PC-488

(524) M.Sc. PHYSICS (FOURTH SEMESTER)

Examination JUNE 2020

Compulsory/Optional

Group -

Paper - I

CONDENSED MATTER PHYSICS-II

Time:- Three Hours] Maximum Marks : 80

Minimum Passing Marks: 29

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

Note: Answer From Both the Section as Directed. The Figures in the right-hand margin indicate marks.

Section -A

1. Answer the following questions: - **1X10 = 10**

   (i) What is superconductivity?
   (ii) What is drift velocity?
   (iii) What do you mean by polarization.
   (iv) Who gave BCS theory
   (v) Write down the expression for the momentum of photon.
   (vi) Define ionic bond in crystal.
   (vii) What is persistent current.
   (viii) Application of Nano particle
   (ix) What do you mean by phase- transition.
   (x) Write down the properties of Ferro electric crystal.

2. Answer the following questions:- **2x5 = 10**

   (a) Define messier effect.
   (b) Explain ionic and covalent crystal.
   (c) What do you mean by acoustical mode of vibrations.
   (d) Write down the properties of nanostructure.
   (e) Explain first and second order phase transition.

Section -B

3. (a) Find an expression for London's equation. 10

   (b) Explain type I and type II superconductors 05

Or

What is Josephson's funnelling and also explain the theory of D.C. Josephson's effect and energy state. 15

4. Write down the Landau's theory of phase transition and discuss it. 15

Or

Explain dipolar, ionic and electronic polarizability and plot the inapt in polarizability and frequency indicating the contribution of three polarizability 15

5. Describe an expression for the density of electrons in the conduction band of an n-type semiconductor. What happens to the Fermi level as the temperatures increases?

Or

What do you mean by drift velocity and mobility of charge carriers? Discuss the current conduction in intrinsic and extrinsic semiconductors.

6. Discuss the vibration of diatomic lattice explain by graph.

Or

Explain the inelastic scattering of neutrons by phonons.