Code No. 6020

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) I – Semester (Main) Examination, November 2013

Subject : Metallurgy and Material Science

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Distinguish between elasticity and plasticity of a material.
2. What is critical shear stress? Write the equation relating tensile stress and critical shear stress.
3. Draw the structure of a fatigue fracture specimen and show the various regions on it.
4. What are the metallurgical variables effecting the fatigue of metal?
5. What is Gibb's phase rule?
6. Draw the cooling curve for pure iron and show the different allotropic form of iron on it.
7. What is the purpose of heat treatment and how is it different from alloying?
8. Name the various iron ores and mention their availability locations in India.
9. Explain about age hardening.
10. What is HSS and list some of its applications.

PART – B (5 x 10 = 50 Marks)

11.a) Differentiate between Edge and screw dislocation. 5
b) What are the metallurgical advantages of hot working over cold working? 5

12.a) Explain the difference between creep curve and stress rupture curve. 5
b) Explain the experimental determination of fatigue strength with the help of a neat sketch. 5

13. Metal 'A' melts at 850^0c and metal 'B' melts at 450^0c. The solid solubility of A in B and B in A are negligible. A and B do not form any compound of intermediate phase. The metal pair forms an eutectic at 35% A and 65% B which solidifies at 300^0c. Assume the liquidus lines to be straight, draw the phase diagram for the alloy series and find 10

a) The temperature at which the alloy 60% A and 40% B starts and completes solidification.
b) For the same alloy the amount of solid phase and liquid phase at 400^0c.

14.a) Differentiate between annealing and normalizing. 5
b) Explain the need of tempering a hardened steel. Describe the process of tempering. 5

15. Explain the production of pig iron in a blast furnace. 10

16.a) What are plain carbon steels and explain its classification? 5
b) Describe the properties and applications of muntz melat. 5

17. Write short notes on : 10
i) Maraging steel
ii) Austempering
iii) Chilled cast iron

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