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Question Paper Code : 60049

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Second Semester

Electrical and Electronics Engineering

PH3202 — PHYSICS FOR ELECTRICAL ENGINEERING

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define dielectric breakdown phenomenon.
2. What are piezo and pyroelectric crystals?
3. Write the Fermi distribution function for electrons in a solid.
4. What are GMR devices?
5. Plot the Energy band diagram of direct and indirect band gap semiconductors.
6. Define Hall effect.
7. Mention the classification of optical materials
8. How does an excitonic state form?
9. Define quantum confinement.
10. How does a quantum well laser work?

PART B — ($5 \times 16 = 80$ marks)

11. (a) Obtain Langevin-Debye equation for the total polarization in a dielectric material (16)

Or

- (b) Obtain Lorentz internal field and derive the Clausius-Mossotti equation. (16)
12. (a) (i) Derive expressions for drift velocity and electrical conductivity for a conducting material kept in an electric field. (12)
- (ii) List the drawbacks of Classical Free Electron theory. (4)

Or

- (b) Explain the origin of Ferromagnetism and exchange interaction in magnetic materials. Discuss the M versus H behavior using domain theory. (16)
13. (a) Derive expressions for density of holes in an intrinsic semiconductor and from the results, obtain an expression for density of holes in a p-type semiconductor. (16)

Or

- (b) Write elaborate notes on Carrier transport (drift and diffusion of electrons and holes) in semiconductors. (16)
14. (a) Explain the construction and working of Light detector and solar cell (16)

Or

- (b) Explain the construction and working of LED and Laser Diode (16)
15. (a) Formulate expressions for density of states in quantum well, quantum wire and quantum dot structures. (16)

Or

- (b) Write elaborate notes on the properties and applications of Carbon nanotubes. (16)