

Reg. No. : 

--	--	--	--	--	--	--	--	--	--	--	--

## 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-Centred 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,  $L = 2.45 \times 10^{-8} \text{ W}\Omega\text{K}^{-2}$ .
4. Elucidate the spin arrangement of Para and Ferro magnetic materials.
5. How does carrier transport in semiconductor differ from metals?
6. The Hall coefficient of a specimen of doped silicon is found to be  $3.66 \times 10^{-4} \text{ m}^{-3}/\text{C}$ . The resistivity of the specimen is  $8.93 \times 10^{-3} \Omega\text{m}$ . Find the mobility and density of charge carriers.

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

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.