MANUFACTURING PROCESSES

Course Code	19ME3404	**Year**	II	**Semester**	II
Course Category	Programme Core	**Branch**	ME	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	19ME3303
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Illustrate the casting processes with their features and applications.
CO2	Explain various metal forming techniques.
CO3	Appraise suitable welding process for the given application.
CO4	Apply suitable Non-Destructive Testing method.
CO5	Discuss the various techniques for processing of plastics, ceramics and powders.

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**
CO1	3	2	1	1	1	1			1		1	1	**3**	1
CO2	3	2	1	1	1	1			1		1	1	**3**	1
CO3	3	2	1	1	1	1			1	1	1	1	**3**	1
CO4	3	2	1	1	2	1			1	1	1	1	**3**	1
CO5	3	2	1	1	1	1			1		1	1	**3**	1

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction:** Importance and selection of manufacturing processes. **Casting Processes:** Introduction to casting, steps in casting process. **Pattern**: Types, materials and allowance. **Sand Molding**: Basic steps in mold preparation, materials used for mould, types of molds, cores. Principles and design of gating system. **Methods of Melting:** Crucible melting and cupola operation. **Special casting processes**: Shell casting, Investment casting, Die casting, Centrifugal casting, CO_2 Molding. Casting defects and remedies. Advantages and applications of casting.	CO1
II	**Metal Forming**: Introduction, hot and cold working of metals; **Rolling**: Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements. **Extrusion**: Basic extrusion processes and its characteristics, wire drawing, tube drawing. **Forging**: Principle of forging. Tools and dies used in forging. **Types**: Smith forging, drop forging and rotary forging, forging defects. **Sheet metal forming**: Introduction, Blanking, Piercing, Bending, Stamping, Coining, Spinning and Stretch Forming. Clearance and shear as applied to Punching/Blanking operations.	CO2

III	**Metal Joining Processes:** Classification of welding processes, types of welds and welded joints, V-I characteristics, 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. Heat affected zone in welding. **Welding defects**: causes and remedies. Soldering and brazing	CO3
IV	**Non Destructive Testing:** Introduction to Non Destructive Testing, Industrial applications of Non destructive evaluation, Visual Optical testing, Dye penetrant testing, Magnetic particle testing, Eddy current testing, Ultrasonic testing, Acoustic emission testing, Radiography, Comparison and selection of NDT methods.	CO4
V	**Plastic Processing, Ceramics and Powder Metallurgy**: **Plastics**: Introduction to polymers, Processing of plastics, extrusion of plastics, transfer molding, compression molding, injection molding, thermoforming, rotational molding and blow molding. **Ceramics**: Ceramic powder preparation; **Processing of ceramic parts**: Pressing, casting, sintering; **secondary processing of ceramics**: Coatings and finishing. **Powder Metallurgy**: Manufacture of powders, steps involved in making a component using powder metallurgy.	CO5

Learning Resources

Text Books

1. P.N.Rao, Manufacturing Technology – Volume I, 5/e, McGraw-Hill Education, 2018.
2. S.Kalpakjain and S.R.Schmid, Manufacturing Engineering and Technology, 7/e, Pearson, 2018.
3. Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010

Reference Books

1. Mikell. P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes and Systems, 4/e, John Wiley and Sons Inc, 2013.
2. P.C.Sharma, A Text book of Production Technology, 8/e, S Chand Publishing, 2014.

e- Resources & other digital material

1. https://nptel.ac.in/courses/112107145/
2. https://www.nde-ed.org
3. https://nptel.ac.in/courses/113/106/113106070/

19ME3404 - MANUFACTURING PROCESSES

Micro Syllabus

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Illustrate the casting processes with their features and applications.	L2
CO2	Explain various metal forming techniques.	L3
CO3	Appraise suitable welding process for the given application.	L2
CO4	Identify the suitable Non-Destructive Testing method for the given application.	L2
CO5	Discuss the various techniques for processing of plastics, ceramics and powders.	L2

Course Content		
UNIT-1	**Introduction:** Importance and selection of manufacturing processes. **Casting Processes:** Introduction to casting, steps in casting process. **Pattern**: Types, materials (Wood, Plastic and metal) and allowances (Machining Allowance, Taper Allowance, Shrinkage Allowance, Distortion Allowance, Finishing Allowance) **Sand Molding**: Basic steps in mold preparation, materials used for mould, types of molds(Green Sand, Dry sand, Skin dried moulds) , cores. Principles and design of gating system.(Types of gates, Gating Ratio) **Methods of Melting:** Crucible melting and cupola operation. **Special casting processes**: Shell casting, Investment casting, Die casting, Centrifugal casting, CO_2 Molding. Casting defects and remedies. Advantages and applications of casting.	**CO1**
UNIT-2	**Metal Forming**: Introduction, hot and cold working of metals; **Rolling**: Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements. **Extrusion**: Basic extrusion processes and its characteristics, wire drawing, tube drawing. **Forging**: Principle of forging. Tools and dies used in forging. **Types**: Smith forging, drop forging and rotary forging, forging defects. **Sheet metal forming**: Introduction, Blanking, Piercing, Bending, Stamping, Coining, Spinning and Stretch Forming. Clearance and shear as applied to Punching/Blanking operations.	**CO2**
UNIT-3	**Metal Joining Processes:** Classification of welding processes, types of welds and welded joints, V-I characteristics, 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. Heat affected zone in welding. **Welding defects**: causes and remedies. Soldering and brazing	**CO3**
UNIT-4	**Non Destructive Testing:** Introduction to Non Destructive Testing, Industrial applications of Non destructive evaluation,	**CO4**

	Visual Optical testing, Dye penetrant testing, Magnetic particle testing, Eddy current testing, Ultrasonic testing, Acoustic emission testing, Radiography, Comparison and selection of NDT methods.	
UNIT-5	**Plastic Processing, Ceramics and Powder Metallurgy**: **Plastics**: Introduction to polymers, Processing of plastics, Extrusion of plastics, Transfer molding, Compression molding, Injection molding, Thermoforming, Rotational molding and blow molding. **Ceramics**: Ceramic powder preparation; **Processing of ceramic parts**: Pressing, Casting, Sintering; **Secondary processing of ceramics**: Coatings and finishing. **Powder Metallurgy**: Manufacture of powders, steps involved in making a component using powder metallurgy.	**CO5**

Learning Resources	
Text Books:	1. P.N.Rao, Manufacturing Technology – Volume I, 5/e, McGraw-Hill Education, 2018. 2. S.Kalpakjain and S.R.Schmid, Manufacturing Engineering and Technology, 7/e, Pearson, 2018. 3. Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010
Reference Books:	1. Mikell. P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes and Systems, 4/e, John Wiley and Sons Inc, 2013. 2. P.C.Sharma, A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
E-Resources & other digital Material:	1. https://nptel.ac.in/courses/112107145/ 2. https://www.nde-ed.org 3. https://nptel.ac.in/courses/113/106/113106070/

Course Coordinator HOD

Code No: 19ME3404 **PVP19**

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY
(Autonomous)
II B.Tech. – II Semester Model Question Paper
MANUFACTURING PROCESSES
(ME)

Duration: 3 Hours **Max Marks: 70**

Note: 1. This question paper contains two papers Part A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in part A.
3. Part B consists of 5 units. Answer any one full question from each unit. Each Question carries 12 marks and may have a, b, c as sub questions.
4. All parts of question paper must be answered in one place.

PART-A

5×2=10 Marks

		Blooms Level	CO
1.a)	State any four advantages and applications of casting process.	1	**CO1**
1.b)	Distinguish between punching and blanking operations.	2	**CO2**
1.c)	How do you classify welding processes?	2	**CO3**
1.d)	Summarize any four industrial applications of Non destructive evaluation.	2	**CO4**
1.e)	Name at least four components made by powder metallurgy technique.	1	**CO5**

PART-B

5×12=60 Marks

			Blooms Level	CO	Max. Marks
UNIT-I					
2	a	Explain the steps involved in casting process.	2	**CO1**	6
	b	Illustrate the casting process used for making thick and long metallic water pipes.	2	**CO1**	6
OR					
3	a	Explain any four types of patterns and their applications.	2	CO1	6
	b	Illustrate the lost wax process with applications.	2	CO1	6
UNIT-II					
4	a	Compare hot working and cold working process.	2	**CO2**	6
	b	Illustrate the metal forming process used for making hollow tubes.	2	**CO2**	6
OR					
5	a	Discuss about different types of rolling mills and their features.	2	**CO2**	6
	b	Illustrate the metal forming process used for making wrenches and crane hooks.	2	**CO2**	6
UNIT-III					
6	a	Illustrate the welding process used in heavy fabrication industries to weld thick plates in flat position.	2	**CO3**	6
	b	Discuss about welding defects, causes and remedies.	2	**CO3**	6
OR					
7	a	Illustrate the welding process mainly used for rail welding in railways.	2	**CO3**	6
	b	Differentiate between soldering and brazing.	2	**CO3**	6
UNIT-IV					
8		Compare different non destructive testing methods.	2	**CO4**	12

OR					
9	a	Explain the following non destructive testing processes. i) Dye penetrant testing ii) Magnetic particle testing	2	**CO4**	6
	b	Illustrate the Radiography method of non destructive testing.	2	**CO4**	6
UNIT-V					
10	a	How do you classify polymers?	2	**CO5**	6
	b	Illustrate the process used for making plastic bottles.	2	**CO5**	6
OR					
11	a	Illustrate the steps involved in making a ceramic component.	2	**CO5**	6
	b	Explain the method of making powders using Atomization technique.	2	**CO5**	6

Course coordinator **HOD**