



Seat No. _____

HAK-XIX

B. Sc. / M. Sc. (Applied Physics) (Sem. V) (CBCS) Examination

May - 2023

Paper - XIX : Applied Condensed Matter Physics (New Course)

Time : $2\frac{1}{2}$ / Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Numbers in the right indicate marks.

1	(A)	Write Answers	4
	1.	Define: Unit Cell	
	2.	Draw: Cubic Crystal	
	3.	What do mean by Lattice Plane?	
	4.	Define : Diffraction in material science.	
	(B)	Write Answer : (any one)	2
	1.	Draw: NaCl structure	
	2.	Draw: CaCl Structure	
	(C)	Write Answer : (any one)	3
	1.	Explain: Miller Indices	
	2.	Write down Bragg ls Law	
	(D)	Write Answer (any one)	5
	1.	Explain: Powder. Method	
	2.	Explain: Laue` s Method	
2	(A)	Write Answers :	4
	1.	Define: Crystalline materials	
	2.	Define Defects	.
	3.	Define : Primitive Unit Cell	
	4.	What do you mean by plane defects?	

(B)	Write Answer : (any one)	2
1.	What are Line defects?	
2.	What are Schottky defects?	
(C)	Write Answer : (any one)	3
1.	What are Frankel defects?	
2.	What are color centers?	
(D)	Write Answer : (any one)	5
1.	Explain: Vacancy defects with necessary diagram.	
2.	Compare and contrast Schottky defects and Frankel defects in crystals:	
3	(A) Write Answers :	4
1.	What is approximate value of bandgap in the semiconductor?	
2.	Define: Valence band	
3.	Define: Conduction band	
4.	Define: Insulating material in the vicinity of bandgap.	
(B)	Write Answer : (any one)	2
1.	Explain: Origin of energy gap	
2.	Explain: Effective mass of electron	
(C)	Write Answer : (any one)	3
1.	Explain: Bloch Theorem	
2.	Differentiate: Metals and semiconductors in the vicinity of bandgap:	
(D)	Write Answer : (any one)	5
1.	Explain: Kronig-Penney model?	
2.	Explain: Experimental technique for studying the band structure.	
4	(A) Write Answers :	4
1.	Define: Superconductivity	
2.	Define: Para magnetism	
3.	What is T_c in superconductivity?	
4.	Draw : Hysteresis loop for magnetic material.	

(B) Write Answer : (any one) 2

1. What is critical magnetic field in the superconductivity?
2. Explain: Any two properties of superconductor.

(C) Write Answer : (any one) 3

1. Explain: Antiferromagnetism.
2. Explain: Ferrimagnetism.

(D) Write Answer : (any one) 5

1. Explain : Meissner effect.
2. Explain: Discovery of superconductivity- in details.

5 (A) Write Answers : 4

- 1 What do you mean by bandgap?
- 2 Define: Diamagnetism.
- 3 Define: list out name of material used as coolant in superconductivity.
- 4 List out name of rare earth elements.

(B) Write Answer : (any one) 2

- 1 Explain: How to find crystal structure using Brag' s Method
- 2 Draw: Lattice planes in cubic crystal.

(C) Write Answer : (any one) 3

- 1 Explain impact of defect on material.
- 2 Write down applications of Ferromagnetism.

(D) Write Answer : (any one) 5

- 1 Categorize material in the vicinity of band diagram with necessary diagram.
- 2 Explain: Various types of Superconductors.
