



Code No. **5004/N**

**FACULTY OF ENGINEERING AND INFORMATICS**  
**B.E. I Year (New) Common to all Brinches (Suppl.)**  
**Examination, January 2012**  
**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. How many orders will be observed by a grating having 4000 lines per cm if it is illuminated by visible light in the range 4000 Å and 7000 Å . 3
  
2. Match the following : 2

| I                                       | II                                                                  |
|-----------------------------------------|---------------------------------------------------------------------|
| 1) The inner most part of optical fibre | (a) Refractive index of core increases towards the axis of the core |
| 2) In Graded index fibre                | (b) Interference                                                    |
| 3) Laser beam is made of                | (c) Core                                                            |
| 4) Hologram is related to               | (d) Highly coherent photons                                         |
|                                         | (e) Electrons                                                       |
|                                         | (f) Non-uniform refractive index                                    |

**A) 1 - b, 2 - a, 3 - d, 4 - c**      **B) 1 - c, 2 - a, 3 - d, 4 - b**  
**C) 1 - d, 2 - c, 3 - a, 4 - f**      **D) 1 - b, 2 - c, 3 - d, 4 - e**
  
3. The energy of an electron contained to move in a one-dimensional box of length 4.0 Å is  $9.664 \times 10^{-17}$  J. Find out the order of excited state. 2
  
4. What is displacement current ? Explain. 2
  
5. i) The Miller indices of a set of parallel planes which make equal intercepts on the three axes are 1

a) (121)      b) (111)      c) (100)      d) (101)
  
- ii) In a simple cubic lattice the ratio of  $d_{100} : d_{110} : d_{111}$  is 2

a)  $\sqrt{6} : \sqrt{2} : 1$       b)  $1 : \sqrt{2} : \sqrt{3}$       c)  $1 : \sqrt{2} : \sqrt{3}$       d)  $6 : 3 : 1$


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6. Mobilities of electrons and holes in a sample of intrinsic Ge at 300 K are  $0.36 \text{ m}^2 \text{ V}^{-1} \text{ S}^{-1}$  and  $6.17 \text{ m}^2 \text{ V}^{-1} \text{ S}^{-1}$  respectively. If the resistivity of the specimen is  $2.12 \text{ } \Omega \cdot \text{m}$ , compute the intrinsic concentration of carriers for Ge.  
Where  $m_e = 0.5 m_0$  and  $m_h = 0.37 m_0$  **3**
7. Draw the crystal structure of Barium titanate above 393 K and explain how its structure and polarization changes with decreasing temperature. **3**
8. Define the terms critical temperature, critical magnetic field and critical current. **3**
9. What are carbon nano tubes ? Explain. **2**
10. Explain the basic principle used in atomic force microscopes. **2**

### PART B

(5x10=50 Marks)

11. What is optical activity ? Explain construction and working of Larentz's half shade polarimeter. **10**
12. a) Explain what is phase-space. **(2+2+6)**  
 b) Distinguish between Bosons and fermions. Obtain the expression for Fermi-Dirac distribution law.
13. a) Show that among SC, B.C.C. and FCC, FCC has closed packed structure. **5**  
 b) Obtain an expression for the concentration of Schottky defects in an ionic crystals. **5**
14. a) What are dielectrics ? Explain Various electrical polarization mechanism. **6**  
 b) Distinguish between soft and hard magnetic materials. **4**
15. a) Distinguish between bulk, thin film and nano-scale materials. **3**  
 b) Explain the thermal evaporation method of depositing thin films. **7**
16. a) Describe the classification of optical fibres.  
 b) Write down the Maxwells equations and deduce an expression for the velocity of propagation of a plane electro magnetic wave in homogeneous, isotropic dielectric medium. **6**
17. Write a note on :  
 a) LED. **5**  
 b) High temperature super conductors. **5**