Exam. Code: 0905
Sub. Code: 6825

1079
B. Engg. (1st Year)-1st Semester
AS-102: Physics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt five questions in all, selecting atleast two questions from each Section.*

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Section-A

Q. 1 (a) What is a plane polarized light? Explain how the phenomenon of double refraction can be used to produce a plane polarized light. (5)

(b) Differentiate between 'spontaneous emission' and 'stimulated emission' of radiation. Obtain a relation between transition probabilities of the two. Using this ratio, show why normal optical sources are highly incoherent. (5)

Q. 2 (a) Discuss various kinds of dispersion and attenuation losses observed during propagation of signal through optical fiber. (5)

(b) Find the core radius required for single mode operation at 820 nm of a step index fiber, which has a core refractive index of 1.48 and cladding refractive index of 1.476. (2)

(c) State some of the applications of holography. What are the requirements to get a good hologram? (3)

Q.3 (a) Explain the black body radiation spectrum. Give an account of the various attempts made through various laws to explain the spectrum. (6)

(b) Find the de broglie wavelength of an electron accelerated through a potential difference of 200 volts. (2)

(c) Show that electrons cannot exist within the nucleus on the basis of Heisenberg uncertainity principle. (2)

Q. 4 (a) Derive time independent and time dependent Schrodinger equation. (5)

(b) Using Schrodinger's equation. show that energy of a particle in 1-D potential well of infinite height is quantized. Also obtain the normalized eigen function for the particle. (5)

Section B

Q. 5 (a) Deduce Bragg's law of X-ray diffraction in crystals. Discuss and explain how can it be used in the study of crystal structure determination? (5)

(b) Explain the various types of point defects in a crystal. (5)

Q. 6 (a) Explain the variation of electrical resistivity with temperature. Hence explain Matthiessen's rule. (5)

(b) What is Hall Effect? Give an elementary theory of Hall Effect. Mention the important uses of Hall Effect. (5)

Q. 7 (a) What is meant by local field in a dielectric and how it is calculated for a cubic structure. Deduce the Clausius Mosotti relation. (6)

(b) Explain Piezoelectric Effect. Give some of the important applications of the piezoelectrics. (4)

Q. 8 (a) What are ferromagnetic materials? Discuss the domain theory to explain the ferromagnetism. (5)

(b) Give an account of Langevin's theory of paramagnetism and point out its limitation. Discuss Weiss modification to explain spontaneous magnetization in ferromagnetic substances. (5)

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