

COURSE TITLE- MECHANICAL TECHNOLOGY
 COURSE CODE 6M204

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Mechanical	Second

1. RATIONALE

Diploma engineers are always involved in the application of engineering processes in the manufacturing areas. In view of this, it is essential that the diploma engineers should be well exposed to the fundamental processes called non chip forming processes like welding, cold working, hot working, press work, pattern making and foundry processes. Mechanical engineer should be able to visualize these processes in the field of engineering.

2. COMPETENCY

At the end of studying this course students will be able to

"Produce different components using non chip forming process."

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)				Total Credits (L+T+P)				Examination Scheme (Marks)			
L	T	P	C	ESE	PT	Theory		Practical		Total	
						ESE @ (PR/OR)	PA (TW)				
3	-	3	6	80	20	--	50	--	--	150	
Duration of the Examination (Hrs)				03	01	--	--	--	--		

Legends : L-Lectures; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal,- Online Examination.

4. COURSE OUTCOMES

At the end of studying this course students will be able to :-

- 1) Prepare pattern considering different allowances
- 2) Produce simple castings by using sand moulds.
- 3) Prepare simple components by press operations
- 4) Perform welding operation by using relevant parameters.
- 5) Follow safety precautions.



5. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-Topics
Unit - I Pattern Making	1a. Describe the constructions of pattern 1b. Prepare pattern layouts 1c. Use of different allowances. 1d. Apply colour codes.	1.1 Definition, Design consideration in pattern, pattern layout, pattern construction, 1.2 Pattern materials, selection of materials; Allowances, master pattern, function, types, core prints unserviceable parts as pattern; core boxes 1.3 Color code and preservation of pattern. Shrinkage / contraction Rule.
Unit - II Moulding	2a. Describe different moulding machine 2b. Identify the Characteristics of moulding sand 2c. Describe testing of moulding sand 2d. Write functions of gating system	2.1 Hand tools, and their uses, 2.2 Moulding machines and their types, 2.3 Moulding sand, characteristics, constituents of moulding sand, sand preparation & conditioning, sand testing equipments, core moulding, and solidification of metals. 2.4 CO ₂ moulding. 2.5 Moulding procedure, gating, rising, use of pads, exothermic material, use of chills, chaplets.
Unit - III Foundry Engineering	3a. Describe different types of furnaces. 3b. Explain cupola operation. 3c. Identify defects in casting 3d. Describe different casting processes.	3.1 Introduction, furnaces used in foundry like coke fired, gas fired, cupola, 3.2 Preparation of cupola, charging of cupola, jamming of cupola, 3.3 Defects in casting, causes & remedies, inspection of casting, 3.4 Gravity die casting, slush casting, 3.5 Special casting methods, permanent mould, hot chamber die casting m/c, cold chamber 3.6 Die casting m/c, centrifugal casting, true centrifugal, semi centrifugal, and centrifuging, investment casting, continuous

	allowances.																		
2	Produce simple castings by using sand moulds.	3	3	3	3	-	-	-	2	-	-	-	-	-	-	-	-	-	3
3	Prepare simple component by press operations	3	3	3	3	-	-	-	2	-	-	-	-	-	-	-	-	-	3
4	Perform welding operation by using relevant parameters.	3	3	3	3	-	-	-	2	-	-	-	-	-	-	-	-	-	3
5	Follow safety precautions.	3	3	3	3	-	-	-	2	-	-	-	-	-	-	-	-	-	3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	D.V. Tammewar	Workshop Superintendent, Govt. Polytechnic, Aurangabad
2	S.V. Borde	Lecturer in Mechanical Engg. Govt. Polytechnic, Aurangabad.

(Member Secretary PBOS)

(Chairman PBOS)



11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Wood turning lathe ,hand tools	As per Workshop specification
2.	Pit furnace and foundry tools	As per Workshop specification
3	Fly press	As per Workshop specification
4	Arc welding / Gas welding set up	As per Workshop specification

12. LEARNING WEBSITE & SOFTWARE

- i. www.nptel.ac.in
- ii. <http://nptel.iitm.ac.in/video.php?subjectid=112105126>
- iii. <http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Manu%20Pro%20II/pdf/LM-01.pdf>
- iv. <http://www.savetubevideo.com/?v=H0AyVU88-k&list=PLEFE7D1579523C45D>
- v. <http://www.savetubevideo.com/?v=FTzRlop5bpa&list=PL843C2A830C65F2EE>
- vi. <http://www.savetubevideo.com/?v=81Fdif5e85c>
- vii. http://www.savetubevideo.com/?v=A0dVf_Q8BA&list=PL2C105C94D2955C8B
- viii. <http://www.savetubevideo.com/?v=Dc09Gm8D4&list=PL3AFB507B668AF162>
- ix. <http://www.savetubevideo.com/?v=THVgkbnjLq0>
- x. <http://www.savetubevideo.com/?v=6pCBkTFahI>
- xi. <http://www.savetubevideo.com/?v=7wC1u4W0V1o>
- xii. <http://www.savetubevideo.com/?v=VJ0lJZuTunI>
- xiii. <http://www.savetubevideo.com/?v=IqG9mZS0YI>
- xiv. <http://www.savetubevideo.com/?v=Mn9pqj8rao>
- xv. <http://www.savetubevideo.com/?v=8SuoH5aLlSY>
- xvi. http://www.savetubevideo.com/?v=xxNZSOML_ZA
- xvii. <http://www.savetubevideo.com/?v=XXUH2xweBov&list=PLD07DE61CB871A0CD>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Prepare pattern considering different	3	3	3	3	-	-	-	-	2	-	-	-	3

Unit - IV Hot and Cold working processes	4a. Describe different hot working processes. 4b. Describe different cold working processes.	casting 4.1 Processes of Hot working: Pipe & tube production, forging, extrusion, piercing, hot spinning. 4.2 Process of cold working: cold rolling, shearing & blanking, wire drawing, spinning, embossing, stretch forging, squeezing, high pressure sheet metal forming.
Unit - V Press and Press work	5a. Describe different types of presses 5b. Identify different parts of power press. 5c. Describe power press driving mechanism	5.1 Introduction, types of presses, 5.2 Power press parts, power press driving mechanism, press size, press tools, 5.3 Methods of punch support, methods of die support, die accessories, types of dies and operations, press guard, Types of press tools, press brake, press operations.
Unit - VI Welding	6a. Classify welding. 6b. Describe welding methods 6c. Select proper welding method for different materials	6.1 Classification of welding, 6.2 Study of welding methods – Arc welding, Gas welding, Resistance welding, Spot welding, butt welding, flash welding, seam welding, projection welding, thermit welding, inert gas arc welding, TIG welding, MIG welding, 6.3 Selection of welding methods for different materials such as cast steel, cast iron, carbon steel, stainless steel.



SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R Level	U Level	A Level	TOTAL
1	Pattern Making	6	02	04	08	14
2	Moulding	5	02	04	08	14

3	Foundry Engineering	5	02	06	06	14
4	Hot and Cold working processes	5	02	06	04	12
5	Press and Press work	5	02	04	06	12
6	Welding	6	04	04	06	14
		32	14	28	38	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Prepare a Pattern by using various allowances. • Selection of material. • Reading of drawing. • Selection of materials/tools. • Procedure for pattern making.	03 03 03 03
2	2	Prepare a sand mould for simple component. • Selection of material. • Reading of drawing. • Procedure for sand mould.	02 03 03
3	3	Produce sand casting.	08
4	5	Prepare a simple component on press machine. • Selection of material. • Reading of drawing. • Manufacturing of the component.	02 03 03
5	6	Produce a component by using arc welding process. • Reading of drawing. • Cut the raw material as per drawing. • Selection of hand tools/ machines. • Observe the welding defects & interpretation. • Application of proper safety precautions.	03 03 02 01 01
TOTAL			48

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- Visit to the Foundry shop and observe the Centrifugal/Investment/Die Casting process and identify the different defects on the surface of component.
- Visit to industry where the operation like drop forging, rolling & extrusion are carried out. Collect information on types these machines, their specification and observe various activities performed in a these processes and characteristics of output product.
- Visit to industry/workshop to observe the process like seam, spot, TIG & MIG welding. Collect information on these machines, their specification and observe these processes critically and get the information regarding various accessories (electrodes, current rating etc.) used in these processes.
- Collect information of recent advancement in manufacturing processes, machines/tools/equipments and its specifications/manufacturer and application in the industry.
- Collect information of various forming processes used in industry. Observe shape of input and output product and suggest suitable operation for various jobs.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- Improved Lecture methods-
- Q & A technique.
- Demonstration
- Seminars
- Activity based learning

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1	Workshop Technology Vol. 1	Hajra, Choudhary	Asia Publications Delhi
2	Workshop Technology Vol.1	Raghuwanshi,	Dhanpat rai and sons
3	Production Technology	R.K. Jain,	Khanna Publications
4	Workshop Technology	Chapman (Vol. 1 & Vol. 2)	Arnold Publications