



Reg. No. :

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

**Question Paper Code : X 67605**

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020  
Second Semester  
Civil Engineering  
HS 1152 – 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. Give the microscopic form of Ohm's law in a metallic conductor. Whether the Ohm's law is true at all temperatures.
2. What is Fermi energy ? What is its important ?
3. With increase of temperature the conductivity of semiconductor increases while that of metals decreases. Give reasons.
4. The intrinsic carrier concentration of Ge at 300 K is  $2.5 \times 10^{19} \text{ m}^{-3}$ . Calculate its resistivity if electron and hole mobilities are  $0.39 \text{ m}^2 \text{ V}^{-1} \text{ s}^{-1}$  and  $0.19 \text{ m}^2 \text{ V}^{-1} \text{ s}^{-1}$ .
5. Define the Curie Weiss law for a ferromagnetic material.
6. What is the effect of temperature and magnetic field on a Superconductor ?
7. What is meant by polarization ? Write down its relationship with the applied electric field.
8. What are Zener and avalanche breakdown ?
9. What are the properties of shape memory alloys ?
10. What are the uses of carbon nano-tubes ?

PART – B

(5×16=80 Marks)

11. a) Derive an expression for the electrical and thermal conductivity of a metal and hence prove Wiedemann-Franz law. (16)

(OR)



- b) i) Obtain an expression for density of energy states. (8)  
ii) Explain Fermi-Dirac distribution function and explain how it varies with temperature. (8)
12. a) i) From the expression for the intrinsic carrier concentration, obtain an expression for the Fermi level in an intrinsic semiconductor. (6)  
ii) Derive an expression for the electrical conductivity and hence the bandgap of an intrinsic semiconductor. (5+5)
- (OR)
- b) i) Discuss in detail about the theory and experiment to determine the Hall coefficient of a material. (10)  
ii) The energy gap of Si is 1.1 eV and the average electron effective mass is  $0.31 m_e$ . Calculate the concentration of electrons in the conduction band of Si at temperatures of 0 K and 100 K. Explain the reason for changes in the values of carrier concentration. (6)
13. a) i) Explain Domain Theory of Ferromagnetism. (8)  
ii) Explain BCS Theory. (4)  
iii) Differentiate Type I and Type II Superconductors. (4)
- (OR)
- b) i) What are Antiferro and Ferri magnetic Materials ? (6)  
ii) Explain Hysteresis based on Domain Theory. (4)  
iii) Explain Magnetic Levitation and Squids. (3+3)
14. a) i) Discuss the different components of dielectric polarization and obtain the total polarization. (10)  
ii) Explain, with diagram, the frequency dependence of dielectric polarization. (6)
- (OR)
- b) Derive the various contributions and hence the total internal field of a dielectric and hence deduce the Clausius-Mossotti equation. (10+6)
15. a) i) Write about the two different phases of shape memory alloys.  
ii) Describe the synthesis, properties and applications of Ni-Ti alloys. (6+10)
- (OR)
- b) i) Describe the chemical vapour deposition used to produce nanomaterials. What are the advantages and drawbacks of this method ?  
ii) Mention the different types of geometry of carbon nanotubes. (10+6)
-