

Course code	Course Name	L-T-P – Credits	Year of Introduction
ME311	MANUFACTURING PROCESSES	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives			
<ul style="list-style-type: none"> To introduce the different types of manufacturing processes used to create different forms of metals/alloys/composites. 			
Syllabus			
Introduction to material casting processes - welding process and the physics of welding - mathematical/ physical description of forming processes – rolling and types – forging processes – advanced manufacturing – non-traditional machining – design for manufacturing			
Expected outcome.			
<ul style="list-style-type: none"> The students will become aware of the types of processes used for the manufacturing the parts of automobile. 			
Text Books:			
<ol style="list-style-type: none"> Helmi A Youssef, Hassan A El-Hofy and Mahmoud H Ahmed, Manufacturing Technology (materials, processes and equipments) , CRC Press, 2017 Kalapakjian and Schmid , Manufacturing Engineering and Technology, Pearson, 7e, 2013 			
References:			
<ol style="list-style-type: none"> Hine and Rosenthal, Principles of Metal Casting , Tata McGraw Hill India, 1995 P.R.Beeley, Foundry Technology, Butterworths Publication, 1972 			
Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Casting of metallic materials – introduction – expendable mold casting processes – sand casting, shell, vacuum, slurry, plaster and ceramic molding, expandable pattern casting – permanent mold castings – die and centrifugal casting – melting furnaces – cupolas and crucible furnace –cleaning and finishing of castings – quality of castings – defects & method of inspection of defects	7	15%
II	Bulk forming of metallic materials – Classification – Forging processes – open die, close die, special forging processes – forging equipment and defects Rolling processes – flat, section, tube , and special rolling processes and rolling defects – Extrusion – classification – equipment & defects Drawing – rod, wire and tube – classification and drawing die	7	15%
FIRST INTERNAL EXAMINATION			
III	Sheet metal forming processes – Classification – Shearing processes and mechanism – Bending processes – parameters – springback and residual stresses – bending equipment – stretch forming – Deep drawing – blank holding pressure, ironing, deep drawing force, redrawing – hydroforming – spinning –	8	15%

	conventional, flow tunneling and tube spinning.		
IV	Joining processes – Fusion welding – gas, thermit, electric arc, resistance and high energy beam welding – Solid state welding – cold, diffusion, explosion, forge, friction, hot pressure, roll, and ultrasonic welding – Solid-liquid state welding – brazing, soldering and adhesive bonding – welding of plastics – metallurgy of welded joints – welding defects – quality control – destructive and non-destructive tests – mechanical joining.	8	15%
SECOND INTERNAL EXAMINATION			
V	Non-traditional machining – Jet machining – abrasive, water jet, and abrasive water jet – ultrasonic machining – USM equipment and process capabilities – Chemical milling & photochemical machining - ECM – elements, equipment and process capabilities – electrochemical grinding – EDM – sinking, milling and wire cutting – EBM – LBM – plasma arc cutting	8	20%
VI	Advanced manufacturing techniques – near net shape manufacturing – metal injection molding and rapid prototyping – microfabrication technology – microcutting, microfinishing, and nonconventional micromachining – application of nano technology – sustainable and green manufacturing. Manufacturing process capabilities – process selection factors – process information maps – ranking strategy – design for manufacturing – casting, sheet metal forming, die forging, welding, and assembly.	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN

Maximum Marks : 100

Exam Duration: 3 Hrs

PART A

4 Questions uniformly covering modules 1 and 2. Each question carries 10 marks. Students will have to answer any three questions out of four. (3X10=30 marks)

PART B

4 Questions uniformly covering modules 3 and 4. Each question carries 10 marks. Students will have to answer any three questions out of four. (3X10=30 marks)

PART C

6 Questions uniformly covering modules 5 and 6. Each question carries 10 marks. Students will have to answer any four questions out of six. (4X10=40 marks)

Note: In all parts, each question can have a maximum of 4 sub questions, if needed.