KUMARAGURU
college of technology
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Register Number: ……

B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2013)

Second Semester

CIVIL ENGINEERING

U13PHT201: Materials Science

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. If the particles of the medium vibrate perpendicular to the direction of propagation of sound then the waves are said to be
   a) Longitudinal waves b) Transverse waves
   c) Progressive waves d) Stationary waves
2. According to Weber Fechner law, the loudness of sound is proportional to _____.
3. The thermal conductivity in metals is due to
   a) Electrons and phonons b) Electrons only
   c) Electrons and photons d) Phonons only
4. For metals, relaxation time is equal to _____.
5. In N-type semi conductor if the electron concentration increases, what about the Fermi level?
   a) Decreases b) increases
   c) Initially increases then decreases d) Initially decreases then increases
6. The energy of holes in valence band in a p-type semi conductor is lying between _____.
7. The measure of the degree to which the magnetic lines of force can penetrate through the material is called _____.
   a) Relative permeability b) Intensity of magnetization
   c) Magnetic permeability d) Magnetic susceptibility
8. The equation for dielectric loss is P_L = _____.
9. In CNT structure, when the tube axis is perpendicular to C – C bond then it is called
   a) Zig zag b) Chiral
   c) Spinal d) Arm chair
10. The two phases of SMAs are _____ and _____.

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. Define acoustics.
12. Distinguish echo and echelon effect.
13. List any four drawbacks of classical free electron theory.
14. What are SQUIDs?
15. Define effective mass of an electron.
16. A semi conducting crystal of 15 mm long, 1.5 mm wide and 105 mm thick has a magnetic flux density of 0.6 wb/m^2. A current of 15mA is passed through the specimen in which the voltage across its width is formed to be 40 μv. Calculate the Hall coefficient of the semi conductor and the density of charge carriers.
17. Define hysteresis.
18. What is dielectric breakdown?
19. Define quenching.
20. Differentiate between top down and bottom up processes.

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. Define reverberation time. Derive an expression for Sabine's law of reverberation time.

22. a) (i) State the postulates of classical free electron theory. (7)

(ii) What are high temperature super conductors? Give examples. Explain the application of magnetic levitation with neat diagram. (7)

(OR)

b) Derive an expression for density of states and deduce the expression for Fermi level at 0 K.

23. a) What is intrinsic semi conductor? Deduce an expression for density of electron in conduction band in an intrinsic semi conductor.

(OR)

b) (i) Discuss the experimental determination of Hall coefficient with neat diagram. Further mention the applications of Hall effect. (10)

(ii) Discuss the variation of Fermi level in p-type semi conductor. (4)

24. a) (i) Describe domain theory of ferro magnetism in detail. (10)

(ii) Calculate the electronic polarizability of atom if the dielectric constant of the dielectric material is 1.0024 and the number of atoms per unit volume is 2.6 x 10^{25} at NTP. (4)

(OR)

b) (i) Derive an expression for electronic and ionic polarization. (10)

(ii) Differentiate between hard and soft magnetic materials. (4)

25. a) Discuss the production, properties and applications of metallic glasses.

(OR)

b) (i) Explain the production of nano materials by sol-gel method. (7)

(ii) Discuss pulsed laser deposition method of synthesizing carbon nano tubes. (7)

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