SEMESTER – IV

SUBJECT CODE : PHYSICS (PHYS)

FULL MARKS: 35 **CONTACT HOURS: 60 HOURS**

COURSE CODE : THEORY

UNIT No.	TOPICS	CONTACT HOURS	MARKS
6	**OPTICS** **SUB TOPICS : RAY OPTICS AND OPTCAL INSTRUMENTS** Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and its applications, optical fibers. Refraction at spherical surfaces, lenses, thin lens formula. Lens -Maker's Formula. Displacement method to find the position of image (conjugate points), magnification power of a lens. Combination of thin lenses in contact, combination of lens and mirrors. Refraction and dispersion of light through a Prism. Scattering of light - blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) only qualitative Ideas. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. **SUB TOPICS : WAVE OPTICS** Wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using Huygens' principle. Interference: interference of monochromatic light by double slits –Young's experiment, conditions for sustained interference of light - coherent sources, condition of maxima and minima in the term of path difference and phase difference, expression for the fringe width. Diffraction: Fraunhoffer's diffraction due to single slit, width of central maximum. Resolving power of microscope and astronomical telescope. Polarization, plane polarized light. Brewster's law, uses of plane polarized light and polaroid.	25	14
7	**DUAL NATURE OF RADIATION AND MATTER** Dual nature of radiation. Photoelectric effect. Hertz and Lenard's observations, Einstein's Photoelectric equation - particle nature of light. Matter waves - wave nature of particles, de Broglie relation and its simple applications.	7	4

UNIT No.	TOPICS	CONTACT HOURS	MARKS
8	**ATOMS AND NUCLEI** **SUB TOPICS: ATOMS** Alpha - particle scattering experiment, Rutherford's model of atom, Bohr model of hydrogen like atoms, energy levels, hydrogen spectrum. Elementary theory of X -ray production, continuous and characteristic X-ray(their origin and properties only),Moseley's law. **SUB TOPICS : NUCLEI** Composition and size of nucleus, atomic mass, isotope, isobar, isotone. Radioactivity: alpha, beta and gamma particles / rays and their properties, radioactive decay law. Mass - energy relation, mass defect, binding energy per nucleon and its variation with mass number, Nuclear fission and fusion.	10	6
9	**ELETRONIC DEVICES** Thermal emission of electrons and only the basic concepts of vacuum diode and triodes. Energy bands in solids: conductors, insulators and semiconductors (qualitative idea only) Intrinsic and extrinsic semiconductors, band diagram. P- N junction diode, forward and reverse bias, I - V characteristics of junction diode (nonlinear concept). Special type of diodes: LED, photodiode, solar cell and Zener diode with their characteristics. Zener diode as a voltage regulator. Junction transistor, npn and pnp transistor, transistor action, characteristics of a transistor, transistor as an amplifier (common emitter configuration). Transistor as a switch. Elementary idea of analogue and digital signals. Concepts of decimal and binary numbers. Logic gates : OR,AND,NOT,NAND,NOR (Symbols, input, output Boolean equations, truth table, qualitative explanation). Simple cases of combination of gates.	15	8
10	**COMMUNICATION SYSTEM** Elements of a communication system (Block diagram only), concepts of amplitude and frequency modulation. Band width of signals (speech, TV and digital data). Band width of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky wave and space wave propagation (qualitative idea only).	5	3

FOR SEMESTER IV

- **CONTACT HOURS FOR THEORY PART – 60 HOURS**
- **CONTACT HOURS FOR PRACTICAL PART – 20 HOURS**
- **CONTACT HOURS FOR REMEDIAL CLASSES AND TUTORIAL – 10 HOURS**

SO TOTAL CONTACT HOURS FOR 4TH SEMESTER IS 90 HOURS.