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Question Paper Code : 41652

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

## Second Semester

## Electronics and Communication Engineering

PH 3254 – PHYSICS FOR ELECTRONICS ENGINEERING

(Common to Electronics and Telecommunication Engineering)

(Regulations 2021)

(Also Common to PTPH 3254 for B.E (Part –Time) – Second Semester– Electronics and Communication Engineering–Regulations 2023)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are basic lattice parameters?
2. Define coordination number. What is the coordination number for simple cubic (SC) system?
3. Define electrical conductivity of metals.
4. What is meant by tight binding approximation?
5. What are indirect bandgap semiconductors? Give any two examples.
6. With increase of temperature the conductivity of semiconductor increases while that of metals decreases. Give reasons.
7. Mention any two applications of LED.
8. Define plasmonics.
9. What is meant by tunneling?
10. List out any two applications of carbon nanotubes.

PART B — ( $5 \times 16 = 80$  marks)

11. (a) Describe the structure of a body centred cubic (BCC) system and face centred cubic (FCC) system. Also, calculate the atomic packing factor (APF) of body centred cubic (BCC) system and face centred cubic (FCC) system.

Or

- (b) (i) Give the procedure for finding Miller indices of crystal planes. (8)
- (ii) Explain the imperfections in crystals with neat diagram. (8)
12. (a) Derive an expression for the density of states and based on that calculate the carrier concentration in metals.

Or

- (b) Describe the differences between diamagnetic, paramagnetic and ferromagnetic materials.
13. (a) Derive an expression for density of electrons in the conduction band and also explain how the Fermi level varies with concentration of impurities in N-type semiconductors.

Or

- (b) (i) Give the theory of Hall Effect and obtain the expression for Hall coefficient. List out the applications of Hall effect. (12)
- (ii) Distinguish between Ohmic contacts and Schottky contacts. (4)
14. (a) Give a brief description of the optical processes that occur in semiconductors and quantum wells.

Or

- (b) Explain the principle and working of a (i) Solar cell and (ii) Laser diode with neat diagram. (7 + 9)

15. (a) Discuss in detail about quantum confinement and quantum structures in nanomaterials.

Or

- (b) (i) What is meant by single electron phenomena and describe the construction and working of single electron transistor with neat diagram. (12)
- (ii) What is Spintronic devices? List out any two applications of Spintronic devices. (4)
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