

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***Third Semester, B.E. - Mechanical Engineering****Semester End Examination; Dec. - 2019****Material Science and Metallurgy**

Time: 3 hrs

Max. Marks: 100

Note: I) **PART - A** is compulsory. One question for 2 marks from each unit.II) **PART - B:** Answer any **two** sub questions (from a, b, c) for Maximum of 18 marks from each unit.

Q. No.	Questions	Marks
I : PART - A		10
I a.	Define interstitial defects in crystal structure.	2
b.	List the linear and nonlinear properties in elastic region.	2
c.	Define Gibb's phase rule.	2
d.	Define heat treatment process.	2
e.	List four copper alloys.	2
II : PART - B		90
UNIT - I		18
1 a.	Explain with a neat sketch the following crystal structure. Body centered cubic (BCC) Hexagonal Closed Pack (HCP).	9
b.	Define atomic packing factor. Calculate APF for HCP structure.	9
c.	Classify different types of crystal imperfections. Explain in detail line imperfections.	9
UNIT - II		18
2 a.	With the help of a neat schematic conventional stress-strain diagram for mild steel under uniaxial static tension, explain clearly the behavior of the material till fracture.	9
b.	Define hardness and explain in detail the brinell hardness testing.	9
c.	Define creep deformation. Explain the different stages of creep with a neat sketch.	9
UNIT - III		18
3 a.	List and explain rules governing for formation of solid solution with example.	9
b.	Draw neatly Iron-Carbon equilibrium diagram and label all the parts.	9
c.	With the help of sketch, discuss the effect of alloying elements on Fe-C diagram.	9
UNIT - IV		18
4 a.	With a neat sketch, explain different types of annealing process.	9
b.	Define carburizing. Explain the various types of carburizing process.	9
c.	Explain with a neat sketch the Jominy-end quench test.	9
UNIT - V		18
5 a.	With a neat sketch, explain hand layup process.	9
b.	Define composite material. Classify the composite materials based on matrix and reinforcement material.	9
c.	Discuss the structure and composition of gray CI, white CI and SG iron.	9