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MATS201

[ST]

Enrol. No.

END SEMESTER EXAMINATION : NOV.-DEC., 2016

MATERIAL SCIENCE

Time : 3 Hrs. *Maximum Mars : 70*

Note: ***Attempt questions from all sections as directed.***

Use of Scientific Calculator is allowed.

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six.**

Each question carries **06** *marks.*

1. (a) Explain briefly Crvstalline and Amorphous materials and give suitable examples of each.(3)

   (b) Explain Unit Cell as "Building Block" of Crystalline materials. Define and draw "FCC" and "HCP" Unit Cell. (3)

2. (a) Define Atomic Packing Factor (APF) and derive it expression for FCC Crystals. (3)

   (b) Define and draw Stress-strain curve for Ductile and Brittle Materials. (3)

P.T.O.

3. What is Hardness ? Discuss Brinell Hardness Test method.

What are various Ferrous and Non-Ferrous Alloys ? How Bronze differs from Brass, suggest applications of both.

5 Draw and explain TTT curve.

6. What are Carbon Steels ? What are its various types. Suggest some suitable applications of each type.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**
Each question carries **10** *marks.*

7. (a) Write different classifications of Crystal defects and explain any two of the defects. (3)

(b) What do you mean by Ductile to Brittle Transition Temperature ? Describe with neat sketch the curve specifying the ductile and brittle regions. (3)

(c) Describe different types of semi-conductors and their specific applications. (4)

8. (a) Discuss Fatigue and Creep behavior of materials. Enumerate the phases of creep diagrammatically. (5)

(b) Explain Plastics and their broad classifications. Also, suggest specific applications of various types of plastics. (5)

9 Draw a neat labeled sketch of Iron-Carbon equilibrium diagram.

SECTION – C (20 Marks)

(Compulsory)

10. (a) A mild steel tensile test specimen having diameter of 16 mm and gauge length of 80 mm was tested under tensile loading till fracture and the following results obtained.

Load at yield point = 87 kN

Extension at yield point = 173×10^{-6} m

Ultimate load = 124 kN

Total extension at fracture = 24 mm

Diameter of specimen at fracture = 9.8 mm

Cross – sectional area at fracture = 75.4 mm^2

Cross – sectional Area 'A' = 200 mm^2

Compute the followings:

(i) Modulus of elasticity of steel

P.T.O.

(ii) The ultimate tensile stress

(iii) The yield stress

(iv) The percentage elongation

(v) The Percentage reduction in Area

(b) Define Crystallography. What is constructive and destructive Interference in X- Ray crystallography ? (3)

(c) What are Superconductors ? Explain its importance and applications. Differentiate Type-I and Type-II Superconductors. (6)

(d) Describe heat treatment process. What is annealing ? How it differs from case hardening ? (4)