SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	A.Y	Date of commencement of Semester
23ME4T01	Manufacturing processes	IV	Mechanical Engineering	6	2025-2026	08-12-2025

S.NO	COURSE OUTCOMES	BTKL
CO1	Discuss the working principle of different metal casting processes and gating system	K2
CO2	Classify the welding processes, working of different types of welding processes and welding defects.	K2
CO3	Illustrate the nature of plastic deformation, cold and hot working process, working of a rolling mill and types of extrusion processes.	K3
CO4	Understand sheet metal forming processes	K2
CO5	Learn about the different types of additive manufacturing processes	K2

UNIT	Out Comes/ BTKL	Topics No.	Topics/Activity	Text Book/ Reference	Conduct Hour	Delivery Method
			1. CASTING			
I	CO1: Discuss the working principle of different metal casting processes and gating system.	1.1	Introduction to casting Steps involved in making a casting, Advantage of casting and its applications.	T_1& T_2	1	Chalk, Talk, PPT Demonstration
		1.2	Patterns and Pattern making, Types of patterns Materials used for patterns, pattern allowances and their construction	T_1& T_2	2	
		1.3	Molding – molding methods - ingredients of molding sand	T_1	1	
		1.4	Molding materials, Properties of molding sand, Testing of molding sand	T_1& R_1	1	
		1.5	Types of molding – Hand molding – Machine molding, Core – different types of cores	T_1& R_1	1	
		1.6	Materials – properties of core sand – core manufacturing.	T_2& R_2	1	
		1.7	Risers – Types, function and design, casting design considerations	T2 & R2	1	
		1.8	Methods of melting and types of furnaces – cupola, Blast furnace.	T1	2	

		1.9	Electric arc, resistance and induction furnace	T1	1	
		1.10	Solidification of castings-Solidification of pure metals and alloys-Short & long freezing range alloys. Casting defects.	T2 & R2	1	
		1.11	Centrifugal casting, True, semi and centrifuging.	T_1& R_1	1	
		1.12	Die casting, Investment casting and shell molding.	T1 & R1	1	
				Total	**14**	
II	**CO2: Classify the welding processes, working of different types of welding processes and welding defects.**	**2. WELDING**				
		2.1	Introduction to welding and Classification of welding processes, types of welded joints and their characteristics.	T_1 &T_2	2	Chalk, Talk& PPT, Case Study.
		2.2	Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting.	T_1& R_1	1	
		2.3	Basic principles of Arc welding, power characteristics, Manual metal arc welding, Submerged arc welding.	T_1& R_1	1	
		2.4	TIG & MIG welding, Electro – slag welding.	T_1& R_1	1	
		2.5	Resistance welding, Friction welding, Friction stir welding.	T_1& T_3	2	
		2.6	Forge welding, Explosive welding.	T1 & R1	1	
		2.7	Thermit welding, Plasma Arc welding, Laser welding,	T_1 &T_2	2	
		2.8	Electron beam welding ,Soldering & Brazing.	T1 &T2	1	
		2.9	Heat affected zones in welding, pre & post heating	T_1& R_1	1	
		2.10	Weldability of metals, welding defects – causes and remedies	T_1& R_1	1	
		2.11	destructive and nondestructive testing of welds	T1 &T2	1	
				Total	**14**	
III	**CO3: Illustrate the nature of plastic deformation, cold and hot working process, working of a rolling mill and types of extrusion processes.**	**3. BULK FORMING**				
		3.1	Plastic deformation in metals and alloys	T_1&W_2	2	Chalk, Talk& PPT, Web Resources
		3.2	Recovery, recrystallization and grain growth.	T1 & R2	1	
		3.3	Hot working and Cold working process	T1 & R2	1	
		3.4	Strain hardening and Annealing. Bulk forming processes.	T1 & R2	1	
		3.5	Forging - Types of Forging, Smith forging, Drop Forging, Roll forging, Forging hammers.	T_1 & T_2	2	
		3.6	Rotary forging, forging defects, Rolling – fundamentals, types of rolling mills and products.	T1 & T2	2	

		3.7	Forces in rolling and power requirements, Extrusion and its characteristics.	T_1 & T_2	1	
		3.8	Types of extrusion, Impact extrusion, Hydrostatic extrusion.	T_1 & T_2	2	
		3.9	Wire drawing and Tube drawing.	T_1 & T_2	1	
				Total	**13**	

IV	CO4:Understand sheet metal forming processes		**4. SHEET METAL FORMING**			
		4.1	Sheet metal forming - Blanking and piercing.	T1 & T2	2	Chalk, Talk, & Tutorials,
		4.2	Forces and power requirement in these operations.	T1 & T2	1	
		4.3	Deep drawing, Stretch forming, Bending, Spring back and its remedies.	T1 & T2	2	
		4.3	Coining, Spinning, Types of presses and press tools.	T1 & T2	2	
		4.4	High energy rate forming processes	T2& R1	1	
		4.5	Principles of explosive forming	T1 & T2	1	
		4.6	Electromagnetic forming.	T1 & T2	1	
		4.7	Electro hydraulic forming	T1& R1	1	
		4.8	Rubber pad forming, advantages and limitations.	T1& R1	1	
				Total	**12**	
V	CO5:Learn about the different types of additive manufacturing processes		**5. ADDITIVE MANUFACTURING**			
		5.1	Steps in Additive Manufacturing (AM)	T_1 & T_2	2	Chalk, Talk & Seminars
		5.2	Classification of AM processes, Advantages of AM.	T_1 & T_2	1	
		5.3	Types of materials for AM	T_1 & T_2	2	
		5.4	VAT photo polymerization AM Processes	T1 & T2	2	
		5.5	Extrusion - Based AM Processes	T_1 & T_2	1	
		5.6	Powder Bed Fusion AM Processes	T_1 & T_2	1	
		5.7	Direct Energy Deposition AM Processes	T1 & T2	1	
		5.8	Post Processing of AM Parts, Applications	T2& R1	1	
	C.B.S	5.9	megmeet welding	R_1	1	
				Total	**12**	
				Cumulative Proposed Periods	**65**	

Where : **C.B.S** = Content Beyond the Syllabus

Text Books:	
S.No	**Authors, Book Title, Edition, Publisher, Year of Publication**
T1	Kalpakjain S and Steven R Schmid, Manufacturing Processes for Engineering Materials, 5/e, Pearson Publications, 2007.
T2	P.N. Rao, Manufacturing Technology -Vol I, 5/e, McGraw Hill Education, 2018.
Reference Books:	
S.No.	**Authors, Book Title, Edition, Publisher, Year of Publication**
R1	A. Ghosh &A. K. Malik, Manufacturing Science, East West Press Pvt. Ltd, 2010.
R2	Lindberg and Roy, Processes and materials of manufacture, 4/e, Prentice Hall India Learning Private Limited, 1990.
R3	R.K. Jain, Production Technology, Khanna Publishers, 2022.
R4	Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
R5	H.S. Shaun, Manufacturing Processes, 1/e, Pearson Publishers, 2012.
Web Details	
W1	https://www.edx.org/learn/manufacturing/massachusetts-institute-of-technologyfundamentals-of-manufacturing-processes
W2	https://onlinecourses.nptel.ac.in/noc21_me81/preview
W3	www.coursera.org/learn/introduction-to-additive-manufacturing-processessera
W4	https://archive.nptel.ac.in/courses/112/103/112103263/
W5	https://elearn.nptel.ac.in/shop/nptel/principles-of-metal-formingtechnology/?v=c86ee0d9d7ed

S.NO.	Details	Name	Signature
i.	Faculty	Dr .P.S.N.RAJU	
ii.	Course Coordinator	Dr .P.S.N.RAJU	
iii.	Module Coordinator	Dr. R.SANJEEV KUMAR	
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