

PH 185- PHYSICS FOR COMMUNICATION ENGINEERING

(Regulations 2004)

Time: 3 Hour

Max.Mark: 100

Answer ALL Questions

Part A (10 X 2 = 20 Marks)

1. Define mobility of electrons.
2. Calculate the drift velocity of the free electrons in copper for an electric field strength of 0.5 V/m (mobility of the charge carriers = $3.5 \times 10^{-3} \text{ m}^2/(\text{V}\cdot\text{s})$).
3. Define minority carrier life time of the charge carriers.
4. What is Meissner effect?
5. Distinguish between ionic polarization and orientational polarization.
6. The difference in energy level between the conduction and the valence band is 0.4eV. Find the probability of escape per second of a trapped electron at room temperature. Given that $kT = 0.025 \text{ eV}$.
7. Mention the applications of ferrites.
8. A paramagnetic material has a magnetic field intensity of 10^4 A/m . If the susceptibility of the material at room temperature is 3.7×10^{-3} , calculate the magnetization and flux density in the material.
9. Define crystallization.
10. What is meant by hydrothermal growth of a crystal?

Part B (5 X 16 = 80 Marks)

11. Explain the various process steps involved in the following crystal growth techniques: (i) Czochralski method (ii) Chemical vapour deposition.
12. (a) What are the salient features of the free electron gas model? Obtain the Ohm's law based on it.
(OR)
(b) Derive an expression for the electrical conductivity of a metal. How is it affected by temperature?
13. (a) Explain Clausius-Mosotti relation in dielectrics subjected to static fields.
(OR)
(b) What is meant by absorption? Explain the phenomena of absorption of light in metals, insulators and semiconductors.
14. (a) Explain the classification of magnetic materials on the basis of electron spin.

(OR)

(b) Explain the quantum theory of paramagnetism.

15. (a) Derive a mathematical expression for the density of states.

(OR)

(b) Derive an expression for the electrical conductivity of a metal. How is it affected by temperature?