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Total number of printed pages – 2

B. Tech  
BSCC 2202

**Third Semester (Special) Examination – 2013**

**MATERIAL SCIENCE**

**BRANCH : CHEM**

**QUESTION CODE : D 213**

**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
- (a) What are the different forms of load applied to determine the mechanical strength of materials ?
- (b) Name the different measures to be taken to increase the resistance to fatigue of a metal alloy.
- (c) Why intense corrosion does occur when anode is smaller than cathode ?
- (d) Briefly describe Meissner effect.
- (e) Differentiate between Ionic Polarization & Electronic Polarization.
- (f) Briefly explain the phenomena of magnetic hysteresis.
- (g) Calculate the shift of electron clouds with respect to nucleus in He atom when electric field of  $10^6$  Volt/m is applied. The polarizability of He is  $1.6 \times 10^{-40}$  Farad- $m^2$ .
- (h) Differentiate between addition and condensation of polymerization.
- (i) Explain why Teflon is used in reaction vessels and frying pans.
- (j) What is Aspect Ratio ?
2. (a) Classify the engineering materials based on atomic bonding forces with suitable examples. 4
- (b) Define failure and write some important causes of failure. 3
- (c) A steel wire of original diameter 12.8 mm is subjected to a tensile load up to fracture. Its diameter at fracture is 10.2 mm, then find its ductility. 3

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3. (a) What is Wiedermann–Franz law ? Explain Lorentz number & its significance. 5
- (b) A metallic wire of length 0.6 m and diameter 0.4 mm has a resistance of 0.1 Ohm at 300 K. Then calculate Lorentz number according to classical free electron theory of metals if the thermal conductivity of metal at 300 K is 380 w/mK. 5
4. (a) What is LASER ? Discuss the principle of operation of He-Ne Laser. 5
- (b) Briefly write down the advantages of composite materials. 5
5. (a) Discuss the phenomena of corrosion and explain why Aluminium is less corrosive than Iron ? 5
- (b) Compare the desired mechanical characteristics of Matrix and fibrephases. 5
6. (a) Distinguish between Soft and Hard Superconductor. 5
- (b) It is found experimentally that the superconducting critical temperature of lead is 7.193 K and critical magnetic induction at 0K is  $80.3 \times 10^{-9}$  Tesla. What will be the critical current density of lead wire of radius 5mm at 4 K ? 5
7. (a) What are the different forms of load applied to determine the mechanical strength of materials ? 4
- (b) Name the different measures to be taken to increase the resistance to fatigue of a metal alloy. 3
- (c) Why intense corrosion does occurs when anode is smaller than cathode ? 3
8. Write short notes on the following : 5×2
- (a) SMART materials
- (b) Metal matrix composites.

