NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B.Tech. in Mechanical Engineering
Course Code:	2ME103
Course Title:	Manufacturing Processes-I
Course Type:	Core
Year of introduction:	2023-24

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Course Learning Outcomes (CLOs):

After successful completion of the course, student will be able to –

1	illustrate the basics of manufacturing processes,	(BL2)
2	interpret the effect of process parameters on manufacturing processes,	(BL2)
3	appraise casting and welding processes for functional requirement,	(BL5)
4	recommend suitable metal forming processes for a given application.	(BL5)

Syllabus: **Total Teaching Hours: 30**

Unit	Syllabus	Teaching Hours
Unit I	**Introduction to manufacturing processes:** classification, applications and limitations **Metal Casting:** Casting principle, Metal casting processes and equipment, Gating system, melting of metal in foundry, Solidification, fluidity test, Shrinkage, cleaning of casting, Casting defects and residual stresses. Special casting processes.	**10**
Unit II	**Metal Joining** Physics of welding, Formation of a fusion welded joint, welding arc, welding power source characteristics, Metal transfer, Heat flow, Thermal stresses, Metallurgical aspect of welding, Solid state joining processes, Brazing and Soldering, Welding defects, NDT in welding, welding quality standards,WPS	**10**
Unit III	**Metal Forming**	**10**

Fundamentals of plastic deformation, Fundamentals of hot and cold working processes, Forging, Rolling, Extrusion, Wire drawing and Sheet metal forming, Load estimation of forming processes, Forming defects, Advanced metal forming processes.

Self – Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work: Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated

Suggested Readings/References:

1. Kalpakjian S and Schmid S., Manufacturing Processes for Engineering Materials, Pearson Education India.
2. Rao P. N., Manufacturing Technology: Foundry, Forming & Welding, Tata McGraw Hill Education.
3. Ghosh Amitabh and Malik A. K., Manufacturing science, East-West Press Ltd.
4. George E. Dieter, Mechanical Metallurgy, Tata McGraw Hill Education.
5. Campbell John, Casting, Elsevier publication

Suggested list of experiments: (not restricted to the following)

Sr. No.	Title	Hours
1.	Pattern allowance calculations for given component in sand casting.	2
2.	Measurement of properties of moulding sand.	2
3.	Effect of proportion of oxygen and acetylene on the gas welding flame and gas cutting.	2
4.	Effect of welding parameters on weld seam quality in MMAW.	2
5.	Preparation of joints using Tungsten Insert Gas(TIG) welding process.	2
6.	Preparation of joints using Metal Insert Gas (MIG) welding process.	2
7.	Preparation of different type of joints by using spot welding and butt welding process.	2
8.	Determination of forging load in open die forging.	2
9.	Determination of rolling load in two high rolling mill.	2
10.	Study of various extrusion processes.	2
11.	Spring back effect in sheet metal and GI Pipe bending process.	2
12.	Study of incremental sheet metal forming	2
13.	Demonstration of friction stir welding processes.	2