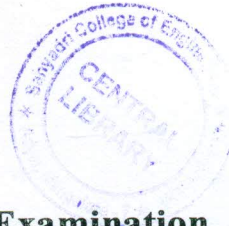


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10ME/AU42A

Fourth Semester B.E. Degree Examination, June/July 2017
Material Science and Metallurgy

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Define coordination number. Also work-out the APF for FCC unit cell. (08 Marks)
 b. Write note on crystal imperfections. (04 Marks)
 c. Discuss diffusion process and laws of diffusion. (08 Marks)
- 2 a. Explain with stress-strain diagram the behavior of ductile metal under static tension till fracture. (06 Marks)
 b. Discuss Johnson's offset method for finding yield stress. (04 Marks)
 c. Distinguish between slip and twinning. (04 Marks)
 d. A test bar of 6mm dia is subjected to tensile load of 600N and reduced to 5mm dia through plastic deformation. Calculate – i) Engg. Stress ii) Engg. Strain
 iii) True stress iv) True strain. (06 Marks)
- 3 a. Define fracture. Illustrate stages of ductile metal fracture in tensile loading. (07 Marks)
 b. Explain creep curve with stages of creep. (06 Marks)
 c. Illustrate fatigue testing arrangement. Also draw S-N curve for ferrous and non-ferrous materials. (07 Marks)
- 4 a. Discuss homogeneous and heterogeneous nucleation. (05 Marks)
 b. Sketch and explain crystal growth and cast metal structure. (05 Marks)
 c. List and briefly explain "Hume-Rothazy rules". (05 Marks)
 d. State Gibbs phase rule and explain each term. (05 Marks)

PART – B

- 5 a. With neat figure explain lever rule. (06 Marks)
 b. Draw Iron – Carbon equilibrium diagram and discuss the salient features. (10 Marks)
 c. Briefly write about invariant reactions. (04 Marks)
- 6 a. Briefly explain TTT curves with figure. (05 Marks)
 b. List and explain various heat treatment processes. (10 Marks)
 c. Define hardenability and how it is determined. (05 Marks)
- 7 a. Compare the properties and composition of grey cast iron and malleable iron. (08 Marks)
 b. Briefly discuss SG iron and steel properties. (06 Marks)
 c. Classify the various brasses with their use. (06 Marks)
- 8 a. Define composite materials and list the classification. (06 Marks)
 b. Discuss the fundamentals of production of FRP's and MMC's. (08 Marks)
 c. List the advantages and application of composites. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.