Syllabus (W.E.F. 2022-23)

ENGINEERING PHYSICS-I (KAS-101)

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Unit – I: Relativistic Mechanics:

Frame of reference, Inertial & non-inertial frames, Galilean Transformations, Michelson- Morley experiment, Postulates of special theory of relativity, Lorentz transformation equations, Length contraction & Time dilation, Velocity addition theorem, Variation of mass with velocity, Einstein's Mass energy relation, Relativistic relation between energy and momentum, Massless particles. 06 Hrs.

Unit - II: Wave Optics

Interference: Coherent Sources, Interference in uniform and wedge shaped thin film, Necessity of extended sources, Newton's rings and its application.

Diffraction -Fraunhoffer diffraction at Single, Double & N- Slit, Diffraction grating, Grating spectra, Dispersive power, Resolving power of grating, Rayleigh's criterion of resolution. 10 Hrs.

Unit - III: Polarization and Laser

Polarization- Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptically polarized light, Fresnel's theory of optical activity, Polarimeters.

Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Einstein's Coefficients, Population Inversion, various level of laser, Ruby, He-Ne lasers and laser applications. 08 Hrs.

Unit – IV: Fibre Optics and Holography

Fibre Optics: Introduction to fibre Optics, Acceptance angle and cone, Numerical aperture, normalized frequency, Classification of fibres, Propagation mechanism and communication in optical fibre. Attenuation and Dispersion in an optical fibre.

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography. 06 Hrs.

Reference Books:

1. Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill)
2. Introduction to Special theory of Relativity - Robert Resnick - Wiely
3. Optics - Ajoy Ghatak (TMH) Brijlal & Subramanian (S.Chand)
4. Fundamental of Physics - Resnick, Halliday & Walker (Wiely)

Course Outtcomes:

1. To understand theory of relativity
2. To study the basics of Physical Optics and Fibre optics
3. To know holography.

ENGINEERING PHYSICS-II (KAS-202) **L T P**
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Unit – I: Quantum Mechanics and X-ray Diffraction

Black body radiation, Stefan's law, Wein's law, Rayleigh-Jean's law, Planck's Law, Wave- particle duality of radiation, De-Broglie concept of matter waves, Phase and Group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation and its application – particle in one dimensional box. X-rays: Diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect.

10 Hrs. **Unit – II: Electromagnetic Field Theory**

Continuity equation for current density, Displacement Current, Modifying Equation for curl of Magnetic field to satisfy continuity equation, Maxwell's Equations in vacuum and non-conducting medium, Energy in an electromagnetic field Poynting vecor and Poynting theorem, Plane electromagnetic waves in vacuum nad their transverse nature, Relation between electric and magnetic fields of an electromagnetic wave, Energy and momentum carried by electromagnetic waves, Resultant pressure, skin depth. 06 Hrs.

Unit-III: Dielectric and Magnetic Properties of Materials:

Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability), Equation of internal fields in liquid and solid (One- Dimensional), Claussius Mussoti- Equation, Ferro and Piezo electricity (Qualitative), Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material, Langevin's theory for dia and paramagnetic material, Phenomena of hysteresis and its applications.

Ultrasonic: Generation, detection and application of ultrasonics 08 Hrs.

Unit-IV: Superconductivity and Science and Technology of Nanomaterials:

Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors. Characteristics of superconductors in superconducting state, Applications of Superconductors.

Introduction to Nanomaterials- Basic principles of nanoscience and technology, creation and uses of buckyballs, structure, properties and uses of Carbon nanotubes, Applications of nanotechnology. 06 Hrs

Reference books: 1- Concept of Modern Physics - by Aurther Beiser (Tata Mc-Graw Hill)
2- Solid State Physics - by C. Kittel, 7th edition (Wiley Eastern)
3- Materials Science and - by V. Raghavan (Prentice- Hall India) Engineering

Course Outcomes:

1. To solve the classical and wave mechanics problems.
2. To formulate the problems related to electromagnetic field theory
3. To understand basics of dielectrics, magnetic properties and ultrasonics.

To understand basics of superconductivity and nanotechnology.