HU150	FUNCTIONAL ENGLISH	AUDIT
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Introduction	Importance of Languages
Grammar	Parts of Speech, Usage of Preposition and Article, Punctuation
Tenses & Degrees of Comparison	
Collective Nouns Abstract nouns Transformation of Sentences	Usage in sentences, formation of abstract nouns from verbs, adjectives and common nouns Active Passive, Affirmative- Negative, Exclamatory- Assertive, Interrogative Assertive, Kinds of sentences
Common errors in Usage	
Concord Direct-Indirect Speech	Subject – verb agreement, common errors
Vocabulary Usage Modification of words	Homonyms, Correct Spelling, One word equivalents
Précis Writing	
Essay/Report Writing	
Letter Writing	Personal, Official, Applications
Figurative Expressions, Idioms & Phrases	Meaning & Usage in sentences
Comprehension	Of an unseen passage
Elaboration	Expansion of ideas, proverbs
Presentation	Preparation of materials and presentation - step

Books:

1. Basic Grammer – S L N Sharma & K Shankaranarayana, Navakarnataka publications.
2. New International Business English – Leo Jones & Richard Alexander, Cambridge University press.
3. English Grammer – Wren & Martin
4. Oxford Guide to speaking and Writing John Seely.

HU102/HU152	CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS	Audit
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- 1) Preamble to the constitution of India Fundamental rights under Part - III details of Exercise of Rights, Limitations & Important cases. **4 Hrs.**
- 2) Relevance of Directive principles of State Policy under Part - IV. Fundamental duties & their significance. **3 Hrs.**
- 3) Union Executive President, Prime Minister, Parliament & the Supreme Court of India. **3 Hrs.**
- 4) State executive Governors, Chief Minister, State Legislator and High Courts. **3 Hrs.**
- 5) Constitutional Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions. **4 Hrs.**
- 6) Electoral process, Amendment procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments. **3 Hrs.**
- 7) Scope & aims of engineering Ethics. Responsibility of Engineers. Impediments to responsibility. **3 Hrs.**
- 8) Honesty, Integrity and reliability, risks, safety & liability in engineering. **3 Hrs.**

Books:

- 1) Durga Das Basu: "Introduction to the Constitution of India" (Students Edn.) Prentice - Hall EEE, 19th/20th Edn., 2001.
- 2) "Engineering Ethics" by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia, 2003-08-05.
- 3) "An Introduction to Constitution of India" by M.V.Pylee, Vikas Publishing, 2002.
- 4) "Engineering Ethics" by M. Govindarajan, S.Natarajan, V.S.Senthilkumar., Prentice - Hall of India Pvt. Ltd. New Delhi, 2004.

HU103/HU153	ENVIRONMENTAL SCIENCE	Audit
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- 1) **Environment:** Definition, Eco system - Balanced ecosystem, Human activities - Food, Shelter, Economic and Social Security. **3 Hrs.**
- 2) **Effects of human activities on environment:** Agriculture, Housing, Industry, Mining, and Transportation activities, Environmental Impact Assessment. Sustainable Development. **3 Hrs.**
- 3) **Natural Resources:** Water resources - Availability and Quality aspects. Water borne diseases, Water induced diseases, Fluoride problem in drinking water.

Mineral Resources, Forest Wealth, Material Cycles - Carbon, Nitrogen and Sulphur Cycles. **4 Hrs.**

- 4) **Environmental Pollution and their effects:** Water pollution. Land pollution. Noise pollution. Public Health aspects. **3 Hrs.**
- 5) **Energy:** Different types of energy, Electro-magnetic radiation. Conventional and Non - Conventional sources - Hydro Electric, Fossil fuel based, Nuclear, Solar, Biomass and Bio-gas. Hydrogen as an alternative future source of Energy. **4 Hrs.**
- 6) **Current Environmental issues of importance:** Population Growth, Climate change and Global warming - Effects, Urbanization, Automobile pollution. **3 Hrs.**
- 7) Acid Rain, Ozone layer depletion, Animal Husbandry. **3 Hrs.**
- 8) **Environmental Protection:** Role of Government, Legal aspects, Initiatives by Non -Governmental Organizations (NGO), Environmental Education, Women Education. **3 Hrs.**

Books:

- 1) Environmental Studies - Benny Joseph - Tata McGrawHill-2005.
- 2) Environmental Studies - Dr. D.L Manjunath, Pearson Education - 2006
- 3) Principles of Environmental Science and Engineering - P. Venugopala Rao, Prentice Hall of India.
- 4) Environmental Science and Engineering - Meenakshi, Prentice Hall India.

- 1) **Differential Calculus:** Radius of curvature - Cartesian – parametric, polar forms, Rolle's theorem. Lagrange's and Cauchy's mean value theorems. Taylor's theorem for a function of a single variable and Maclaurin's series expansions (without proofs) and problems. **7 Hrs.**
- 2) **Indeterminate forms:** L Hospital's rule, Taylor's theorem for a function of two variables (without proofs) Maxima and minima for function of two variables Lagrange's method of undetermined multipliers (with one subsidiary condition) and problems. **6 Hrs.**
- 3) **Integral Calculus:** Multiple Integrals – Evaluation by change of order of integration - change of variables and applications to area and volume. Beta and gamma functions. **6 Hrs.**
- 4) **Vector Calculus:** Vector Integration, Line Integrals, Surface integrals and volume integrals, Greens, Stokes, Gauss theorems (without proofs) and problems. **6 Hrs.**
- 5) **Differential Equations:** Linear differential equations of 2nd and higher order with constant coefficients, Initial and boundary value problem, method of variation of parameters. **6 Hrs.**
- 6) **Differential Equations (Contd.):** Method of undetermined coefficients. Solutions of Cauchy's homogeneous linear equation and Legendres linear differential equation. **6 Hrs.**
- 7) **Laplace Transforms:** Definition, transforms of elementary functions, multiplication and division by t. Transforms of derivatives and integrals, Properties, Periodic function, Unit step function. **7 Hrs.**
- 8) **Inverse Laplace Transforms:** Properties – Convolution theorem. Solutions of ordinary differential equations and simultaneous differential equations. Applications to Engineering problems. **6 Hrs.**

Books:

- 1) Higher Engg. Mathematics by - B.S. Grewal, 36th Edn. July 2001.
- 2) Advanced Engineering Mathematics by - Peter V. Oniel Thompson Learning Publications
- 3) Advance Engineering Mathematics by – E. Kreyszing John Wiley & Sons. 8th Edn.
- 4) Engineering Mathematics Vol. I & II - S.S Shastry -Prentice Hall of India

ME150

ENGINEERING GRAPHICS - II

(1-0-2) 2

- 1) Introduction to Computer Aided Drawing. **6 Hrs.**
- 2) Conversion of Pictorial view into Orthographic projection of simple machine parts.
6 problems to be solved using computer **18 Hrs.**
- 3) Isometric view of simple solids. 6 problems to be solved using computer **18 Hrs.**

Note:

- 1) Printouts of all problems along with CIE tests are to be submitted in the bound form at the end of the semester.
- 2) Entire syllabus to be taught in Computer Lab using any CAD software.

Books:

- 1) Engineering Drawing by N. D. Bhatt & V. M. Panchal, Charotar Publishers, Anand, Gujarat.
- 2) Machine Drawing by N. D. Bhatt & V. M. Panchal, Charotar Publishers, Anand Gujarat.
- 3) Engineering Graphics by K. R. Gopalakrishna, Subhas Stores, Bangalore.
- 4) Machine Drawing by K. R. Gopalakrishna, Subhas Stores, Bangalore.

Evaluation System

1) Theory courses:

- ❖ Maximum Marks: 100
 - ❖ Continuous Internal Evaluation (CIE):
 - Maximum Marks: 50
 - Assignment, Case study, Problem solving, Report writing, Class room interaction etc.,
 - CIE Test : 40 Marks
- } 10 marks to be awarded by the course instructor

Sl. No.	Timing of the tests	Particulars		
1	6 th week	CIE Test – 1 Duration: 1 Hour Portion: First 25% of the syllabus	--	1) Sum of best scores of any two tests to be considered for 40 marks. 2) Two papers per day.
2	10 th week	CIE Test – 2 Duration: 1 Hour Portion: Second 25% of the syllabus	20	
3	14 th week	CIE Test – 3 Duration: 1 Hour Portion: Third 25% of the syllabus	20	

- Students are expected to attend all the test.
- Students are required to score a minimum of 20 out of 50 marks in CIE to be eligible for Semester End Examination (SEE).
- Question paper pattern for CIE test:

Parts	Questionnaire details	Max. Marks	Remarks
PART - A	Multiple choice, Fill in the blanks, Match the following, True/False and Make corrections	05	No choice
PART - B	Analytical and problem oriented questions involving short steps but demanding thorough knowledge and appreciation of the course.	05	No choice
PART - C	Standard questions that are objectively evaluated (describe, explain, short notes to be avoided)	10	One choice

- ❖ Semester End Examination (SEE):
 - Maximum Marks: 50
 - Conducted in the 18th week of the semester for a maximum mark of 100 and the duration of the exam will be 3 hours.
 - Marks obtained for 100 will be proportionally reduced to 50 marks.
 - Attendance to the exam is compulsory.
 - Question paper pattern for SEE:

Parts	Questionnaire details	Question No.	Max. Marks	Remarks
PART - A	Multiple choice, Fill in the blanks, Match the following, True/False and Make corrections	1 2	Each question carries 10 marks	No choice
PART - B	Analytical and problem oriented questions involving short steps but demanding thorough knowledge and appreciation of the course.	3 4		No choice
PART - C	Standard questions (maximum three sub divisions), which can be objectively evaluated (describe, explain, short notes to be avoided) on the entire syllabus.	5 to 12		6 questions out of 8

- ❖ Total score = CIE + SEE
- ❖ Relative grading using statistical approach will be done on this total score.

2) Practical courses:

- ❖ Maximum Marks: 100
- ❖ Interaction, preparation, journal writing etc., in each practical session spread over the entire semester carries 50 marks and this is to be awarded by the course instructor. Students are required to score a minimum of 20 marks to be eligible for the practical examination.
- ❖ Practical examination:
 - Maximum Marks: 50
 - To be conducted in the 15th and/or 16th week.
 - Practical batch for the exam shall have a maximum of 15 students.
 - Duration of the examination: 3 hours.
 - Two examiners are to be nominated by the HOD.
 - Attendance to the exam is compulsory.
 - Total score will be the sum of the above components.
 - Relative grading using statistical approach will be done on this total score.