



# 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
<b>I : PART - A</b>		<b>10</b>
I a.	Define unit cell and space lattice of crystal structure.	2
b.	Define Elastic deformation and plastic deformation.	2
c.	Write the range of carbon percentages in steel and cast iron.	2
d.	List types of Annealing.	2
e.	Write the application and brass.	2
<b>II : PART - B</b>		<b>90</b>
<b>UNIT - I</b>		<b>18</b>
1 a.	Calculate the APF for FCC and BCC crystal structure.	9
b.	Describe different types of diffusion mechanisms.	9
c.	Explain surface imperfections.	9
<b>UNIT - II</b>		<b>18</b>
2 a.	Differentiate between slip and twisting with neat sketches.	9
b.	Explain the mechanism for creep and describe the stages of creep using creep curve.	9
c.	Describe with the neat sketches different stages of ductile fracture.	9
<b>UNIT - III</b>		<b>18</b>
3 a.	Draw iron-carbon diagram and explain all the invariant reactions.	9
b.	List and explain rules governing for formation of solid solutions.	9
c.	Draw the sketch and describe the Continuous Cooling Curves [CCT] for 0.8% carbon steel.	9
<b>UNIT - IV</b>		<b>18</b>
4 a.	Discuss the process, temperature range, microstructure of the products and application of stress relief annealing.	9
b.	What is the purpose of case hardening? Discuss the different methods of case hardening.	9
c.	Briefly explain different quenching methods used in heat treatment process.	9
<b>UNIT - V</b>		<b>18</b>
5 a.	List the various types of cast iron and give details of chemical composition, properties and application of any one type.	9
b.	Discuss the functions of matrix and reinforcement in composites.	9
c.	Explain briefly about AISI and SAE delay nation.	9