

FACULTY OF ENGINEERING & INFORMATICS
B.E. I Year (Common to All Branches) Examination, January 2012
ENGINEERING PHYSICS (Old)

Time: 3 Hours]

[Max. Marks:75

Note : Answer all questions from Part A. Answer any five questions from Part B.

PART – A**(25 Marks)**

1. Design a double-slit system in which the central maximum of the envelop of the double slit Fraunhofer pattern contain only eleven fringes. 2
2. A beam of linearly polarized light of wavelength 6000 Å is changed in to circularly polarized light by passing it through a slice of 0.003 cm thick. Calculate the difference in refractive indices of the two (O-and e-ray) rays in the crystal. 2
3. A nuclear particle decays on average about 0. 1ns after it is created. Its rest energy is 1672 MeV. Estimate the fractional uncertainty in the particles rest energy. 3
4. Relative to the laboratory, a proton moves to the right with a speed of $(4/5)c$, while relative to the proton an electron moves to the left with a speed of $(5/7)c$. What is the speed of electron relative to the lab ? 3
5. In a given dielectric medium the phase velocity is given by 2
 - a) $1/\sqrt{\mu_r \epsilon_r}$
 - b) $\sqrt{\mu_r \epsilon_r}$
 - c) $C/\sqrt{\mu_r \epsilon_r}$
 - d) $\sqrt{\mu_r \epsilon_r} / C$
6. Find the Miller indices of a set of parallel planes. Which make equal intercepts on the three axes. 3
7. The intrinsic carrier density at 300K in silicon is $1.5 \times 10^{16}/m^3$. If the electron and hole mobilities are 0.13 and 0.05 $m^2V^{-1}s^{-1}$ repectively. Calculate the conductivity of intrinsic silicon. 2
8. Draw the neat diagram of Bragg's spectrometer and explain its principle. 3
9. What is magnetic Hysterisis ? How it is used to explain the nature of different magnetic materials. 2

10. Calculate the induced dipole moment per unit volume of helium gas when it is placed in a field of 6×10^5 V/m. The atomic polarizability of helium is 0.18×10^{-40} FM² and the concentration of helium atom is $2.6 \times 10^{25}/\text{m}^3$.

3

PART – B

(5×10=50 Marks)

11. a) Explain how light is propagated through multi mode step and graded index fibres. 4
 b) Explain the terms critical angle, Acceptance angle and Numerical aperture. Obtain the expression for Acceptance angle and numerical aperture for an optical fibre. 6
12. a) Explain how Entropy and Thermodynamical probability are related ? 3
 b) Define the nature of particles which obey the Maxwell – Boltzmann statistics. 2
 c) Obtain the Maxwell – Boltzmann distribution function. 5
13. a) Define Schottky and Frenkel defects. 2
 b) Obtain an expression for the equilibrium concentration of Frenkel defects. 5
 c) Explain the classification of solids in to conductors, insulators and semi-conductors on the basis of band theory of solids. 3
14. a) Explain how conductivity of intrinsic and extrinsic semi conductors vary with temperature. 4
 b) Discuss the Mass Bauer spectroscopic technique used for the analysis of materials. 4
 c) Explain the construction of Solar cell. 2
15. a) Describe the experiment to determine the dielectric constant of materials. 4
 b) Distinguish between hard and soft magnetic materials. 4
 c) Write few applications of super conductors. 2
16. a) Explain qualitatively diffraction pattern observed with single slit, double slit and diffraction grating. 4
 b) Using Schrodinger wave equation, discuss the nature of particles moving across the potential step. 6
17. Write short notes on :
 a) Crystal systems and bravais lattice 4
 b) LED 4
 c) Meissner effect. 2