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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fourth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; June/July - 2015

Material Science and Metallurgy

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.

ii) Assume suitable missing data if any.

UNIT - I

1. a. Define the following:
 - i) BCC- Body centered cubic 10
 - ii) FCC –Face centered cubic
 - iii) HCP – Hexagonal Close packed.
- b. Discuss point imperfections and explain classification of point imperfections. 10
2. a. Briefly explain the types of dislocation like
 - (i) Edge dislocation (ii) Screw dislocation. 10
- b. Briefly explain the mechanism of Diffusion. 10

UNIT - II

3. a. Define engineering stress and strain, true stress and strain. Find out the relationship between engineering stress and true stress. 8
- b. With the help of neat sketch explain stress-strain diagram. The behavior of ductile material. 8
- c. Differentiate between slip and Twinning. 4
4. a. What is creep? With neat sketch discuss primary, secondary, tertiary creep. 10
- b. Draw and explain the S-N curve for steel and aluminium alloy. 10

UNIT - III

5. a. Briefly explain types of solid solutions. 10
- b. Discuss with neat sketch Ni-Cu Binary diagram. 10
6. a. With neat labeled phase diagram of Iron-Carbon phase diagram. Discuss the three invariant reactions taking place in the system. 10
- b. Briefly explain the T-T-T diagram for Hypo and Hyper eutectoid steel. 10

UNIT - IV

7. a. Give definition for annealing, explain with neat sketch. 8
- b. Write short notes on:
 - (i) Martempering 12
 - (ii) Austempering

- 8 a. Briefly explain Flame Hardening with neat sketch. 7
- b. Explain Nitriding with a neat sketch. 7
- c. Explain Cyaniding with a neat sketch. 6

UNIT - V

- 9 a. List out various methods of corrosion prevention. Explain any 2 methods. 10
- b. Explain surface Heat treatment any one method
 - i) Pacle carburizing 10
 - ii) Liquid carburizing
- 10. Write explanatory notes on any **Four** of the following :
 - (i) Medium Carbon steels
 - ii) High Carbon steels
 - iii) Titanium alloys 20
 - iv) Copper and it's alloys
 - v) Aluminium and its alloys

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