Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

## Question Paper Code : 21043

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Second Semester

Civil Engineering

PH 6251 – ENGINEERING PHYSICS – II

(Common to All branches)

(Regulations 2013)

Time : Three hours                                          Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State any two drawbacks of classical free electron theory.

2. Define density of states and state its importance.

3. Distinguish between elemental and compound semiconductors.

4. Write the expressions for Fermi energy of extrinsic semiconductors at 0 K.

5. Define Bohr magneton.

6. What do you mean by critical magnetic field?

7. What is local field?

8. Mention the properties of dielectric materials.

9. What is the advantage of chromium in metallic glasses?

10. What are non-linear optical materials?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive an expression for thermal conductivity of a metal. (8)

       (ii) Explain quantum free electron theory. (8)

Or

(b) (i) Define Fermi function and Fermi energy. Explain the variation of Fermi function with temperature with graph. (12)

       (ii) Evaluate the value of Fermi distribution function for an energy kT above the Fermi energy. (4)

12. (a) Derive an expression for the total charge carrier concentration in intrinsic semiconductor. (16)

Or

(b) (i) Define Hall Effect. Describe the theory of Hall Effect. (12)

       (ii) The Hall coefficient of certain silicon specimen was found to be $-7.35 \times 10^{-5} \text{m}^3\text{C}^{-1}$. If the conductivity was found to be $200\,\text{m}^{-1}\Omega^{-1}$, calculate mobility of charge carriers. (4)

13. (a) Describe the domain theory of ferromagnetism and explain various energies involved in domain growth. (16)

Or

(b) (i) Explain the BCS theory of superconductivity. (12)

       (ii) Write notes on Meissner effect. (4)

14. (a) Derive expressions for electronic and ionic polarizabilities. (16)

Or

(b) (i) Discuss any four dielectric breakdown mechanisms in detail. (12)

       (ii) Give brief account on the uses of dielectric materials in capacitors. (4)

15. (a) What are shape memory alloys? Explain the mechanism of shape memory effect and mention its applications. (16)

Or

(b) (i) Explain the pulsed laser deposition method to produce Nano materials. (8)

       (ii) Write notes on Biomaterials and its applications. (8)