Code No. : 3314/N

FACULTY OF ENGINEERING & INFORMATICS

B.E. I Year (New) (Common to all Branches) (Main) Examination, June 2011

ENGINEERING PHYSICS

Time : 3 Hours] **[Max. Marks : 75**

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

PART – A (Marks : 25)

1. A soap film (n = 1.33) in air is 320 nm thick. If it is illuminated with white light at normal incidence, what colour will it appear to be in reflected light ? **3**

2. Two Nicols have parallel polarizing directions so that the intensity of transmitted light is maximum. Through what angle must either Nicol be turned if intensity is to drop by one-fourth of its maximum value ? **2**

3. Compare and contrast between Bose-Einstein and Fermi-Dirac Statistics. **3**

4. Calculate the value of poynting vector at the surface of the sun if the power radiated by the sun is 3.8×10^{26} W and its radius is 7×10^{8} m. **2**

5. The first order diffraction is found to occur at a glancing angle of 9°. Calculate the wavelength of X-rays and the glancing angle for second order diffraction if the spacing between the adjacent planes is 2.51Å. **3**

6. For an intrinsic semiconductor having band gap $E_g = 0.7$ eV, calculate the density of holes and electrons at room temperature (27 °C). Given $K = 1.38 \times 10^{-23}$ j/K and $h = 6.62 \times 10^{-34}$ J. **3**

7. Draw the nature of magnetic dipole moments and variation of susceptibility with temperature graphs in ferro-ferri-and anti-ferromagnetic materials. **3**

8. Explain the isotopic effect in superconductors. **2**

9. Write few applications of nano materials. **2**

10. Explain how X-diffraction is used in charactering the nano materials. **2**

PART – B (Marks : 50)

11. (a) Obtain an expression for the Intensity of diffraction pattern in case of Fraunhofer diffraction at single slit, and obtain the condition for minima of different orders. **8**

    (b) Explain the construction of quarterwave plate. **2**

12. (a) Discuss the properties of wavefunction. 2
    (b) Using Schrödinger time independent wave equation, discuss the nature of a particle moving across the potential barrier and define quantum tunnelling. 8

13. (a) Discuss the free electron theory of metals. 5
    (b) Explain, how, Kronig-Penny model of solids lead to energy band formation. 5

14. (a) Explain the phenomenon of ferroelectricity and discuss how dielectric constant of Barium titanate changes as its temperature is decreased. 7
    (b) Write few applications of ferroelectrics. 3

15. (a) What are thin films ? Describe the chemical vapour deposition method of preparation of thin films. 5
    (b) Write a note on solar-cells. 5

16. (a) Explain the construction and working of Ruby-laser. 5
    (b) Using Bose-Einstein distribution law obtain the Planck's law of black-body radiation. 5

17. Write a note on :
    (a) Concept of fermi level in semiconductors. 2
    (b) Type I and Type II superconductors. 4
    (c) TEM. 4