



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS
SIXTH SEMESTER – NOVEMBER 2016
PH 6612 – SOLID STATE PHYSICS
(FROM 12-BATCH)

Date: 15-11-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer all questions. All questions carry equal marks.

(10 X 2 = 20 marks)

1. Sketch the planes (101), (111).
2. Define Miller Indices. State its two significant features.
3. List the materials that can be studied using powder crystal method.
4. Explain Bragg's law.
5. State any two assumptions of classical theory with regard to specific heat of solids.
6. Define specific heat and molar heat capacity.
7. Write the Lorenz number.
8. Define density of energy states.
9. What is Meissner Effect?
10. List the properties of superconductors.

PART – B

Answer any FOUR questions

(4 x 7.5 = 30 marks)

11. Show that the atomic packing factor for FCC and HCP metals are the same. (7.5)
12. Explain crystal imperfections and classify them in the order of their geometry. (7.5)
13. Discuss neutron diffraction method of investigating the structure of a crystal. Mention few of its advantages. (7.5)
14. Explain the concept of thermal expansion in crystals. (7.5)
15. Derive the relation between electrical and thermal conductivity and hence arrive at Wiedemann Franz law. (7.5)
16. Give the salient features of BCS theory of superconductors. (7.5)

PART C

Answer any FOUR questions:

(4 x 12.5 = 50 marks)

17. Name the seven types of crystal systems and give the relation of length of axes and the relation of angles between the axes of a unit cell in each type. (2.5+10)
18. Explain the determination of crystal structure using Powder crystal method. (12.5)
19. Account for the variation of specific heat capacity of solids with temperature based on Einstein's theory. (12.5)
20. What is Hall Effect? Obtain an expression for the Hall coefficient and explain how it is used to determine the mobility of charge carriers. (12.5)
21. Explain the current-voltage characteristics exhibited by a metal-insulator superconducting junction. Explain DC Josephson effect. (2.5+10)
22. (a) Explain Type I and Type II superconductors.
- (b) Discuss briefly the potential applications of superconductors. (7+5.5)
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