ED-603

M.Sc. 3rd Semester
Examination, March-April 2021

PHYSICS

Paper - III

Solid State Physics - I

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer **all** questions. All questions carry equal marks.

Unit-I

1. What is nearly free electron model ? Explain its consequences and also discuss origin of energy gap.

OR

Discuss Kronnig Penny Model of movement of electron in a periodic field of crystal lattice.

Unit-II

2. What is free electron gas ? Discuss reduced and periodic zone schemes near zone boundary.

OR

What is De Haas-Van Alphen effect ? How shape of Fermi surface is determined by this effect ?

Unit-III

3. Write notes on any **two** of the following :

(*a*) Optical and Acoustic modes

(*b*) Phonon momentum

(*c*) Inelastic neutron scattering by phonons

(*d*) Thermal resistivity of phonon gas

Unit-IV

4. Give the historical background of superconductivity. Explain the types of superconductivity and also discuss Meissner effect.

OR

What do you mean by Isotope effect ? Explain basic features of BCS theory and also define vortex state.

Unit-V

5. Why semiconductors are doped ? Give a suitable energy level diagram. Explain how doping by donors improve the conductivity of semiconductors.

OR

Write notes on the following :

(*a*) Thermal ionizations of Acceptors

(*b*) Thermoelectric effects

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