

<b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b> <b>Winter Examination: 2022 - 23</b> <b>Program: B. Tech.                      Branch: Mechanical Engineering                      Semester: III</b> <b>Course Code &amp; Name: BTMEC302 Materials Science and Metallurgy</b> <b>Max. Marks: 60                              Date: 15.3.2023                              Duration: 3 Hrs.</b>			
<b>Instructions to the Students:</b> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question. 3. Use of non-programmable scientific calculator is permitted. 4. Assume suitable data wherever necessary and mention it clearly.			
		(Level/CO)	Marks
<b>Q. 1</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	<b>What is atomic packing factor? Prove that the atomic packing factor for FCC structure is 0.74.</b>	Understand	<b>6</b>
B)	<b>What are the mechanisms of plastic deformation? Explain slip mechanism due to the movement of edge dislocations and screw dislocations with neat sketch.</b>	Understand	<b>6</b>
C)	<b>Discuss Vickers hardness test w.r.t working principle, indenter details, formula, advantages and limitations.</b>	Remember	<b>6</b>
<b>Q.2</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	<b>Draw Iron-Carbide Equilibrium diagram and define all the phases.</b>	Remember	<b>6</b>
B)	<b>Explain Hume-Rothery's rules of solid solubility. What is Gibb's phase rule.</b>	Remember	<b>6</b>
C)	<b>What is the importance of TTT diagram? Explain the procedure to determine these diagrams with the help of neat sketch.</b>	Understand	<b>6</b>
<b>Q. 3</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	<b>What are the objectives of heat treatment? Explain different types of annealing processes with the help of schematic diagrams.</b>	Understand	<b>6</b>
B)	<b>Define hardenability and explain, in detail, the Jominy End Quench Test with neat sketch.</b>	Remember	<b>6</b>
C)	<b>Explain induction hardening process in detail. Give its advantages and limitations.</b>	Understand	<b>6</b>
<b>Q.4</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	<b>Describe various steps in specimen preparation for microscopy.</b>	Understand	<b>6</b>
B)	<b>Explain the construction and working principle of metallurgical microscope with neat sketch.</b>	Remember	<b>6</b>
C)	<b>Discuss Spark test in detail and draw the spark pattern for the Mild Steel and High Carbon Steel.</b>	Understand	<b>6</b>

<b>Q. 5</b>	<b>Solve <i>Any Two</i> of the following.</b>		<b>12</b>
<b>A)</b>	<b>Describe Magnetic Particle testing w.r.t. principle of working and applications.</b>	Understand	<b>6</b>
<b>B)</b>	<b>Explain Dye Penetrant Test in detail w.r.t. basic principle, steps, and limitations.</b>	Understand	<b>6</b>
<b>C)</b>	<b>Explain basic mechanism of dispersion strengthening. What are its critical factors, advantages and applications?</b>	Remember	<b>6</b>
<b>*** End ***</b>			

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