DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B.Tech. Branch : Mechanical Engineering/Mechanical Engineering (Sandwich)

Subject Code & Name: BTMES304; Materials Science and Metallurgy Semester : III

Max Marks: 60 Date:12/02/2025 Duration: 3 Hr.

Instructions to the Students:

1. *Each question carries 12 marks.*
2. *Question No. 1 will be compulsory and include objective-type questions.*
3. *Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.*
4. *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.*
5. *Use of non-programmable scientific calculators is allowed.*
6. *Assume suitable data wherever necessary and mention it clearly.*

					(Level/CO)	Marks
Q. 1	**Objective type questions. (Compulsory Question)**					**12**
1	There are fourteen atoms in a unit cell of ……				CO1	1
	a. BCC	b. FCC	c. HCP	d. none of these		
2	The elastic stress strain behavior of rubber is ……				CO1	1
	a. Linear	b. Non-linear	c. Plastic	d. No fixed relationship		
3	Substitution of a foreign atom in the site of parent atom in the crystal is a ……				CO1	1
	a. Vacancy defect	b. Substitution impurity	c. Volume imperfection	d. Line imperfections		
4	Gibbs phase rule is ……, when no chemical reaction occurs				CO3	1
	a. F – C + P = 2	b. F + C – P = 2	c. F + C + P = 2	d. F – C – P = 2		
5	The percentage of carbon in cast iron varies from…				CO2	1
	a. 0.1 to 0.5	b. 0.5 to 1	c. 0.5 to 1	d. 2 to 4.5		
6	Steel containing 0.8 to 1.5% carbon, is known as…				CO2	1
	a. mild steel	b. dead mild steel	c. medium carbon steel	d. high carbon steel		
7	A given component cracked after heat treatment. What can be the possible reason?				CO4	1
	a. It was heated	b. It was not	c. It was	d. It was slowly		

	for long time	properly cleaned before heating	suddenly cooled in brine	cooled in air		
8	The process of producing a component with tough and ductile core and a hard outer surface is known as…				CO4	1
	a. Hardening	b. Case Hardening	c. Tempering	d. Annealing		
9	The study of metallographic includes…….				CO5	1
	a. alloy constituents	b. failure analysis	c. metal structure	d. all of the above		
10	In order to observe the grain size of steel samples under microscope, the magnification should be the order of….				CO5	1
	a. 2	b. 20	c. 1500	d. 100		
11	Dye penetrant method is generally used to locate…				CO6	1
	a. core defects	b. surface defects	c. superficial defects	d. temporary defects		
12	During radiography test, which region absorbs less radiation and transmits more?				CO6	1
	a. Low and high density regions absorb and transmit same amount of radiation	b. High density region	c. Low density region	d. None of the above		
Q. 2	**Solve the following.**					**12**
A)	Explain stress strain curves for different materials with figures.				CO2	**6**
B)	Explain Imperfections in crystals.				CO1	**6**
Q.3	**Solve the following.**					**12**
A)	Draw neat and complete Iron-iron carbide equilibrium diagram, showing phases, temperatures.				CO3	**6**
B)	Describe classifications, and applications of different steels.				CO3	**6**

Q. 4	**Solve Any Two of the following.**		**12**
A)	Explain tensile testing method with stress-strain curve and necessary formulas.	CO2	**6**
B)	Describe the normalizing heat treatment process with neat figure.	CO4	**6**
C)	Describe the nitriding heat treatment process with neat figure.	CO4	**6**
Q.5	**Solve Any Two of the following.**		**12**
A)	Explain in brief how to prepare specimen for metallography testing.	CO5	**6**
B)	Describe Spark test with figures.	CO5	**6**
C)	Draw CCT diagram for steel and write its importance.	CO3	**6**
Q. 6	**Solve Any Two of the following.**		**12**
A)	Differentiate between destructive testing and non-destructive testing.	CO6	**6**
B)	Explain ultrasonic inspection with neat figure.	CO6	**6**
C)	Explain any one Strengthening method for metals.	CO6	**6**
	***** End *****		