LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION –**PHYSICS**

SIXTH SEMESTER – **APRIL 2018**

PH 6612– SOLID STATE PHYSICS

Date: 19-04-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART- A

Answer ALL questions: (10 X 2 =20 marks)

1. What is a primitive cell?
2. Give the co-ordination number and packing fraction of hcp structure.
3. What is crystal diffraction?
4. Write Laue equation in X-ray diffraction.
5. Write Gruneisen relation.
6. Define thermal conductivity.
7. What is Fermi energy?
8. State Widemann-Franz law.
9. Explain magnetic levitation.
10. What is a cooper pairs?

PART- B

Answer any FOUR questions: (4 X 7.5 =30 marks)

11. Determine the Miller indices of a plane. Which is parallel to X-axis and cuts intercepts of 2 and ½ along y-axis and z-axis respectively?
12. Establish Bragg's law for X-ray diffraction in crystals.
13. Discuss the classical theory of specific heat of solids.
14. With necessary theory, explain the Hall effect.
15. What is Meissner effect? Distinguish between type-I and type- II superconductor.
16. Discuss Langevin's theory of paramagnetism of free electrons.

PART – C

Answer any FOUR questions: (4 X 12.5 =50 marks)

17. With neat diagrams, discuss the 14 Bravais lattices of 7 crystal systems.
18. Explain how crystal structure is determined using powder crystal method. Discuss the merits and demerits.
19. Discuss the salient features of Debye's theory of specific heat and show how far it agrees with the experimental values.
20. Obtain an expression for electrical conductivity of metals based on Sommerfeld's model.
21. a) Explain DC Josephson effect in a superconductor.
    b) Write a short note on BCS theory of superconductivity.
22. Derive an expression for the specific heat of a solid based on Einstein model. Show that at low temperatures it decreases exponentially with decreasing temperature.

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