Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 94082

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Second Semester

Civil Engineering

PH 2161/080040002/PH23 – ENGINEERING PHYSICS – II

(Common to all Branches)

(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Write down the expression for Fermi-Distribution function.
2. Give the expression for the carrier concentration in metals.
3. Find the resistance of an intrinsic Ge rod 1 cm long, 1mm wide, and 0.5 mm thick at 300 K. For Ge, $n_i = 2.5 \times 10^{19}/m^3$, $\mu_c = 0.39\ m^2v^{-1}s^{-1}$ and $\mu_p = 0.19\ m^2\ v^{-1}s^{-1}$ at 300 K.
4. Given an extrinsic semiconductor, how will you find whether it is n-type or p-type.
5. The magnetic field strength of silicon is 1500 Am^{-1}. If the magnetic susceptibility is $-(0.3 \times 10^{-5})$. Calculate the magnetisation and flux density is silicon.
6. What is meant by persistent current ?
7. Define dielectric constant.
8. Distinguish between dielectric loss and dielectric breakdown.
9. What is pseudo elasticity in shape memory alloys ?
10. Give four properties of carbon nano tubes.

PART – B (5×16=80 Marks)

11. a) Define electrical conductivity. Obtain an expression for electrical conductivity by free electron theory.

(OR)

b) Based on Fermi – Dirac statistics, state the nature of Fermi distribution function. How does it vary with temperature ?

12. a) i) What is Fermi level in intrinsic semiconductor ? And discuss the variation of Fermi level in intrinsic semiconductor with temperature. (8)

ii) Derive the expression for electrical conductivity in an intrinsic semiconductor and explain the variation of it with temperature. (8)

(OR)

b) i) How the Fermi level changes its position with the temperature and impurity concentration in N – type semiconductors ? (6)

ii) Define Hall effect in semiconductors. How the Hall coefficient is determined ? (10)

13. a) i) A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the susceptibility of the material at room temperature is 3.7×10^{-3}, calculate the magnetization and flux density of the material. (4)

ii) Describe the structure of ferrites. (4)

iii) Mention the different properties of ferrites. (4)

iv) What are the applications of ferrites ? (4)

(OR)

b) i) Prove that susceptibility of superconductor is –1 and relative permeability is zero. (4)

ii) Briefly explain the following : (4)

1) Cryotron (4)

2) Magnetic Levitation (4)

3) High Temperature Super Conductors.

14. a) Explain about :

i) Electronic Polarisation, Ionic Polarisation. (8)

ii) Dielectric breakdown. (8)

(OR)

b) Derive an expression for the internal field in a dielectric and hence obtain the Clausius–Mosatti equation. (16)

15. a) i) What are shape memory alloys ? Describe the characteristics of shape memory alloys. (8)

ii) List out any four applications of shape memory alloys. (4)

iii) Mention any two advantages and two disadvantages of SMAs. (4)

(OR)

b) i) What are nanoparticles ? Explain how nanoparticles can be produced using ball-milling technique. (2+6)

ii) Describe the mechanical, chemical and magnetic properties of nanoparticles. (8)

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