

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Third Semester B.E. Degree Examinations, January 2025

MATERIAL SCIENCE AND METALLURGY

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
 2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1.	a. Define engineering material? Draw stress-strain diagram for mild steel and explain all the stages.	10	(2 :1 : 1.6.1)
	b. With help of neat sketch explain concept of offset yield strength.	10	(2 :1 : 1.6.1)
(OR)			
2.	a. Describe linear and non-linear elastic behaviour of engineering materials.	10	(2 :1 : 1.6.1)
	b. Define atomic diffusion and explain the factors affecting to atomic diffusion.	10	(2 :1 : 1.6.1)
<u>Module-2</u>			
3.	a. With help of neat sketch explain mechanism of ductile and brittle fracture.	10	(2 :2 : 1.6.1)
	b. Describe three types of fatigue loads with sketch.	10	(2 :2 : 1.6.1)
(OR)			
4.	a. With neat sketch explain S-N curve for Al and Steel on fatigue test.	10	(2 :2 : 1.6.1)
	b. With neat sketch explain mechanism of creep behaviour of ferrous materials.	10	(2 :2 : 1.6.1)
<u>Module-3</u>			
5.	a. What are the solid solutions? Explain the different types of solid solutions.	10	(2 :3 : 1.6.1)
	b. Write a short note on (i) Mechanism of solidification (ii) Hume Rothery rules.	10	(2 :3 : 1.6.1)
(OR)			
6.	a. Construct iron-carbon equilibrium phase diagram and explain the different phases in it	10	(2 :3 : 1.6.1)
	b. Write a short note on (i) Gibbs phase rule (ii) Lever rule	10	(2 :3 : 1.6.1)

Module-4

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| 7. | a. With the help of neat sketch explain construction of T-T-T curve. | 10 | (2 :4 : 1.6.1) |
| | b. Explain with sketch (i) Annealing (ii) Normalizing (iii) Hardening | 10 | (2 :4 : 1.6.1) |

(OR)

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| 8. | a. Explain the following surface hardening methods
(i) Carburizing (ii) Nitriding (iii) Cyaniding | 10 | (2 :4 : 1.6.1) |
| | b. Explain the following strengthening mechanism
(i) Recrystallization temperature (ii) Age hardening (iii) Recovery | 10 | (2 :4 : 1.6.1) |

Module-5

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| 9. | a. Write a compositions, properties and applications of low carbon and high carbon steel. | 10 | (2 :5 : 1.6.1) |
| | b. Write a compositions, properties and applications of gray cast and white cast iron. | 10 | (2 :5 : 1.6.1) |

(OR)

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| 10 | a. Sketch and explain the tensile test on metallic and non-metallic specimen using UTM. | 10 | (2 :5 : 1.6.1) |
| | b. With neat sketch explain Charpy and Izod impact test for mild steel. | 10 | (2 :5 : 1.6.1) |

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