Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with A++ Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment - I
V Semester

Class : III B.Sc.,Physics **Time : 2 Hours**
Branch : Physics **Max. Marks : 60**

23BPHC08 Solid State Physics

Course Outcomes:

1. Distinguish between crystalline and amorphous solids.
2. Explain thermal, acoustic and optical properties of solids.
3. Explain symmetry elements, Bruilloin Zone and comment on elementary lattice dynamics.
4. Distinguish magnetic material with relevant theories.
5. Explain semiconductors based band theory.

Part A **6x1=6**

Choose the Correct Answer

1. Which of the following is a characteristics of amorphous solid? CO1K1
   a. A definite and characteristic enthalpy of fusion
   b. Melting at a sharp and characteristic temperature
   c. A definite characteristic geometrical shape
   d. Gradual softening over a range of temperature
2. Number of atoms in one unit cell of FCC crystal structure is CO1K1
   a. 1 b. 2 c. 4 d. 8
3. The volume of a primitive cell is given by CO1K1
   a. V= a.b.c b. V= |axbxc| c. V= |a.bc| d. V= |a.bxc|
4. In a lattice containing N atoms per primitice cell, the number of frequency bands are CO2K1
   a. N b. N-1 c. N+1 d. N/2
5. In case of a monoatomic one dimensional lattice, the range of k values for first Brillouin Zone is CO3K1
   a. $0 \le k \le \pi/a$ b. $0 \le k \le 2\pi/a$ c. $-\pi/a \le k \le \pi/a$ d. $-\pi/2a \le k \le \pi/$
6. In case of a diatomic (m<M) linear lattice, the ratio of amplitudes for acoustic branch is CO2K1
   a. 1 for K=+ $\pi/2a$ b. ∞ for K=0 c. 1 for K=0 d. 1 for K=+ $\pi/2a$

Part B **3 x 6 = 18**

Answer ALL questions
Each answer should not exceed 400 words or two pages

7a. Distinguish between a primitive unit cell and non primitive unit cell. CO1K1

(OR)

7b. Deduce the interplanar distance between two planes in a cubic lattice. CO1K3

8a. What do you mean by coordination number? Illustrate the coordination number for Simple cubic, body centered and face centrered cubes with neat diagrams. CO1K1

(OR)

8b. Draw (230) and (320) Miller planes. CO1K3

9a. Write the conservation laws for Bragg diffraction of X-ray photons(elastic scattering). CO2K1

(OR)

9b. What happens to different modes of vibrations if $M \rightarrow \infty$ (heavier mass) in case of diatomic lattice. CO2K1

Part C **3 x 12 = 36**

Answer ALL questions

Each answer should not exceed 800 words or four pages

10a. Discuss the fundamental types of Bravais Lattices with neat figures in three dimension. CO1K1

(OR)

10b. Analyse all the aspects SC, BCC and FCC cubic crystal structure with an emphasize to atomic packing factor. CO1K1

11.a. Derive the expression for atomic structure factor. Obtain Atomic structure factor for Simple cubic and Base centered cubic unit cells. CO2 K2

(OR)

11b. Calculate the Geometrical structure factor for BCC and FCC unit cells. CO2K3

12a. Discuss the vibrational modes of one dimensional lattice. CO3K2

(OR)

12b. Discuss the Debye model for specific heat capacity with respect to temperature. CO3K3