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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; June - 2017

Material Science and Metallurgy

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a.	Define atomic packing factor. Prove that the APF for FCC is higher than BCC.	9
b.	Differentiate between edge and screw dislocation.	5
c.	Aluminum has atomic radius of 0.143 nm. Assuming the atoms of aluminum to be spherical shape which touch each other along the face diagonal of the unit cell. Determine the density of aluminum. The atomic mass of aluminum is 26.98 g/mol.	6
2 a.	With a stress strain diagram, explain the tensile properties for ductile materials.	8
b.	List and explain the different types of surface defects in materials.	12

UNIT - II

3 a.	What is S-N diagram? Explain its importance with the example of mild steel and aluminum.	8
b.	What is meant by creep? With the help of creep curve, explain different stages of creep.	9
c.	List factors affecting fatigue life of a material.	3
4 a.	Explain Hume Rothery rules for formation of substitutional solid solution.	10
b.	With a neat sketch explain the construction of phase diagram.	10

UNIT - III

5 a.	Draw a neat label sketch of Fe-C phase diagram and mention all the phases present at different temperatures.	12
b.	List and explain the different regions in the Fe-C diagram.	8
6 a.	With the help of a neat sketch explain the construction of TTT diagram.	10
b.	Explain with a neat sketch, Hypo and Hyper Eutectoid steel.	10

UNIT - IV

7 a.	With a neat sketch, explain Annealing process.	7
b.	Differentiate between normalizing and annealing process.	5
c.	With a neat sketch, explain Jominy end Quench test.	8
8 a.	With the help of a neat sketch, explain induction hardening and flame hardening processes.	10
b.	State the properties and uses of gray cast iron, malleable cast iron, spherodioal cast iron and white cast iron.	10

Contd…2

UNIT - V

9	a.	Write a note on Titanium alloys and copper and its alloys.	10
	b.	Explain the role the Reinforcement and matrix materials in composites.	10
10	a.	List the advantages of composites.	4
	b.	Distinguish between α and (α+β) brasses with respect to composition, properties and applications.	10
	c.	Define Composites. Explain how composites are classified.	6

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