

FACULTY OF ENGINEERING & INFORMATICS**B.E, I—Year (Common to all Branches) (Main) Examination, June 2013****Subject: Engineering Physics****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. What are the basic principles of Holography? (2)
2. If the diameter of two consecutive Newton's rings in reflected light of wave length 5890 \AA are 2.0 and 2.02 cms respectively. Calculate the radius of curvature of the lens. (2)
3. Obtain Rayleigh-Jeans law and Wein's law from Planck's law. (2)
4. Define pointing vector. (2)
5. Calculate the packing fraction for SC, BCC and FCC crystals. (3)
6. The intrinsic carrier density at 300 K in silicon is $1.62 \times 10^{16}/\text{m}^3$. If the electron and hole mobilities are 0.13 and $0.06 \text{ m}^2/\text{V}\cdot\text{s}$ respectively. Calculate the conductivity of intrinsic silicon. (3)
7. Distinguish hard and soft magnetic materials. (2)
8. Distinction between bulk, thin films and nano materials. (3)
9. What are type II superconductors? Explain their importance. (3)
10. What is sputtering? Explain the advantages of sputtering deposition. (3)

PART B (50 Marks)

- 11.(a) Describe Fraunhofer diffraction of light due to single slit and explain maxima and minima conditions and derive the expression for resultant intensity. (6)
- (b) Explain the working of He-Ne laser with the help of neat diagram by giving energy level transitions. (4)
- 12.(a) Derive the expression for Planck's law of radiation by considering the Bose-Einstein distribution function. (5)
- (b) Derive an expression for the velocity of propagation of a plane e.m. wave in homogeneous, isotropic dielectric medium by using Maxwell's equations. (5)
- 13.(a) Explain the salient features of Kronig-Penny model and its conclusions for formation of energy bands in solids. (6)
- (b) State and explain the Miller Indices. (4)
- 14.(a) What are dielectrics? Explain different types of electric polarization mechanisms contributing to the total polarization of dielectric materials. (6)
- (b) What is superconductivity? Describe the preparation of high T_c superconductors. (4)
- 15.(a) Explain the construction and working of TEM-transmission electron microscope. (6)
- (b) Describe the chemical vapour deposition (CVD) method for preparation of thin films. (4)
- 16.(a) Explain the preparation of nano materials by sol-gel method. (5)
- (b) What is the principle of X-ray fluorescence and mention its applications? (5)
- 17.(a) Describe the powder diffraction experimental method for determination of "interplanar spacing" of a crystal. (5)
- (b) What are ferrites? Explain its spinel and inverse spinel structure. (5)