



Department of Mechanical Engineering

Teaching Learning and Assessment Plan

Name of Faculty: Dr. T. R. Shinde

Subject: Material Science & Metallurgy (BTMES304)

Semester: III

Class: SY B. Tech. [Mech.]

Academic Year: 2024-25

Planned Duration: 01-08-2024 to 22-11-2024

Course outcome: After completing the course students will be able to

BTMES304 _1	Study various crystal structures of materials	Reference Books: A. V. D. Kodgire, S.V. Kodgire, "Material Science and Metallurgy for Engineers", Everest Publishing House, Pune, 24 th edition, 2008. B. W. D. Callister, "Materials Science and Engineering: An Introduction", John Wiley and Sons, 5 th edition, 2001. C. V. Raghvan, "Material Science Engineering", Prentice Hall of India Ltd., 1992.
BTMES304 _2	Understand mechanical properties of materials and calculations of same using appropriate equations	
BTMES304 _3	Evaluate phase diagrams of various materials	
BTMES304 _4	Suggest appropriate heat treatment process for a given application	
BTMES304 _5	Prepare samples of different materials for metallography	
BTMES304 _6	Recommend appropriate NDT technique for a given application	

Unit	Lecture No.	Lesson Plan	Duration	Planned Date	Conduction Date	TM	TA	AT	Reference Book	Mapping with Outcomes	
		Content Delivery								CO	PO
I	1	Prerequisite: Basic material properties, Crystal structures	1 Hour	05/08/2024		LT	CB, PPT	CA MSE ESE	A,B	BTMES304 _1 BTMES304 _2	1,2,3,4, 5, PSO 1, PSO 2
	2	Indexing of lattice planes	1 Hour	06/08/2024					A,B		
	3	Imperfections in crystals-point defects, line defects	1 Hour	07/08/2024					A,B		
	4	indexing of lattice planes	1 Hour	12/08/2024					A,B		

Mission of the Department

M1: To develop state of the art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.

M2: To hone employability and entrepreneurship skills of the students through industry-institute interaction.

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		Content Delivery								CO	PO
	5	Mechanism of plastic deformation plastic deformation of polycrystalline materials	1 Hour	13/08/2024					A,B		
	6	Tensile test, engineering stress-strain curve, true stress-strain curve, types of stress-strain curves,	1 Hour	14/08/2024					A,B		
	7	Compression test, formability, hardness testing, and different hardness tests-Vickers, Rockwell, Brinell, Impact test.	1 Hour	20/08/2024					A,B		
II	8	Definitions of terms, rules of solid-solubility, Gibb's phase rule, solidification of a pure metal,	1 Hour	21/08/2024		LT	CB, PPT	CA MSE ESE	A,B	BTMES304_3	1,2,3,4, 5, PSO 1,
	9	plotting of equilibrium diagrams, lever rule,	1 Hour	26/08/2024					A,B		
	10	Iron-iron carbide equilibrium diagram	1 Hour	27/08/2024					A,B		
	11	critical temperatures, solidification and microstructure of slowly cooled steels, non-equilibrium cooling of steels,	1 Hour	28/08/2024					A,B		
	12	classification and application of steels, specification of steels,	1 Hour	02/09/2024					A,B		
	13	TTT diagram,	1 Hour	03/09/2024					A,B		
	14	critical cooling rate, CCT diagram	1 Hour	04/09/2024					A,B		
III	15	Heat treatment of steels,	1 Hour	09/09/2024		LT	CB, PPT	CA MSE	A,B		

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		Content Delivery								CO	PO
	16	Heat treatment of steels, cooling media	1 Hour	10/09/2024				ESE	A,B	BTMES304 _4	1-10 PSO 1,
	17	annealing processes, normalizing	1 Hour	11/09/2024					A,B		
	18	hardening, tempering	1 Hour	18/09/2024					A,B		
	19	quenching and hardenability,	1 Hour	23/09/2024					A,B		
	20	surface hardening processes-nitriding, carbo-nitriding	1 Hour	24/09/2024					A,B		
	21	flame hardening, induction hardening	1 Hour	25/09/2024					A,B		
IV	22	Microscopy, specimen preparation, polishing abrasives and cloths, specimen mounting	1 Hour	07/10/2024		LT	CB, PPT	CA ESE	A,B	BTMES304 _5	1,2,3,4, 5,7,9, PSO 1, PSO 2
	23	electrolytic polishing	1 Hour	08/10/2024					A,B		
	24	etching procedure and reagents, electrolytic etching	1 Hour	09/10/2024					A,B		
	25	optical metallurgical microscope,	1 Hour	14/10/2024					A,B		
	26	Sulphur printing, flow line observations	1 Hour	15/10/2024					A,B		
	27	examination of fractures,	1 Hour	16/10/2024					A,B		
	28	spark test, electron microscope.	1 Hour	21/10/2024					A,B		
V	29	Refinement of grain size,	1 Hour	22/10/2024		LT	CB, PPT	CA ESE	A,B	BTMES304 _6	1-7, 9,10
	30	cold working/strain hardening	1 Hour	23/10/2024					A,B		

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		Content Delivery								CO	PO
	31	solid solution strengthening	1 Hour	04/11/2024					A,B		
	32	Dispersion strengthening, Precipitation hardening.	1 Hour	05/11/2024					A,B		
	33	Magnetic particle inspection,	1 Hour	06/11/2024					A,B		
	34	dye Penetrant inspection, ultrasonic inspection	1 Hour	11/11/2024					A,B		
	35	radiography, eddy current testing	1 Hour	12/11/2024					A,B		

Note: TM-Teaching Method- Lecture (LT), Laboratory Visit (LV), Industrial Visit (IV) TA-Teaching Aids Chalk Board (CB), Power Point Presentation (PPT), Models (MD) AT-Assessment Tool-Assignments (AS), Examinations (CA, MSE, ESE), Rubrics (RB)

Mode of Assessment

Mode	Assessment Tool	Syllabus	CO Mapped	Marks Weightage	Remark
CA	Poster Presentation	Unit 1 & 2	CO1, CO2	25 M	The maximum weightage shall be of 20 Marks as per University Structure
	Case Study	Unit 4 & 5	CO4, CO5	25 M	
	Assignment	Each Unit	CO1, CO2, CO3, CO4, CO5	50 M	
MSE	Written Exam	50% of Syllabus	CO1, CO2, CO3	20M	The maximum weightage shall be of 20 Marks as per University Structure

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Faculty of Engineering



Department of Mechanical Engineering

ESE	Written Exam	On entire syllabus of MSM	CO1, CO2, CO3, CO4, CO5, CO6	60 M	The maximum weightage shall be of 60 Marks as per University Structure
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Course Coordinator

Academic Coordinator

HOD- Mechanical

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