DEPARTMENT OF PHYSICS

I B.SC. SEMESTER I-THEORY SYLLABUS

PAPER -I: MECHANICS

Unit -I

1. **Vector Analysis**
   Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems – Simple applications.

Unit-II

2. **Mechanics of Particles**
   Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section.
3. **Mechanics of rigid bodies**
   Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope.

Unit – III

4. **Central forces**
   Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

Unit -IV

5. **Special theory of relativity**
   Galilean relativity, absolute frames, Michelson – Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1. Berkeley Physics Course. Vol.1, Mechanics by C. Kittel, W. Knight, M.A. Ruderman - Tata McGraw hill Company Edition 2008.
2. Fundamentals of Physics. Halliday/Resnick/Walker Wiley India Edition 2007.
3. First Year Physics - Telugu Academy.
4. Introduction to Physics for Scientists and Engineers. F.J. Ruche. McGraw Hill.
5. Sears and Zemansky's University Physics by Hugh D. Young, Roger A. Freedman Pearson Education Eleventh Edition.

6. Theory of relativity - Resnick

Reference Books

1. Fundamentals of Physics by Alan Giambattista et al Tata-McGraw Hill Company Edition, 2008.
2. University Physics by Young and Freeman, Pearson Education, Edition 2005.
3. An introduction to Mechanics by Daniel Kleppner& Robert Kolenkow. The McGraw Hill Companies.
4. Mechanics. Hans &Puri. TMH Publications.

FIRST SEMESTER PRACTICALS

PRACTICAL PAPER -I: MECHANICS

1. Study of a compound pendulum determination of 'g' and 'k'.
2. 'Y' by uniform Bending.
3. 'Y' by Non-uniform Bending.
4. Moment of Inertial of a fly wheel.
5. Measurement of errors – simple pendulum.
6. Rigidity moduli by torsion pendulum.
7. Determine surface tension of a liquid through capillary rise method.
8. Determination of surface tension of a liquid by different methods.
9. Determination of viscosity of a fluid.
10. Calculation of slope and intercept of a Y= mX + C by theoretical method.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).

2. S.P. Singh, "Advanced Practical Physics" (PragatiPrakashan, Meerut).

3. "Practical Physics" R.K Shukla, AnchalSrivastava

I B.SC. SEMESTER II -THEORY SYLLABUS

PAPER -II: THERMAL PHYSICS

Unit - I

1. **Kinetic theory of gases:**

   Introduction - Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

2. **Thermodynamics:**

Basics of thermodynamics, -Kelvin's and Claussius statements, Thermodynamic scale of temperature, Entropy, physical significance, change in entropy in reversible and irreversible processes, Entropy and disorder, Entropy of universe, Temperature Entropy (T-S) diagram, change of entropy of a perfect gas, change of entropy when ice changes into steam.

Unit-II

3. **Thermodynamic potentials and Maxwell's equations**

Thermodynamic potentials, Derivation of Maxwell's thermodynamic relations, Clausius-Clayperon's equation, Derivation for ratio of specific heats, Derivation for difference of two specific heats for perfect gas, Joule Kelvin effect, expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

4. **Low temperature Physics**

Joule Kelvin effect, liquefaction of gas using porous plug experiment, Joule expansion – Distinction between adiabatic and Joule Thomson expansion, – Expression for Joule Thomson cooling, Liquefaction of helium, Kapitza's method - Adiabatic demagnetization - Production of low temperatures, Principle of refrigeration, vapour compression type.

Unit-III

5. **Quantum theory of radiation**

Black body, Ferry's black body, distribution of energy in the spectrum of Black body, - Wein's displacement law, Wein's law, Rayleigh-Jean's law, - Quantum theory of radiation, Planck's law, – deduction of Wein's distribution law, Rayleigh-Jeans law, Stefan's law from Planck's law, Measurement of radiation using pyrometers, Disappearing filament optical pyrometer, experimental determination, Angstrom pyroheliometer, determination of solar constant, effective temperature of sun.

Unit -IV

6. **Statistical Mechanics**

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles, classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi Dirac Distribution law, comparison of three distribution laws, Application of B-E distribution to Photons-planks radiation formula, Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

Textbooks

1. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007.
2. Second Year Physics – Telugu Academy.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) S. Chand & Co.
4. Heat and Thermodynamics by Mark W.Zemansky 5th edition McGraw – Hill
5. Heat and Thermodynamics by D.S. Mathur.

Reference Books

1. Modern Physics by G. Aruldhas and P. Rajagopal, Eastern Economy Education.

2.B.B. Laud “Introduction to statistics Mechanics” (Macmillan 1981)

3. F.Reif: "Statistical Physics “(Mcgraw-Hill, 1998) 4. K.Haung: "Statistical Physics “(Wiley Eastern 1988)

SECOND SEMESTER PRACTICALS

PRACTICAL PAPER -II: THERMAL PHYSICS

1. Co- efficient of thermal conductivity of a bad conductor by Lee’s method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Determination of Thermo emf.
6. Cooling Curve of a metallic body (Null method).
7. Resistance thermometer. To Determine temp coeff. resistance.
8. Thermal expansion of solids.
9. Study of conversion of mechanical energy into heat.
10. Determine the Specific of a solid (graphite rod).
11. Thermistor Characteristics. Calculation of A and B.

Text and reference books

1. D.P. Khandelwal, “A laboratory manual for undergraduate classes” (Vani Publishing House, New Delhi).

2. S.P. Singh, “Advanced Practical Physics” (PragatiPrakashan, Meerut).

3. Worsnop and Flint- Advanced Practical physics for students.

4. “Practical Physics” R.K Shukla, AnchalSrivastava

II B.SC. SEMESTER III -THEORY SYLLABUS

PAPER -III: ELECTROMAGNETIC THEORY

UNIT I

1.Electrostatics

Electric Field, Concept of electric field lines and electric flux, Gauss’s law (Integral and differential forms), application to linear, plane and spherical charge distributions, Conservative nature of electric field ‘E’, Irrotational field. Electric potential: Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges,

Energy density in an electric field, Calculation of potential from electric field for a spherical charge distribution.

UNIT II

2.Magnetostatics

Concept of magnetic field 'B' and magnetic flux, Biot-Savart's law, 'B' due to a straight current carrying conductor, Force on a point charge in a magnetic field, Properties of B, curl and divergence of B, solenoidal field, Integral form of Ampere's law, Applications of Ampere's law: field due to straight, circular and solenoidal currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance, Magnetic force between two current carrying conductors, Magnetic field intensity.

Ballistic Galvanometer: Torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

UNIT III:

3.Electromagnetic Induction and Electromagnetic waves

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction, Continuity equation, modification of Ampere's law, displacement current, Maxwell equations, Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium, Poyinting's theorem.

UNIT IV:

4. Varying and alternating currents

Growth and decay of currents in LR, CR and LCR circuits - Critical damping, Alternating current, relation between current and voltage in pure R, C and L-vector diagrams - Power in ac circuits. LCR series and parallel resonant circuit-Q-factor, AC & DC motors-single phase, three phase (basics only).

5.Network Theorems

Passive elements, Power sources, Active elements, Network models: T and π Transformations, Superposition theorem, Thevenin's theorem, Norton's theorem. Reciprocity theorem and Maximum power transfer theorem (Simple problems).

Suggested Books:

1. Fundamentals of electricity and magnetism By Arthur F. Kip (McGraw-Hill, 1968)

2. Electricity and magnetism by J. H. Fewkes & John Yarwood. Vol. I (Oxford Univ. Press, 1991).

3. Introduction to Electrodynamics, 3rd edition, by David J. Griffiths, (Benjamin Cummings, 1998).

4. Electricity and magnetism By Edward M. Purcell (McGraw-Hill Education, 1986)

5. Electricity and magnetism. By D C Tayal (Himalaya Publishing House,1988)

6. Electromagnetics by Joseph A.Edminister 2nd ed.(New Delhi: Tata McGraw Hill, 2006).

THIRD SEMESTER PRACTICALS

PRACTICAL PAPER -III: ELECTROMAGNETIC THEORY

1. To verify the Thevenin's Theorem
2. To verify Norton Theorem
3. To verify Superposition Theorem
4. To verify maximum power transfer theorem.
5. To determine a small resistance by Carey Foster's bridge.
6. To determine the (a) current sensitivity, (b) charge sensitivity, and (c) CDR of a B.G.
7. To determine high resistance by leakage method.
8. To determine the ratio of two capacitances by De Sauty's bridge.
9. To determine self-inductance of a coil by Anderson's bridge using AC.
10. To determine self-inductance of a coil by Rayleigh's method.
11. To determine coefficient of Mutual inductance by absolute method.

Suggested Books:

1. B. L. Worsnop and H. T. Flint Advanced Practical Physics, Asia Publishing House, New Delhi.

2. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal

II B.Sc. SEMESTER IV -THEORY SYLLABUS

PAPER – IV::WAVES AND OPTICS

Unit -I

1. Waves

Fundamentals of Waves -Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance.

Longitudinal vibrations in bars- wave equation and its general solution, Special cases: (i) bar fixed at both ends, ii) bar fixed at the midpoint, iii) bar free at both ends, iv) bar fixed at one end, Transverse vibrations in a bar - wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

UNIT II:

2. Interference

Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light. Interference by division of wave front: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using biprism – change of phase on reflection – Lloyd's mirror experiment.

Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non-reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium D_1, D_2 lines and thickness of a thin transparent plate.

UNIT III:

3. Diffraction:

Introduction – Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction, Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer diffraction pattern with N slits (diffraction grating).

Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating.

Fresnel diffraction-Fresnel's half period zones – area of the half period zones –zone plate – Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

UNIT IV:

4. Polarization

Polarized light: Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption, scattering of light – Brewster's law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

NOTE: Problems should be solved at the end of every chapter of all units.

Suggested books

1. **Optics** by AjoyGhatak. The McGraw-Hill companies.
2. **Optics** by Subramaniyam and Brijlal. S. Chand & Co.
3. **Fundamentals of Physics**. Halliday/Resnick/Walker.C. Wiley India Edition 2007.
4. **Optics and Spectroscopy**. R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
5. **Second Year Physics** – Telugu Academy.
1. **Modern Engineering Physics** by A.S. Vasudeva. S.Chand& Co. Publications.
2. **Feyman's Lectures on Physics** Vol. 1, 2, 3 & 4. Narosa Publications.
3. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, McGraw Hill Inc.
4. K. Ghatak, **Physical Optics'**
5. D.P. Khandelwal, **Optical and Atomic Physics'** (Himalaya Publishing House, Bombay,1988)
6. Jenkins and White: **'Fundamental of Optics'** (McGraw-Hill)

7. Smith and Thomson: **'Optics'** (John Wiley and sons).

FOURTH SEMESTER PRACTICALS

PRACTICAL PAPER -IV: WAVES AND OPTICS

1. Thickness of a wire using wedge method.
2. Determination of wavelength of light using Biprism.
3. Determination of Radius of curvature of a given convex lens by forming Newton's rings.
4. Resolving power of grating.
5. Study of optical rotation- polarimeter.
6. Dispersive power of a prism
7. Determination of wavelength of light using diffraction grating minimum deviation method.
8. Wavelength of light using diffraction grating – normal incidence method.
9. Resolving power of a telescope.
10. Refractive index of a liquid and glass (Boys Method).
11. Pulfrich refractometer – determination of refractive index of liquid.
12. Wavelength of Laser light using diffraction grating.
13. Verification of Laws of a stretched string (Three Laws).
14. Velocity of Transverse wave along a stretched string
15. Determination of frequency of a bar- Melde's experiment.

Suggested Books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastav.

III B.Sc. SEMESTER V -THEORY SYLLABUS

PAPER – V:: (A) MODERN PHYSICS
(DSE-1: ELECTIVE)

UNIT - I

Spectroscopy

1. **Atomic Spectra:**
   Introduction - Drawbacks of Bohr's atomic model – Sommerfeld's elliptical orbits -relativistic correction (no derivation). Stern & Gerlach experiment, Vector atom model and quantum numbers associated with it. L-S and j-j coupling schemes. Spectral terms, selection rules, intensity rules – spectra of alkali atoms, doublet fine structure, Zeeman Effect, Paschen-Back Effect and Stark Effect (basic idea).
2. **Molecular Spectroscopy:**

Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule. Determination of inter nuclear distance. Vibrational energies and spectrum of diatomic molecule. Raman effect, classical theory of Raman effect. Experimental arrangement for Raman effect and its applications.

UNIT – II

3. Quantum Mechanics

Inadequacy of classical Physics: Spectral radiation - Planck's law (only discussion). Photoelectric effect - Einstien's photoelectric equation. Compton's effect - experimental verification.

4. Matter waves & Uncertainty principle:

de Broglie's hypothesis - wavelength of matter waves, properties of matter waves. Phase and group velocities. Davisson and Germer experiment. Double slit experiment. Standing de Brogile waves of electron in Bohr orbits. Heisenberg's uncertainty principle for position and momentum (X and P_x), Energy and time (E and t). Gamma ray microscope. Diffraction by a single slit. Position of electron in a Bohr orbit. Complementary principle of Bohr.

5. Schrodinger Wave Equations

Schrodinger time independent and time dependent wave equations. Wave function properties - Significance. Basic postulates of quantum mechanics. Operators, eigen functions and eigen values, expectation values.

UNIT - III

7. Nuclear Physics

Nuclear Structure: Basic properties of nucleus - size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment. Binding energy of nucleus, deuteron binding energy, p-p, n-n, and n-p scattering (concepts), nuclear forces. Nuclear models - liquid drop model, shell model.

Alpha and Beta Decays: Range of alpha particles, Geiger – Nuttall law. Gamow's theory of alpha decay. Geiger – Nuttall law from Gamow's theory. Beta spectrum - neutrino hypothesis,

Particle Detectors: GM counter, proportional counter, scintillation counter.

UNIT - IV

8. Solid State Physics & Crystallography

Crystal Structure: Crystalline nature of matter, Crystal lattice, Unit Cell, Elements of symmetry. Crystal systems, Bravais lattices. Miller indices. Simple crystal structures (S.C., BCC, FCC, CsCl, NaCl, diamond and Zinc Blende)

X-ray Diffraction: Diffraction of X -rays by crystals, Bragg's law, Experimental techniques - Laue's method and powder method.

Bonding in Crystals: Types of bonding in crystals - characteristics of crystals with different bonding's. Lattice energy of ionic crystals- determination of Madelung constant for NaCl crystal, Calculation of Born Coefficient and repulsive exponent. Born-Haber cycle.

Suggested books:

1. Modern Physics by G. Aruldhas & P.Rajagopal. Eastern Economy Edition.
2. Concepts of Modern Physics by ArthurBeiser.Tata McGraw-Hill Edition.
3. Modern Physics by R. Murugeshan and Kiruthiga SivaPrasath.S. Chand & Co.
4. Nuclear Physics by D.C. Tayal, Himalaya PublishingHouse.

5. Molecular Structure and Spectroscopy by G.Aruldhas. Prentice Hall of India, New Delhi.

6. Spectroscopy -Atomic and Molecular by Gurdeep R Chatwal and Shyam Anand - Himalaya Publishing House.

7. Third Year Physics – Telugu Academy.

8. Elements of Solid State Physics by J.P. Srivastava. (for chapter on nanomaterials)- Prentice-hall of India Pvt. Ltd.

FIFTH SEMESTER PRACTICALS

PRACTICAL PAPER -V: MODERN PHYSICS

(DSE-1: ELECTIVE)

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Phto-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine the Planck's constant using LEDs of at least 4 different colors.
4. To determine the ionization potential of mercury.
5. To determine the absorption lines in the rotational spectrum of Iodine vapour.
6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
7. To setup the Millikan oil drop apparatus and determine the charge of an electron.
8. To show the tunneling effect in tunnel diode using I-V characteristics.
9. To determine the wavelength of laser source using diffraction of single slit.
10. To determine the wavelength of laser source using diffraction of double slits.
11. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
12. To determine the value of e/m for electron by long solenoid method.
13. Photo Cell – Determination of Planck's constant.
14. To verify the inverse square law of radiation using a photo-electric cell.
15. To find the value of photo electric work function of a material of the cathode using a photo electric cell.
16. Measurement of magnetic field – Hall probe method.
17. To determine the dead time of a given G.M. tube using double source.
18. Hydrogen spectrum – Determination of Rydberg's constant
19. Energy gap of intrinsic semi-conductor
20. G. M. Counter – Absorption coefficients of a material.
21. To draw the plateau curve for a Geiger Muller counter.
22. To find the half-life period of a given radioactive substance using a G.M. Counter.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

III B.Sc. SEMESTER VI -THEORY SYLLABUS

PAPER – VI:: (A) ELECTRONICS
(DSE-2: ELECTIVE)

Unit - I

1. **Band theory of P-N junction**:

   Energy band in solids (band theory), valence band, conduction band and forbidden energy gap in solids, insulators, semiconductors and pure or intrinsic semiconductors and impure or extrinsic semi-conductors. N-type semi-conductors, P-type semi-conductors, Fermi level, continuity equation.

2. **Diodes:**

   P-N junction diode, Half-wave, full-wave and bridge rectifier. Zener diode & its characteristics. Zener diode as voltage regulator.

UNIT-II

3. **Bipolar Junction Transistor (BJT)** –

   p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier -RC coupled amplifier – Frequency response (Qualitative analysis).

4. **Feedback concept & Oscillators:**

   Feedback, General theory of feedback–Concepts of oscillators, Barkhausen's criteria, Phase shift oscillator – Expression for frequency of oscillation.

UNIT-III

5. **Special devices-**

   Construction and Characteristics: Photo diode - Shockley diode -Solar cell, Opto couplers - Field Effect Transistor (FET) - FET as an Amplifier - Uni Junction Transistor (UJT), UJT as a relaxation oscillator - Silicon controlled rectifier (SCR) - SCR as a switch.

UNIT-IV

6. **Digital Electronics**

   Binary number system, conversion of binary to decimal and vice-versa.Binary addition and subtraction (1's and 2's complement methods).Hexadecimal number system.Conversion from binary to hexadecimal and vice-versa, Decimal to hexadecimal and vice-versa.

7. **Logic gates:**

   OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan's Laws – Verification.

NOTE: Problems should be solved from every chapter of all units.

Suggested Books:

1. Electronic devices and circuits – Millman and Halkias. Mc.Graw-Hill Education. 2. Principles of Electronics by V.K. Mehta – S. Chand & Co.
3. Basic Electronics (Solid state) – B. L. Theraja , S. Chand & Co.
4. A First Course in Electronics- Anwar A. Khan&Kanchan K. Dey, PHI.
5. Physics of Semiconductor Devices- S. M. Sze
6. Physics of Semiconductors- Streetman.
7. Basic Electronics – Bernod Grob.
8. Basic Electronics for B.Sc (Physics) III Year, 2019, Telugu Academy
9. Digital Principles & Applications – A.P. Malvino and D.P. Leach

SIXTH SEMESTER PRACTICALS

PRACTICAL PAPER -VI: ELECTRONICS

(DSE-2: ELECTIVE)

1. Construction of logic gates (AND, OR, NOT, gates) with discrete components– Truth table Verification
2. AND, OR, NOT – gates constructions using universal gates – Verification of truth tables.
3. Construction of NAND and NOR gates with discrete components and truth table verification
4. Characteristics of a Transistor in CE configuration
5. R.C. coupled amplifier – frequency response.
6. Verification of De Morgan's Theorem.
7. Zener diode V-I characteristics.
8. P-n junction diode V- I characteristics.
9. Zener diode as a voltage regulator
10. Construction of a model D.C. power supply
11. R C phase shift Oscillator –determination of output frequency

Suggested Books:

1. B.Sc. Practical Physics – C. L. Arora – S. Chand & Co.
2. Viva-voce in Physics – R.C. Gupta, Pragathi Prakashan, Meerut.
3. Laboratory manual for Physics Course by B.P. Khandelwal.
4. Practical Physics by M. Arul Thakpathi by Comptex Publishers.
5. B.Sc. practical physics – Subbi Reddy.

Skill Enhancement Course- I
II Year (Common to all Science Courses)
SEMESTER – III

FUNDAMENTALS OF NANO TECHNOLOGY

UNIT I:

1. **Background to Nanotechnology:**
   Scientific revolution, molecular and atomic size, emergence of Nanotechnology, Challenges in Nanotechnology, Carbon age :(new forms of carbon graphene sheet to CNT)

2. **Nucleation:**
   Macroscopic to microscopic crystals and nanocrystals, large surface to volume ratio, top-down and bottom-up approaches, self-assembly process, grain boundary volume in nanocrystals, defects in nanocrystals, surface effects on the properties.

UNIT- II:

3. **Nano materials and properties:**
   Types of Nanostructures, one dimensional (ID), two dimensional (2D), three dimensional (3D) Nanostructured materials, Quantum dots, Quantum wire, Quantum sheet structures. Carbon nanotubes (CNT), Metals (Au, Ag), Metal oxides (TiO2, Zno), semiconductors (Si, Ge, CdS, ZnSe), Ceramics and composites, Biological system, DNA, RNA, Lipids, Size dependent properties, mechanical, physical and chemical properties.

4. **Applications of Nanomaterials:**
   Molecular electronics and nano electronics, Quantum electronic devices, CNT based transistor and Field emission Display, biological applications, Biochemical sensor, Membrane based water purification.

Reference books:

1. Nanotechnology: Basic science and emerging technologies, M.Wilson, K.Kannangara, G. Smith, Overseas Press India PVT.LTD,NEW DELHI:
2. The chemistry of Nanomaterials: Synthesis, properties & applications. C.N.R.Rao, A.Muller, Wiley
3. Nano structures and Nano materials: Synthesis, properties and applications by Guozhong Cao, Imperial College press.
4. Hari Singh Nalwa, Handbook of nanostructured materials &nanotechnology optical properties.
5. Nano fabrication towards biomedical applications, C.S.S.R.Kumar, Wiley-VCH Verlag GmbH & Co, Weinheim.