Reg. No. : E N G G T R E E . C O M

Question Paper Code : 51510

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 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-Physics for Electronics Engineering 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 is the packing factor of Simple Cubic (SC) and Body-Centered Cubic (BCC) crystal structure?

2. Define the terms wafer flats and notches.

3. The thermal conductivity of copper at 300 K is 470 W/m/K. Calculate the electrical conductivity. Given Lorentz number, $L = 2.45 \times 10^{-8} W\Omega K^{-2}$.

4. Elucidate the spin arrangement of Para and Ferro magnetic materials.

5. How does carrier transport in semiconductor different from metals?

6. The Hall co-efficient of a specimen of doped silicon is found to be 3.66×10^{-4} m^{-3}/C. The resistivity of the specimen is 8.93×10^{-3} Ωm. Find the mobility and density of charge carriers.

   Given : $R_H = 3.66 \times 10^{-4} m^{-3}/C$, $\rho_e = 8.93 \times 10^{-3} \Omega m$.

7. What are different types of Optical materials?

8. Mention the properties of the light detectors.

9. What is a quantum dot? How its colour can be changed?

10. What is spintronics? Mention its significance.

PART B — (5 × 16 = 80 marks)

11. (a) Write a short note on

(i) crystal system (4)

(ii) packing factor (4)

(iii) wafer surface orientation and (4)

(iv) diamond cubic structure (4)

Or

(b) Describe the steps to determine the miller indices and also mention its importance.

12. (a) Derive an expression for the density of energy states in a metal.

Or

(b) What is a GMR device? Describe the construction and working methods of GMR.

13. (a) Derive an expression for density of electrons in conduction band of an n–type semiconductor.

Or

(b) State and explain Hall effect. With necessary theory and diagram, derive the Hall coefficient of a semiconductor.

14. (a) Discuss the optical process in quantum well with necessary diagram.

Or

(b) Explain the principle and working of LED with a neat diagram and mention its advantages and disadvantages.

15. (a) Write a detailed note on quantum confinement and quantum structure.

Or

(b) Design a transistor in which the current flows from source to drain due to movement of only one electron at a time. Explain the conditions necessary for this single electron phenomenon and the working of the Single electron transistor.

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