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Question Paper Code: 42003

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

Second Semester

Civil Engineering

14UPH203 - MATERIALS SCIENCE

(Common to Mechanical Engineering)

(Regulation 2014)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. In the case of _____, the valence band and the conduction band overlap each other
(a) conductors (b) dielectrics (c) insulators (d) semiconductors
2. The valence electrons are _____ the nucleus and they are _____ bound.
(a) ionic (b) covalent (c) hydrogen (d) metallic
3. The pure Si and Ge Semiconducting materials have _____ bonds.
(a) intrinsic semiconductor (b) compound semiconductor
(c) n-type semiconductor (d) p-type semiconductor
4. Semiconductors have _____ temperature coefficient
(a) positive (b) negative (c) neutral (d) infinite
5. In the case of paramagnetic materials the spin magnetic moments of the adjacent atoms are aligned
(a) parallel to each other (b) antiparallel to each other
(c) randomly (d) antiparallel but of unequal magnitude

6. The superconducting state is perfectly _____ in nature.
 (a) Diamagnetic (b) heat capacity (c) isotopic effect (d) entropy
7. _____ occurs when a dielectric contains occluded gas bubbles.
 (a) thermal breakdown (b) defect breakdown
 (c) intrinsic breakdown (d) discharge breakdown
8. _____ Polarization occur in Ferrites and semiconductors.
 (a) Electronic (b) Ionic (c) Orientation (d) Space charge
9. Which of the following technique is used to form metallic glasses?
 (a) Slow cooling (b) Quenching (c) Melt spinning (d) Hardening
10. Milling, Lithographic method and machining are examples of
 (a) bottom-up approach (b) sputtering technique
 (c) plasma assisted technique (d) top-down approach

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Derive an expression for the electrical and thermal conductivity and hence deduce Wiedemann- Franz law. (8)
12. Derive an expression for carrier concentration in an n-type semiconductors and discuss the variation of fermi level and carrier concentration with temperature (8)
13. What are Ferrites? Classify Ferrites based on their structures. (8)
14. Interpret the different types of Polarization mechanism in dielectrics. (8)
15. Discuss how to improve the mechanical proportion of engineering materials.
 Differentiate Creep and Fatigue (8)