

# SYLLABUS

## JEE Main

### ELECTROMAGNETIC WAVES

Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves.

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, g- rays). Applications of e.m. waves.

### OPTICS

Reflection and refraction of light at plane and spherical surfaces, Mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens formula, Magnification, Power of a lens, Combination of thin lenses in contact, Microscope and astronomical telescope (reflecting and refracting) and their magnifying powers.

### WAVE OPTICS

Wave front and Huygens' principle, Laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes, Polarisation, Plane polarized light; Brewster's law, uses of plane polarized light and polaroids.

### DUAL NATURE OF MATTER AND RADIATION

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation; Particle nature of light. Matter waves-wave nature of particle, de-Broglie relation. Davisson-Germer experiment.

## ATOMS AND NUCLEI

$\alpha$ -particle scattering experiment; Rutherford's model of atom; Bohr model, Energy levels, Hydrogen spectrum. Composition and size of nucleus, Atomic masses, Isotopes, Isobars; Isotones. 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.

## ELECTRONIC DEVICES

Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; Diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction Transistor, transistor action, Characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR), Transistor as a switch.

## COMMUNICATION SYSTEMS

Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and frequency modulation, Bandwidth of signals, Bandwidth of transmission medium, Basic elements of a communication system (block diagram only).