Program : **Diploma in Mechanical Engineering / Mechatronics**	
Course Code : **2022**	Course Title: **Manufacturing Technology**
Semester : **2**	Credits: **3**
Course Category: **Engineering Science**	
Periods per week: **3 (L:3 T:0 P:0)**	Periods per semester: **45**

Course Objectives:

- To emphasize the importance of manufacturing process in day-to-day life and study the basic manufacturing process.
- To familiarize the conventional manufacturing process like casting, welding, metal forming techniques etc.

Course Prerequisites:

Topic	Course code	Course Title	Semester
Basic manufacturing process foundry, welding etc.		Engineering Workshop Practice	1 & 2

Course Outcomes

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Explain manufacturing process and the relevance of foundry in manufacturing.	11	Understanding
CO2	Identify and explain different types of casting and metal working processes.	10	Understanding
CO3	Describe metal joining process and the areas of applications of a particular joining process.	12	Understanding
CO4	Explain the principle and concepts of forging & press working.	10	Understanding
	Series Test	2	

CO – PO Mapping

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	2	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-
CO3	2	-	-	2	-	-	-
CO4	2	-	-	-	-	-	-

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Explain the significance of manufacturing process and the relevance of foundry in manufacturing.**		
M1.01	Explain manufacturing process and various mechanical properties associated with engineering materials	1	Understanding
M1.02	Explain the types, allowances and materials of patterns	4	Understanding
M1.03	Discuss about the ingredients/ types/properties of moulding sand	2	Understanding
M1.04	Describe different types of moulding process	3	Understanding
M1.05	Discuss about the gating system and functions of riser	1	Understanding

Contents:

Introduction to Manufacturing Process: Properties of materials- Introduction to mechanical properties- strength, hardness, brittleness, toughness, malleability, ductility, stiffness, fatigue, resilience.

Foundry -Types of patterns- single piece pattern- split pattern- match plate pattern- gated pattern- loose piece pattern- sweep pattern etc

Pattern materials- wood- metal- plastics- plaster Advantages & Disadvantages of Pattern materials Pattern allowances- shrinkage allowance- draft allowance- machining allowance- distortion or camber allowance- rapping allowance

Properties of molding sand- porosity- plasticity- adhesiveness- cohesiveness- refractoriness moulding sand: - Types Green sand- dry sand- parting sand- loom sand- facing sand- core sand- Composition of moulding sands- – their ingredient and use - uses of chaplets –

Moulding processes: - Bench moulding- pit moulding- floor moulding and sweep moulding. Pouring and feeding – proper pouring techniques – functions of risers – importance of chiller - of casting – cut-off-trimming-shot and sand blastering.

CO2	**Identify and explain different types of casting and metal working processes.**		
M2.01	Explain different types of casting process	4	Understanding
M2.02	Explain about defects in casting	1	Understanding
M2.03	Describe cold working process with examples	2	Understanding
M2.04	Describe hot working process with examples	2	Understanding
M2.05	Explain various stages involved in powder metallurgy process	1	Understanding
	Series Test I	1	

Contents:

Castings – Types – Ferrous- Nonferrous-special castings-Centrifugal casting- die casting – gravity die casting – pressure casting – goose neck type – direct injection type and cold chamber machine - Slush castings – vacuum casting – cleaning- Defects in casting

Cold working– Operations – Drawing- Squeezing Rolling- Bending- Shearing & Extruding

Hot Working – Operations – Rolling- Piercing- Drawing- Spinning & Extruding - Effects of Hot Working - Types – Advantages & Disadvantages

Powder metallurgy (Elementary level) Importance - various stages of manufacturing- advantages- applications.

CO3	**Describe metal joining process and the areas of applications of a particular joining process.**		
M3.01	Explain the classification of welding process	1	Understanding
M3.02	Explain gas welding and welding flames	2	Understanding
M3.03	Explain various arc welding, resistance welding and thermit welding techniques	5	Understanding
M3.04	Describe the features of welding electrode and explain about various welding positions	3	Understanding
M3.05	Explain brazing and soldering process	1	Understanding

Contents:

Welding: Classification: Fusion and pressure welding; Gas welding techniques; Types of welding flames; Arc Welding – Equipment, Principle of arc welding- arc welding machines – D.C. generators- A.C. transformers (No description on constructional details). Shielded metal arc welding; Submerged arc welding; TIG / MIG welding; Resistance welding - Spot welding, Seam welding, Projection welding; Thermit welding; Welding electrodes- selection- Electrode coatings – functions of Electrode coating. Welding defects; Welding positions — flat- horizontal - vertical and overhead welding- welded joints - butt- lap – corner-- tee--edge - V- joints- U-joint.

Brazing and soldering: Types, Principles, Applications.

CO4	Explain the principle and concepts of forging & press working.		
M4.01	Explain different types of forging operations	2	Understanding
M4.02	Discuss about various forging tools used for the process	2	Understanding
M4.03	Explain different types of press working machines and operations	3	Understanding
M4.04	Compare punching and blanking operations	3	Understanding
	Series Test II	1	

Contents:

Forging processes- Classification of forging processes-flat die forging and closed dye forging Forging tools- anvil- swage block- hammers (hand hammer and sledge hammer- ball peen- straight peen and cross peen hammer)- tongs- chisels- swages- fullers- flatters- set hammer- punch and drift

Press working: Types of presses and Specifications, Press working operations - Cutting, bending, drawing, punching, blanking, notching, lancing; Die set components- punch and die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot, effect of clearance (No numerical problems).

Text/Reference

T/R	BookTitle/Author
T1	Manufacturing process – Begeman - 5th Edition -McGraw Hill, New Delhi 1981
R1	Workshop Technology- WAJ Chapman - Volume I, II, & III – Vima Books Pvt. Ltd., 4262/3, Ansari Road, Daryaganj, New Delhi 110 002.
R2	Production Technology – HMT - Edn. 18 - published by Tata McGraw Hill publishing Co. Ltd., 7 West Patel nagar, New Delhi 110 008. – 2001.
R3	Production Technology - P. C. SHARMA - Edn. X - S.Chand& Co. Ltd., Ram Nagar, New Delhi 110 055 - 2006
R4	Production Technology, Edn. XII, Khanna Publishers, 2-B, North Market, NAI Sarak, New Delhi 110 006 - 2006

Online Resources

Sl.No	Website Link
1	https://nptel.ac.in/courses/112107144/
2	https://nptel.ac.in/courses/112104195/