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Question Paper Code : 51851

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fourth Semester

Mechanical Engineering

**ME 2253 T/ME 1253 T/10122 ME 304 T – ENGINEERING MATERIALS AND
METALLURGY**

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is difference between cooling of a pure metal and a solid solution, from molten state ?
2. What do you mean by invariant reaction ?
3. Define critical cooling rate.
4. List any four principal methods of case hardening.
5. Sketch Slip and Twinning types of deformation.
6. Differentiate between Fatigue and Creep tests.
7. Write the purpose of alloying elements added to steel.
8. Write short notes on high speed tool steel.
9. Define plastics.
10. What is PA ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Draw Iron-Iron carbide phase diagram, name the various field line and reactions. (10)
- (ii) Draw the typical microstructure of 1.2% C steel at 920 °C, 730 °C and 200 °C. (6)

OR

- (b) (i) Discuss on substitutional solid solution of isomorphous alloy system. (8)
- (ii) Brief on maximum percentage of carbon in ferrite and austenite based on the interstitial sites. (8)

12. (a) Explain the various steps followed to determine an isothermal-transformation diagram and draw the I.T. diagram for eutectoid steel. (16)

OR

- (b) Explain the following forms :
- (i) Tempering
- (ii) Austempering
- (iii) Martempering. (16)

13. (a) Explain the following terms with neat sketch :
- (i) The effect of grain size on dislocation motion
- (ii) Ductile fracture and brittle fracture. (16)

OR

- (b) Describe the following with simple diagram.
- (i) Different types of hardness test
- (ii) Fatigue and creep test. (16)

14. (a) What are the influences of alloying Al, Cr, Ni, Mo, Si, Mn, V and Cu in steel ?
Explain in brief.

OR

- (b) What are the properties of aluminium ? And what is the effect of different types of alloying elements such as Cu, Iron, Manganese, Magnesium used with aluminium and its application ? Explain.

15. (a) Write notes on :

- (i) PVC
- (ii) PF
- (iii) Glass
- (iv) PMMA

OR

- (b) (i) What is polymerization ? Describe addition polymerization and condensation polymerization. **(10)**
- (ii) How plastic materials are classified ? Explain each classification. **(6)**