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Reg. No. : .....

Name : .....

Fourth Semester M.Sc. Degree Examination, June 2022

Physics

Special Paper II

PH 243 M : MATERIALS SCIENCE – II

(2020 Admission)

Time : 3 Hours Max. Marks : 75

PART – A

Answer any **five** questions. Each question carries **3** marks.

1. Give an account on the temperature effect of conductivity in metals.
2. Explain the role of polarization mechanism in materials.
3. What is ElectroIuminescence?
4. Explain Excitons.
5. What is Quantum dot?
6. Define Pauli susceptibility.
7. What is Colossal Magnetoresistance?
8. What is Fermi gas?

(5 × 3 = 15 Marks)

P.T.O.

PART – B

Answer **three** questions, each question carries **15** marks.

9. Explain in detail, the various factors affecting the conductivity of metals and alloys.

OR

10. Discuss Electrostriction, Piezoelectricity and Ferroelectricity.

11. Describe Transmission electron microscopy with necessary theory and diagram.

OR

12. Give an account of the optical properties of nanoparticles.

13. Explain single electron tunneling.

OR

14. Distinguish between MEMSs and NEMSs.

($3 \times 15 = 45$ Marks)

PART – C

Answer any **three** questions. Each question carries **5** marks.

15. Calculate the electrical conductivity of pure copper at

    (a) 400°C and

    (b) –100°C.

    Hint-The resistivity of copper at room temperature 1.67×10^{-6} ohm cm and the temperature resistivity coefficient is 0.0043 ohm /ohm “C)

16. Discuss the concept of potential well.

17. Explain Carbon nanotubes.

18. Give an account of Infrared detectors.

19. Briefly describe Fuel cells.

20. Suppose that the average displacement of the electrons relative to the nucleus in a copper atom is $I0^{-8}$ A when an electric field is imposed on a copper plate. Calculate the electronic Polarization (Hint : The lattice parameter of copper is 3.6151 A)

($3 \times 5 = 15$ Marks)

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