

## BASIC MANUFACTURING PROCESSES

<b>CourseCode</b>	20ME5401	<b>Year</b>	II	<b>Semester</b>	II
<b>Course Category</b>	Minor in DM	<b>Branch</b>	ME	<b>Course Type</b>	Theory
<b>Credits</b>	4	<b>L – T – P</b>	3 – 1 – 0	<b>Prerequisites</b>	Physics
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes:** Upon successful completion of the course, the student will be able to

	<b>Statement</b>	<b>Skill</b>	<b>BTL</b>	<b>Units</b>
<b>CO1</b>	Understand basic principles of various manufacturing process.	Understand Communication	L2	1,2,3,4,5
<b>CO2</b>	Illustrate moulding and casting process	Apply, Communication	L2	2
<b>CO3</b>	Discuss various metal forming processes	Apply, Communication	L3	3,4
<b>CO4</b>	Identify various Metal joining process for different products	Apply, Communication	L3	5

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3		1							2		2	DS	DS
<b>CO2</b>	3		1							2		2	DS	DS
<b>CO3</b>	3		1							2		2	DS	DS
<b>CO4</b>	3		1							2		2	DS	DS

**Syllabus**

<b>UNIT</b>	<b>Contents</b>	<b>Mapped COs</b>
<b>I</b>	<p><b>INTRODUCTION TO FOUNDRY:</b>  <b>Introduction:</b> Definition, Classification of manufacturing processes. Metals cast in the foundry-classification, factors that determine the selection of a casting alloy. Introduction to casting process &amp; steps involved.            Patterns: Definition, classification, materials used for pattern, various pattern allowances and their importance.  <b>Sand Molding:</b> Basic steps in mold preparation, materials used for mould, types of molds.  <b>Special casting processes:</b> Shell moulding, Investment casting, die casting, Centrifugal casting, Casting defects and remedies. Advantages and applications of casting.</p>	<b>CO1, CO2</b>
<b>II</b>	<p><b>Introduction to metal forming processes</b>            classification of metal forming processes. Hot working &amp; cold working of metals.  <b>Forging:</b> Classification of forging processes. Forging machines equipment. Expressions for forging pressures &amp; load in open die forging and closed die forging by slab analysis. Smith forging, drop forging &amp; press forging. Forging Equipment, Defects in forging.</p>	<b>CO1, CO3</b>

<b>III</b>	<p><b>Rolling:</b> Classification of rolling processes. Types of rolling mills, Variables of rolling process, expression for rolling load. Roll separating force, Rolling defects.</p> <p><b>Drawing &amp; Extrusion:</b> Drawing of wires, rods &amp; drawing pipes, Variables of drawing process. Difference between &amp; extrusion. Types of Extrusion: Direct, reverse, impact, hydrostatic extrusion. Dies for extrusion, stock penetration. Extrusion ratio of force equipment (with and without friction)</p>	<b>CO1, CO3</b>
<b>IV</b>	<p><b>Sheet Metal Operations:</b> Blanking, piercing, punching, drawing, draw ratio, drawing force, variables in Drawing, Trimming, and Shearing. Bending - types of bending dies, bending force calculation, Embossing and coining. Types of dies: Progressive, compound and combination dies.</p>	<b>CO1, CO 3</b>
<b>V</b>	<p><b>Metal Joining Processes:</b> Classification of welding processes, types of welds and welded joints, Arc Welding, Submerged Arc Welding, Gas Tungsten Arc Welding, Gas Metal Arc Welding, Electron Beam Welding, Laser Welding, Forge welding, Resistance welding, Friction welding, Explosive welding, Thermit welding and Plasma Arc welding. Soldering and brazing. Adhesive Bonding. Welding defects: causes and remedies</p>	<b>CO1, CO 4</b>

### Learning Resources

<b>Text books</b>
<ol style="list-style-type: none"> <li>1. Amitabha Ghosh and Mallick A. K., Manufacturing Science. Affiliated East-West Press Pvt. Ltd. 2010.</li> <li>2. M. P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Third edition. Wiley India Private Limited, 2009.</li> <li>3. S. Kalpakjian, Manufacturing Processes for Engineering Materials, Fifth edition. Pearson Education, 2009.</li> </ol>
<b>Reference books</b>
<ol style="list-style-type: none"> <li>1. G. K. Lal and S. K. Choudhury, Fundamentals of Manufacturing Process, 2009. Boca Raton, FL: CRC Press, 2011.</li> <li>2. J.P. Holman, Experimental Methods for Engineers, McGraw Hills Int. Edition.</li> </ol>
<b>E- Resources &amp; other digital material</b>
<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/112107219">https://nptel.ac.in/courses/112107219</a></li> </ol>