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10627

Reg. No. :

Name :

**Fourth Semester B.Tech. Degree Examination, February 2016
(2013 Scheme)**

13.404 : METALLURGY AND MATERIAL SCIENCE (MNPU)

Time : 3 Hours

Max. Marks : 100

Instructions : 1) Answer **all** questions from Part – A.

2) Answer **any one** question from **each** Module of Part – B.

PART – A

1. Write a note on classification of materials.
2. Which are the allotropic forms of iron ?
3. What is slip plane ? How is it related to dislocation ?
4. What are the factors that affect the fatigue strength ?
5. State and explain Fick's first law.
6. Explain the lever rule as applied to phase diagrams.
7. Differentiate between austenite and martensite.
8. What is age hardening ?
9. What is magnelium ?
10. What is meant by biomaterials ? (10×2=20 Marks)

PART – B

Module – I

11. a) Starting from cutting a specimen, discuss the specimen preparation for viewing under metallurgical microscope. 12
- b) Compare *Metals* and *Composites*. 8
12. a) Discuss recovery, recrystallization and grain growth with the support of sketches. 15
- b) What is etching ? Why it is done ? 5

P.T.O.

**Module – II**

13. a) Explain various Hume-Rothery rules for solid solution formation. 10
b) Explain the relation between structure and properties of materials. 10
14. a) Sketch a typical *creep* curve and explain the different stages of creep. 10
b) Draw the Sn-Pb equilibrium diagram to scale, label all important points and indicate the phases present in different regions. 10

Module – III

15. a) Draw TTT diagram for eutectoid steel and explain how it is constructed. What are its uses ? 10
b) Differentiate between peritectic and peritectoid reactions. Give examples for each. 10
16. a) What is the importance of heat treatment. How hardenability is assessed ? 8
b) Explain the development of microstructure during solidification of a hypoeutectoid steel with the help of Fe-C phase diagram. 12

Module – IV

17. a) What are cast irons ? Name different types of cast irons and briefly discuss each one of them with reference to composition, microstructure, properties and applications. 14
b) What is a pre-preg ? How it is used to make a laminated composite ? 6
18. a) Explain the uses of copper and copper based alloys. 10
b) List the advantages of alloying steels. 10
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