Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

Ph.D in Faculty of Engineering (CE/CSE)

MATERIAL TECHNOLOGY

M.Code : 77376

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carry TWENTY marks.

Q1 a) Discuss the classification of various engineering materials giving their properties and applications. 10

b) Brief on the significance of material(s) selection and their properties for manufacture of 'Crank shaft of an aeronautical engine' based on the service condition, life cycle, cost and manufacturability. 10

Q2 a) Explain the need and significance of Non Destructive Testing in the light of the statement that the destructive testing can completely explain the surface and bulk property of the metals. 12

b) Explain in detail the magnetic particle inspection technique with the help of neat and suitable sketches. 8

10

Q3 a) What are single crystal, polycrystalline and amorphous solids? Explain.

b) What is Dislocation? What are the sources of Dislocation? Compare edge and screw Dislocation. 10

Q4 a) State Griffith theory of brittle fracture. On its basis, derive an expression for fracture stress. State Orowan's modification. 10

b) Define creep. What are the 3 stages of creep? Explain mechanisms of creep & describe creep resistant materials 10

Q5 a) Define 'Alloy'. Name different types of alloys. Discuss Hume-Rothery conditions of formation of solid solution. 10

b) Draw the T-T-T diagram for a Eutectoid steel. Superimpose various cooling curves upon it and explain which microstructures are formed for different cooling rates. 10

Q6 a) State and explain Slip mechanism of plastic deformation. What is Slip system? Explain Slip system in various lattice structures such as FCC, HCP and BCC. 10

b) Discuss the single and multiphase system. Compare the mechanical and metallurgical properties of single and multiphase system. 10

Q7 a) What are carbon nanotubes? Explain the unique thermal and mechanical properties of CNTs that make them intriguing for the development of new materials. 10

b) Define corrosion. Discuss steps for control of corrosion and inhibition. 10

Q8 Write short note on any two of the following : 20

a) Composites, their classification and properties

b) Austenite Stabilizers and ferrite Stabilizers.

c) Effect of alloying element on Fe-C diagram

d) Recrystallization and Effect of recrystallization temperature

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.