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Question Paper Code: 52004

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Second Semester

Electrical and Electronics Engineering

15UPH204 – SOLID STATE PHYSICS

(Common to EIE and Biomedical Engineering)

(Regulation 2015)

Duration: 1:15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The average velocity acquired by the free electron of a metal in a particular direction during the application of electric field is called CO1- R
(a) terminal velocity (b) drift velocity (c) escape velocity (d) critical velocity
2. The magnitude of Lorentz number is CO1- R
(a) 2.44×10^{-8} (b) $2.44 \times 10^{-8} \text{ W } \Omega \text{ K}$
(c) $2.44 \times 10^{-8} \text{ W } \Omega \text{ K}^{-2}$ (d) $2.44 \times 10^{-6} \text{ W } \Omega \text{ K}^{-2}$
3. Silicon is _____ valent element. CO2- R
(a) penta (b) hexa (c) tri (d) tetra
4. P – type semiconductor is formed by adding _____ impurity in a pure germanium crystal. CO2- R
(a) divalent (b) trivalent (c) tetravalent (d) pentavalent
5. Diamagnetic material possess CO3- R
(a) no induced dipoles even when external field is applied
(b) induced dipoles along field direction
(c) permanent magnetic dipoles
(d) absence of permanent magnetic dipoles

6. Below transition temperature a super conducting material exhibits CO3- R
 (a) zero resistance (b) zero resistance and diamagnetism
 (c) zero resistance and paramagnetism (d) zero resistance and ferromagnetism
7. The unit for permittivity of free space is CO4- R
 (a) dimensionless (b) H / m (c) m / H (d) tesla
8. The main constituents of ceramics are CO4- R
 (a) silicon only (b) non –metallic solids only
 (c) silicon - non metallic solids (d) silicon and ferrous alloys
9. In nanomaterials with decrease of size the inter atomic spacing CO5- R
 (a) decreases (b) increases
 (c) first increases and then decreases (d) remains unchanged
10. The following is an example for bottom-up fabrication of nanoparticles CO5- R
 (a) sol-gel method (b) ball milling (c) nanolithography (d) photolithography

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Based on the postulates of classical free electron theory, formulate a CO1- U (8)
 mathematical expression for electrical conductivity of metals
12. Mathematically show that for an intrinsic semiconductor the Fermi CO2 U (8)
 level is located exactly at the mid-point of the energy gap
13. Distinguish between para and ferromagnetic materials. CO3- Ana (8)
14. Compute the internal field for a cubic crystalline structure CO4- U (8)
15. Explain the fabrication of nanoparticles by physical and chemical vapor CO5- U (8)
 deposition techniques.