

PC-370-CV-19
M.Sc. (3rd Semester)
Examination, Dec.-2020
PHYSICS
Paper-III
CONDENSED MATTER PHYSICS-I

Time : Three Hours]

[Maximum Marks : 80
[Minimum Pass Marks : 29

नोट : दोनों खण्डों से निर्देशानुसार उत्तर दीजिए। प्रश्नों के अंक उनके दाहिनी ओर अंकित हैं।

Note : Answer from both the Sections as directed. The figures in the right-hand margin indicate marks.

Section-A

1. Answer the questions in Brief:

1x10=10

- (a) Define unit cells?
- (b) What do you mean by reciprocal lattice?
- (c) Define colour centres in ionic crystals?
- (d) What is screw dislocation?
- (e) What do you mean by Fermi-surface?
- (f) Write down the expression for effective mass?
- (g) Define susceptibility?
- (h) Define magnetoresistance phenomenon?
- (i) What do you mean by exchange interaction?
- (j) Define magnons.

2. Write short notes on any five of the following:-

2x5=10

- (a) Miller indices. (b) Burger vector. (c) Tight Bonding. (d) Bragg's law.
- (e) Neel Temperature. (f) Curie Weiss law. (g) Bloch's Well. (h) Effective Mass.

Section-B

15x4=60

Answer all question.

UNIT-I

3. What do you mean by Bravais lattice? Explain two and three dimensional Bravais lattice with diagram and examples.

OR

Define X-Ray diffraction and explain one method of investigation the structure of single crystal using X-Rays.

UNIT-II

4. What do understand by crystal Imperfections? Classify them by order of their geometry.

OR

What do you meant by dislocations? Obtain an expression for equilibrium concentration of vacancies at a given temperature in a metallic crystal?

UNIT-III

5. Describe the method of De-Hass van alphen effect for measuring the Fermi-surface in detail.

OR

Discuss the problem of an electron moving in periodic potential? Explain the occurrence of energy gap in semiconductor.

UNIT-IV

6. Explain Hiesenberg exchange interaction? How it explains ferromagnetism and obtain Bloch $T^{\frac{3}{2}}$ law?

OR

Explain two detail concepts of ferromagnetic domains and discuss how it is experimentally verified