MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of Mechanical Engineering

Name of the Subject	MANUFACTURING PROCESSES	**Name of the handling Faculty**	Dr. A. SARAVANAN
Subject Code	ME3393	**Year / Sem**	II/III
Acad Year	2023-24	**Batch**	2022-26

Course Objective

To illustrate the working principles of various metal casting processes.

To learn and apply the working principles of various metal joining processes.

To analyse the working principles of bulk deformation of metals.

To learn the working principles of sheet metal forming process.

To study and practice the working principles of plastics molding.

Course Outcome

At the end of the course the students would be able to

Explain the principle of different metal casting processes.

Describe the various metal joining processes.

Illustrate the different bulk deformation processes.

Apply the various sheet metal forming process.

Apply suitable molding technique for manufacturing of plastics components

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB/ PPT / NPTEL/ MOOC / etc)	Blooms Level (L1-L6)	CO	PO
UNIT I: METAL CASTING PROCESSES							
1	Sand Casting, Sand Mould, Type of patterns, Pattern Materials, Pattern allowances	T1	1	PPT	L1	CO1	PO1
2	Moulding sand Properties and testing, Cores,Types and applications	T1	2	PPT	L1	CO1	PO1, PO2
3	Moulding machines, Types and applications, Melting furnaces : Blast and Cupola Furnaces	T1	1	PPT	L1	CO1	PO1, PO2
4	Principle of special casting processes : Shell - investment and Ceramic mould, Pressure die casting and Centrifugal Casting	T1	2	PPT	L1	CO1	PO1, PO2
5	CO2 process and Stir casting	T1	2	PPT	L1	CO1	PO1
6	Defects in Sand casting	T1	1	PPT	L1	CO1	PO1, PO2
Suggested Activity: Assignment							
Evaluation method: Internal Assessment Test							
UNIT II: METAL JOINING PROCESS							
7	Operatingprinciple,basicequipment,meritsand applications	T1	1	PPT	L1	CO2	PO1, PO2

8	Fusion welding processes, Gas welding, Types and Flame characteristics	T1	1	PPT	L1	CO2	PO1, PO2
9	Manual metal arc welding, Gas Tungsten arc welding	T1	1	PPT	L1	CO2	PO1
10	Gas metal arc welding, Submerged arc welding and Electro slag welding	T1	2	PPT	L1	CO2	PO1, PO2
11	Operating principle and applications ofResistance welding	T1	1	PPT	L1	CO2	PO1, PO2
12	Plasma arc welding, Thermit welding and Electron beam welding	T1	1	PPT	L1	CO2	PO1, PO2
13	Friction welding and Friction Stir Welding, Brazing and soldering	T1	1	PPT	L1	CO2	PO1
14	Weld defects: types, causes and cure. Adhesive bonding	T1	1	PPT	L2	CO2	PO1, PO2
Suggested Activity: Tutorial							
Evaluation method: Internal Assessment Test							
UNIT III: BULK DEFORMATIO PROCESSES							
15	Hot working and cold working of metals	T1	1	PPT	L1	CO3	PO1, PO2
16	Forging processes – Open,impression and closed die forging	T1	2	PPT	L1	CO3	PO1, PO2
17	Forging operations, Rolling of metals, Types of Rolling	T1	1	PPT	L1	CO3	PO1, PO2
18	Flat strip rolling, Shape rolling operations	T1	1	PPT	L2	CO3	PO1, PO2
19	Defects in rolled parts.	T1	1	PPT	L2	CO3	PO1
20	Principle of rod and wire drawing ,Tube drawing	T1	1	PPT	L1	CO3	PO1,PO2
21	Principles of Extrusion and its Types. Introduction - shaping operation.	T1	2	PPT	L1	CO3	PO1, PO2
Suggested Activity: Quiz							
Evaluation method: Internal Assessment Test							
UNIT IV: SHEET METAL PROCESSES							
22	Sheet metal characteristics, Shearing, bending and drawing operations	R2	2	PPT	L1	CO4	PO1
23	Stretch forming operations	R2	1	PPT	L1	CO4	PO1, PO2
24	Formability of sheet metal, Test methods	R2	1	PPT	L1	CO4	PO1, PO2
25	Specialformingprocesses-Workingprinciple and applications – Hydro forming	R2	1	PPT	L1	CO4	PO1, PO2
26	Rubber pad forming	R2	1	PPT	L1	CO4	PO1, PO2
27	Metal spinning	R2	1	PPT	L2	CO4	PO1
28	Introduction of Explosive forming, magnetic pulse forming	R2	1	PPT	L1	CO4	PO1, PO2
29	Peen forming, Super plastic forming, Micro forming, Incremental forming	R2	1	PPT	L2	CO4	PO1, PO2
Suggested Activity: Seminar							
Evaluation method: Internal Assessment Test							
UNIT V: MANUFACTURE OF PLASTIC COMPONENTS							
30	Types and characteristics of plastics	T1	2	PPT	L1	CO5	PO1

31	Moulding of thermoplastics – working principles and typical applications	T1	2	PPT	L2	CO5	PO1, PO2
32	Injection moulding , Plunger and screw machines, Compression moulding, Transfer Moulding	T1	1	PPT	L2	CO5	PO1, PO2
33	Typical industrial applications – introduction to blow moulding, Rotational moulding	T1	2	PPT	L1	CO5	PO1, PO2
34	Film blowing, Extrusion, Thermoforming	T1	1	PPT	L1	CO5	PO1, PO2
35	Bonding of Thermoplastics, duff moulding	T1	1	PPT	L2	CO5	PO1, PO2

Suggested Activity: Assignment

Evaluation method: Internal Assessment Test

Content Beyond the Syllabus Planned

1	Method used for Inspection of casting and welding- Ultrasonic testing

Text Books

1	Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India,4th Edition, 2013
2	P.N.Rao Manufacturing Technology Volume 1 Mc Grawhill Education 5th edition,2018

Reference Books

1	Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.
2	S. Gowri P. Hariharan, A.Suresh Babu, Manufacturing Technology I, Pearson Education, 2008.
3	Paul Degarma E, Black J.T and Ronald A. Kosher, Eligth Edition, Materials and Processes, in Manufacturing, Eight Edition, Prentice – Hall of India, 1997.
4	Hajra Chouldhary S.K and Hajra Choudhury. AK., Elements of workshop Technology, volume I and II, Media promoters and Publishers Private Limited, Mumbai, 1997
5	Sharma, P.C., A Text book of production Technology, S.Chand and Co. Ltd., 2004

Website / URL References

1	https://archive.nptel.ac.in/courses/112/107/112107219/
2	https://onlinecourses.nptel.ac.in/noc22_me28/preview
3	https://digimat.in/nptel/courses/video/112104195/L01.html
4	https://digimat.in/nptel/courses/video/112105126/L01.html

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	**Level 4 (L4) : Analysing**		Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			**Level 5 (L5) : Evaluating**			
Level 3 (L3) : Applying			**Level 6 (L6) : Creating**			

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	METAL CASTING PROCESSES	6	0	0	0	0	0	6	0	6
Unit 2	METAL JOINING PROCESSES	7	1	0	0	0	0	8	0	8
Unit 3	BULK DEFORMATION PROCESSES	5	2	0	0	0	0	7	0	7
Unit 4	SHEET METAL PROCESSES	6	2	0	0	0	0	8	0	8
Unit 5	MANUFACTURE OF PLASTIC COMPONENTS	3	3	0	0	0	0	6	0	6
Total		27	8	0	0	0	0	35	0	35
Total Percentage		77.1429	22.85714	0	0	0	0	100	0	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	6	4											1	1
CO2	8	6											1	1

CO3	7	6										1	1
CO4	8	6										2	1
CO5	6	5										2	1
Avg	**7**	**5.4**										**1.4**	**1**

Justification for CO-PO mapping	
CO1	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly
CO2	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly
CO3	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly
CO4	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly
CO5	PO1: Applying the knowledge of maths / science agreed strongly PO2: Identifying and formulating the complex engineering problems agreed strongly

3	**High level**	**2**	**Moderate level**	**1**	Low level

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