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Total number of printed pages – 3

B.Tech
BSMS1213

Third Semester (Back / Special) Examination – 2013

MATERIAL SCIENCE AND ENGINEERING

BRANCH : AEIE, EC, EEE, EIE, ELECTRICAL, ETC, IEE

QUESTION CODE : D 195

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 × 10
- What are the important guidelines for the selection of materials ?
 - What are the limitations of fatigue test ?
 - What are the factors affecting the creep characteristics of metals ?
 - What is the effect of frequency on dielectric constant ?
 - What is thermal conductivity ? Mention the relationship between thermal and electrical conductivities for metals.
 - What is Meissner effect ?



P.T.O.

- (g) Distinguish between hard and soft ferromagnetic materials.
- (h) What is hard and soft PZT ?
- (i) What do you mean by the galvanic corrosion ?
- (j) What do you mean by Ceramic and composite ?
2. (a) Compare material properties of polymers, metals, and ceramics. 3
- (b) The superconducting critical temperature of mercury with isotopic mass 199.5 is 4.2 K. Calculate the superconducting critical temperature when its isotopic mass changes to 202.5. 2
- (c) How is Hardness of a material measured 5
3. (a) Show that the electric field inside a superconductor? 2
- (b) The polarisability of argon is 1.8×10^{-40} Cm²/V. Calculate the dielectric constant and dielectric susceptibility of argon at NTP. 5
- (c) Explain ionic polarization. 3
4. (a) Give comparison between ferromagnetism , anti ferromagnetism and ferri-magnetism. 6
- (b) What is a laser ? Explain the principles of operation of a four level laser system. 4
5. (a) What is electronic polarisability ? Derive an expression for the Electronic polarisability in terms of the radius of the atom. 6
- (b) Write short note on Hysteresis. 4

6. (a) Describe two method by which cathodic protection can be used to protect steel pipe from corroding. 5
- (b) Define polymerization. How it is performed ? 5
7. (a) Difference between addition and condensation polymerization. 5
- (b) What do you mean by the MMC (Metal–matrix composite) ? Discuss. 5
8. Define composite material. How these are classified ? What is the distinction between matrix and dispersed phase in a composite material compare it with ceramic material ? 10

