Model Questions

Subject : Engineering Physics (BE-201)

Unit-1 (Quantum Physics)

Q.1 Explain the term Phase and particle velocity in context with De Broglie's hypothesis. Prove that for a relativistic and non- relativistic particle, phase velocity is not equal to particle velocity.

Q.2 What is Compton effect? Explaining the Compton shift expression, discuss the various possibilities of X-ray scattering.

Q.3 State and prove Heisenberg uncertainty Principle.

Q.4 Obtain the expression of energy levels and wave function for a particle trapped in one dimensional square with infinitely deep potential well and also derive the formula for eigen function.

Unit-I1 (Wave Optics)

Q.1 Explain the formation of interference fringes by means of Fresnel's biprism when a monochromatic source of light is used and derive an expression for width.

Q.2 Describe and explain the formation of Newton's rings in reflected monochromatic light. Explain why Newton's rings are circular? How wavelength of given monochromatic light is calculated.

Q.3 What is plan transmission grating? How it is used to find the wavelength of light?

Q.4 Explain Rayleigh criterion of resolving power of optical instrument. Derive the expression for resolving power of grating.

Q.5 Explain working and construction of Nicole prism. Discuss how it is acting as polarizer and analyser?

Unit-II1 (Nuclear Physics)

Q.1 Describe construction and working of cyclotron. What are its limitations. Show that the numbers of revolution particle takes inside the cyclotron is proportional to the square root of the radius of the Dees.

Q.2 Describe the working and construction of Geiger Mullar (GM) counter.

Q.3 What is mass spectrograph? Describe the construction of Aston's mass spectrograph with necessary theory. Show that it can be used in detection of isotopes.

Q.4 Mention sailent features of liquid drop model and explain the various terms given in Bethe – Weizsacker semi – empirical mass formula.

Q.5 Discuss construction and working of Betatron.

Unit-IV (Solid State Physics)

Q.1 Define effective mass (m^*) and prove that the effective mass of an electron is given by

$$m^* = \hbar^2 / \left(d^2E/dK^2\right)$$

And explain its physical significance.

Q.2 What is Hall effect? Show that Hall coefficient is independent of the applied magnetic field and is inversely proportional to current density and electronic charge.

Q.3 Explain constructional working, with the help of I – V characteristics of Zener diode or tunnel diode.

Q.4 Explain the Fermi energy level in solids. And prove that in intrinsic semiconductors the Fermi energy levels lies at the middle of band gap.

Q.5 What is superconductivity? Discuss type-I and types-II superconductors.

Unit-V (Laser and Fiber Optics)

Q.1 What is spontaneous and stimulated emission? Explain Einstein' s coefficient and derive relationship between them.

Q.2 Discuss working and construction of Ruby or CO_2 Laser with the help of necessary diagram.

Q.3 Discuss construction and working of He-Ne laser.

Q.3 What are optical Fiber? Explain how glass fiber guides light from one end to other. Define acceptance angle and numerical aperture.

Q.4 Differentiate the step index and graded index optical fiber.

Q.5 Write a short note on different mechanism in optical fiber.