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MATS201 Enrol. No. .....

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END SEMESTER EXAMINATION : NOV. – DEC., 2017

MATERIAL SCIENCE

Time : 3 Hrs. *Maximum Marks : 70*

Note: ***Attempt questions from all sections as directed. Use of scientific non-programmable calculators are permitted.***

SECTION – A (30 Marks)

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

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

1. Write short notes on the following:

   (a) Importance of Materials and application of Nanomaterials (3)

   (b) Ductility and Brittleness with examples of materials having these properties (3)

2. Describe crystalline and amorphous form of materials on basis of their range of order of spatial arrangements with suitable diagram. Give examples of each type of materials.

P.T.O.

3. What are ceramic materials? What are its properties? Give examples of industrial ceramics and its advantages over other materials.

4. Define heat treatment. What are its advantages and disadvantages? What are various procedures adopted for heat treatment?

5. What do you understand by surface hardening? Discuss carburizing and flame hardening process.

6. (a) What do you mean by crystal imperfections? What is it importance in deformation mechanism? Discuss briefly its types with suitable sketch. (4)

(b) What is hardness ? How it is measured for a material? Enlist different hardness tests. (2)

SECTION – B (20 Marks)

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

7. (a) What do you understand by material behaviour? Describe ductile and brittle material behaviour under tensile load. Represent the behaviour by well labelled curve. (6)

(b) What are ferrous and non-ferrous materials? Give suitable example. Enlist specific applications for each types of the aforesaid materials. (4)

8. A mild steel tensile test specimen with diameter of 18 mm and a gauge length of 90 mm was tested to destruction, and the following results were obtained.

Load at yield point = 97 kN

Extension at yield point = 183×16^{-6} m

Ultimate load = 124 kN

Total extension at fracture = 26 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 following and represent these first three quantities by neat stress-strain diagram

(i) Modulus of elasticity of steel

(ii) The ultimate tensile stream

(iii) The yield stress

(iv) The percentage elongation

(v) The Percentage reduction in Area. (10)

P.T.O.

9. (a) What are plastic materials? What are its various classifications? List one example. Application for each types. (5)

(b) Describe one technique which can be used for crystal structure determination with neat diagram. Discuss the associated law applied during crystal structure. (5)

SECTION – C (20 Marks)

(Compulsory)

10. (a) Draw a neat diagram of iron-carbon equilibrium and label the various regions of eutectic and eutectoid. (10)

(b) What are semi-conductors? Describe dopants and its types. How do doping affect the conduction properties? (6)

(c) Differentiate fatigue and creep loading with the help of neat labelled diagram. (4)