

**upload your college symposium/conference  
details,function photos,videos in  
www.technicalsymposium.com**

**S 9266**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Second Semester

Electronics and Communication Engineering

PH 135 — MATERIAL SCIENCE

(Common to Metallurgical Engineering and Bio-Medical Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between crystalline and non-crystalline materials.
2. For silver, lattice constant ' $a$ ' = 4.09 Å . First order diffraction takes place at  $19^{\circ}12'$  for (111) plane. Calculate the wavelength of X-rays.
3. In transmission lines, ACSR cables are used what are its advantages over copper cables?
4. What is the main conclusion from Meissner effect related to super conductivity?
5. Mention two compound semiconductors and their two important properties.
6. Draw the graphs regarding the variation of fermi level with carrier concentration with temperature in  $n$ -type semiconductor.
7. Mention four special features of domain theory of ferromagnetism.
8. Mention two active dielectrics and two passive dielectrics along with their applications.
9. Metals are good reflectors of light. Why?
10. Give the principle of thermography.

**upload your college symposium/conference  
details,function photos,videos in  
www.technicalsymposium.com**

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are Miller indices? Give their importance in crystallography?  
(ii) Draw three important planes along with their Miller indices for a simple cubic crystal.  
(iii) How do you identify the Miller indices for a given plane? (3 + 6 + 7)

Or

- (b) (i) What are symmetry elements? Write down the symmetry elements corresponding to cubic crystals.  
(ii) Derive the expressions for packing factor for SC, BCC and FCC crystals.  
(iii) What are point defects? Give their importance in semiconductor technology. (6 + 6 + 4)
12. (a) (i) What are density states? Derive an expression for Fermi energy of a metal at OK.  
(ii) Explain the concept of hole and effective mass of electron. (10 + 6)

Or

- (b) (i) Explain four high resistivity alloys along with their composition and applications.  
(ii) Explain the magnetic levitation and Josephson effect and their applications related to superconductivity. (10 + 6)
13. (a) (i) Derive an expression the electrical conductivity of an intrinsic semiconductor using density of states.  
(ii) Intrinsic semiconductors are not very useful. Why? (13 + 3)

Or

- (b) (i) Give an account on the carrier concentration in *n*-type and *p*-type semiconductors and discuss its variation with the rise of temperature.  
(ii) How will you determine the mobility of a charge carrier using Hall effect?  
(iii) Discuss the operating temperature limits on the impurity semiconductors. (5 + 8 + 3)

**upload your college symposium/conference  
details,function photos,videos in  
www.technicalsymposium.com**

14. (a) (i) Define energy product of a magnetic material.  
(ii) Distinguish between ferri, ferro and antiferro-magnetic materials.  
(iii) What are ferrites? Mention two important ferrites along with their applications. (3 + 9 + 4)

Or

- (b) (i) Give an account on metallic glasses as transformer core materials.  
(ii) Deduce an expression for local field in a dielectric having cubical structure. Hence deduce Clausius-Mosotti equation. (4 + 12)
15. (a) (i) Distinguish between phosphorescence and fluorescence.  
(ii) Explain the importance of excitons, traps and colour centres in non-metallic crystals.  
(iii) Give an account on photoconductivity. (4 + 9 + 3)

Or

- (b) (i) Describe the working of LED using  $p-n$  junction.  
(ii) Describe the construction of LED.  
(iii) Distinguish between LED display and LC display. (6 + 6 + 4)

**upload your college symposium/conference  
details,function photos,videos in  
www.technicalsymposium.com**