

Module-3

5. a) What is the hall effect? Obtain the expression for hall coefficient, and express hall voltage in terms of Hall coefficient [08 Marks] CO2 L2
- b) Describe the successes of quantum free electron theory. [07 Marks] CO2 L2
- c) Calculate the probability of an electron occupying an energy level 0.02eV above the Fermi level at 200k and 400k. [05 Marks] CO2 L3

OR

6. a) What is Fermi factor and explain the variation of Fermi factor with respect to temperature and energy. [08 Marks] CO2 L2
- b) Mention the expression of hole and electron concentration in a intrinsic semiconductor and derive the expression for Electrical conductivity of a semiconductor. [07 Marks] CO2 L1
- c) The Hall coefficient of a material is $-3.68 \times 10^{-5} \text{ m}^3/\text{C}$. What is the type of charge carriers? Also calculate the carrier concentration. [05 Marks] CO2 L3

Module-4

7. a) Define Liquefaction of gases. Describe Liquefaction of gases by cascade process [08 Marks] CO3 L1
- b) With neat diagram, explain the construction and working of Platinum resistance thermometer. Mention its advantages and disadvantages. [07 Marks] CO3 L2
- c) In Joule Thomson experiments Temperature changes from 100°C to 150°C for pressure change of 20 MPa to 170MPa . calculate Joule Thomson co-efficient. [05 Marks] CO3 L3

OR

8. a) Define Liquefaction of gases. Describe Liquefaction of oxygen gases by cascade process. [08 Marks] CO3 L1
- b) State Joule Thomson effect and Describe its theory with derivation of three cases. [07 Marks] CO3 L2
- c) A bubble of air is underwater at temperature 15°C and the pressure 1.5bar. If the bubble rises to the surface where the temperature is 25°C and the pressure is 1.0bar, Calculate the volume of the bubble? [05 Marks] CO3 L3

Module-5

9. a) Explain construction and working of SEM [08 Marks] CO4 L2
- b) Mention any three properties and any four applications of carbon nano tubes. [07 Marks] CO4 L2
- c) Explain experimental determination of young's modulus of the given materials by single cantilever method. [05 Marks] CO5 L3

OR

10. a) Explain construction and working of TEM [08 Marks] CO4 L2
- b) Describe classification composite materials based on reinforcement materials and matrix. [07 Marks] CO4 L2
- c) Explain experimental determination wavelength of laser source using grating method. [05 Marks] CO5 L3
