

CBCS Scheme

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Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Material Science and Metallurgy

Max. Marks: 80

Time: 3 hrs.

Note: Answer any FIVE full questions,
choosing ONE full question from each module.

Module-1

- 1 a. Define the following lattice : (08 Marks)
i) unit cell ii) space lattice iii) atomic packing factor iv) co-ordination number. (08 Marks)
b. Derive an expression for atomic packing factor of FCC.

OR

- 2 a. State and explain Fick's law of diffusion. (08 Marks)
b. With the help of conventional stress strain diagram, explain the behavior of mild steel under static load till fracture. (08 Marks)

Module-2

- 3 a. Differentiate slip and twinning with neat sketches. (08 Marks)
b. Explain with neat figure, ductile fracture and brittle fracture. (08 Marks)

OR

- 4 a. What is meant by creep? With the help of creep curve explain different stages of creep. (08 Marks)
b. Draw typical S – N curve diagrams for mild steel and aluminium and explain. (08 Marks)

Module-3

- 5 a. Explain Hume Rothery rules for the formation of solid solutions. (08 Marks)
b. State the Gibb's phase rule and explain with a simple example. (08 Marks)

OR

- 6 a. Draw the eutectic and eutectoid phase diagrams. Give the invariant reaction. (10 Marks)
b. Explain lever rule with an example. (06 Marks)

Module-4

- 7 a. Explain with a sketch induction hardening. (06 Marks)
b. Draw and explain Iron – carbide equilibrium diagram and label all the points and fields. (10 Marks)

OR

- 8 a. Draw a neat sketch of a TTT diagram and label all the fields for an eutectoid steel. (10 Marks)
b. Explain the following : i) Normalizing ii) Hardening. (06 Marks)

Module-5

- 9 a. Briefly explain the composition, properties and application of grey cast Iron. (08 Marks)
b. Write a note on the following : i) Al–Si alloy ii) Copper alloys. (08 Marks)

OR

- 10 a. Explain the following with neat sketches : (10 Marks)
i) Spray lay-up process ii) MMCS by stir casting. (06 Marks)
b. What are the applications of composite materials?

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Important Note : 1. On receiving the question paper, check the page diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equate.