



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Automobile Engineering

Subject Code: DI04002081

Subject Name: Automobile Manufacturing Technology

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - II

Prerequisite:	
Rationale:	As a diploma engineer, students are supposed to manage operations of manufacturing in the automobile industries. Therefore, they should have operational knowledge and expertise of different types of machine tools and manufacturing processes. This course provides operational knowledge and skills related to a variety of manufacturing processes. It also provides background knowledge on the different machine tools and machining operations performed on them. Course also delivers a better understanding of modern manufacturing technologies and machine tools. The course also attempts to build safety awareness among students so that they can work safely in the machine shop.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Recall the nature, classifications, working principles, and selection factors of manufacturing processes.	R & U
02	Illustrate the classification, working principles, key components, and common defects of diverse metal casting processes.	U & A
03	Categorizing metal working processes, identify their defects and remedial measure.	U & A
04	Differentiate between various metal joining processes based on their principles and diagnose the causes of common welding defects.	R & U
05	Demonstrate understanding of emerging manufacturing trends such as Industry 4.0, automation, and their applications in smart factories.	R & U

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE(E)		PA(M)	PA(I)	ESE(V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	1.1 Nature, role and scope of manufacturing process. 1.2 Classification, Selection and Applications of each manufacturing processes 1.3 Production, Types of Production, Comparison of Production and manufacturing process 1.4 Introduction to Basic Machine Tools 1.5 Working principle and Operation of: lathe, milling, drilling, shaper, planer and grinding machine. 1.6 Describe working principles of surface finishing methods such as honing, buffing, lapping and polishing. 1.7 Factors affecting the selection of suitable Machine tool.	09	20%
2.	2.1 Introduction and classification of metal casting methods. 2.2 Working principles of sand casting 2.3 Types of patterns, allowances and pattern materials 2.4 Types of moulding sands and its properties. 2.5 Introduction about Gating system 2.6 Working of melting furnaces. 2.7 Working principles of centrifugal casting, die casting & investment casting. 2.8 Casting defects & remedial measures.	09	20%
3.	3.1 Introduction and classification of metal working methods. 3.2 Hot and cold working processes. 3.3 Working principles and application of: Rolling, Blanking, Piercing, Wire and Tube Drawing, Spinning, Forging, Bending, Embossing and Extrusion. 3.4 Recent trends in metal forming: Hydroforming, Superplastic Forming, Incremental Sheet Forming, Electromagnetic Forming (EMF) & Electrohydraulic Forming (EHF) 3.5 Defects observed in cold and hot working processes & its Remedial measures. 3.6 Classification, construction and Working principle of press machine.	09	20%
4.	4.1 Introduction and classification of metal joining methods 4.2 Types of Welding joints	8	17%



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	4.3 Working principles, application, and limitations of Gas Welding, Arc Welding, 4.4 Special welding processes such as TIG, MIG, friction welding, Resistance Welding, Laser beam welding and Electron beam welding. 4.5 Working principle of Soldering, Brazing and Braze Welding. 4.6 Application of Welding robots in Automobile. 4.7 Defects and Remedial Measures in Welding.		
5.	5.1 Classification, comparison between conventional and non-conventional machining processes 5.2 Working principles, application, and limitations of Electrical Discharge Machining (EDM), Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Laser Beam Machining (LBM), Electron Beam Machining (EBM) 5.3 Introduction, basic principles and need of Additive Manufacturing -3D Printing and its applications in Automobile 5.4 Need and Role of Automation in manufacturing of automobile industry 5.5 Basic concepts of NC, CNC, DNC, CIM, GT, FMS 5.6 Application of Automated Material handling tools like AGVs, AS/RS and Robots 5.7 Recent trend in Industry Automation: Basic concepts of Industry 3.0, Industry 4.0, Industry 5.0	10	23%
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
40	40	20	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Production Technology	R. K. Jain & S.C.Gupta	Khanna Publications.



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			ISBN: 9788174090997
2	Production Technology Vol-I, Vol-II	O.P.Khanna	Dhanpat Rai and Sons ISBN: 978-9383182046
3	Elements of Workshop Technology Vol-I, Vol-II	Hazra Choudhary	Media promoters and publishers pvt. Limited, ISBN: 978-8185099156
4	Workshop Technology Vol- I, Vol-II	Raghuwanshi	Dhanpat Rai and Sons, Publication: 01- 01-2017
5	Manufacturing processes	M. L. Begeman	Wiley International edition, USA, ISBN(10)0471062405, ISBN(13)978-0471062400
6	A Textbook Of Workshop Technology: Manufacturing Processes	R.S. Khurmi and J.K. Gupta	S. Chand Limited ISBN(10)812190868X , ISBN(13)978-8121908689
7	Manufacturing Technology: Foundry, Forming & Welding	P.N. Rao	TATA Mc-Graw Hill ISBN (13)978-9353160500 , ISBN (10)9353160502
8	Automation, Production Systems, and Computer- integrated Manufacturing	Mikell P. Groover	PEARSON ISBN 13: 978-0-13-349961-2 ISBN 10: 0-13-349961-8
9	Computer Aided Manufacturing	P. N. Rao, N. K. Tewari, T. K. Kundra,	TATA Mc-Graw Hill , ISBN(13):978-0-07-068193-4

(b) Open source software and website:

1. <https://nptel.ac.in>
2. <https://swayam.gov.in>
3. <https://vlab.co.in>



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Suggested Course Practical List:

Sr. No	Practical Outcomes (PrOs)		Unit No.	Approx. Hrs. required
1	Identify various manufacturing processes & its application in Automobile.	Any one	I	04
2	Demonstrate any one surface finishing operation (honing, buffing, lapping & polishing).		I	04
3	Demonstrate operation of lathe, milling, drilling, shaper, planer and grinding machine.		II	06
4	Prepare a pattern for the given components/drawings, considering pattern allowance.	Any one	II	04
5	Prepare a mould using a prepared pattern, and molding sand. Also pour molten metal and get the casting. (Use wax in place of molten metal for the purpose of demonstration.		II	04
6	Identify various casting defects of given casting parts and suggest remedial measures.		II	04
7	Prepare a job using hot/cold forging/hot smithy process.	Any One	III	04
8	Identify various defects of given hot/cold metal working process and suggest remedial measures.		III	04
9	Prepare a job using arc welding. This includes cutting of raw material and edge preparation.	Any two	IV	04
10	Prepare a job using gas welding. This includes cutting of raw material and preparation of pre-weld parts.		IV	04
11	Prepare a job using special welding processes such as TIG, MIG, Friction welding, Resistance welding, laser beam & Electron beam welding.		IV	04
12	Prepare two jobs, one using soldering and another using brazing.		IV	04
13	Demonstrate or Make a chart on, any two advance manufacturing process. (EDM, USM, AJM, LBM and EBM.)	Any two	V	04
14	Make a report on Automation in Manufacturing Technology.		V	04
15	Demonstrate working of CNC Lathe and/or CNC Milling Machine.		V	04
16	Make a report on Industrial revolution Industry 3.0, Industry 4.0 and Industry 5.0.		V	02



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17	Prepare a report on Role of Additive Manufacturing in Automotive Design and Production.	Any one	V	02
Total Hrs.		08		30

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	<ol style="list-style-type: none">1. Bench Grinder2. Hand Grinder3. Lapping Machine4. Honing tools5. Buffing tools6. Polishing tools	2
2	Machine tools: <ol style="list-style-type: none">1. Lathe2. Milling3. Shaper4. Planner5. Bench drill	3
3	Pattern Making: <ol style="list-style-type: none">1. Wood cutting planer machine/Wood2. jack plane3. Carpentry vice4. Flat file5. Hammer6. Steel rule7. Right angle8. Saw	4
4	Molding: <ol style="list-style-type: none">1. Cope and drag Boxes2. Molding sand with additives and3. binder4. Vent wire5. Furnace or Oven6. Consumable (Wax)	5
5	Smith forging:	7



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	<ol style="list-style-type: none">1. Anvil2. Furnace3. Hammer4. Tong5. Steel rule6. Air blower7. Swage block	
6	Arc welding: <ol style="list-style-type: none">1. Arc welding Machine with electrodes2. holder3. Tong4. Chipping hammer5. Wire brush6. Hand gloves7. Hand screen8. Safety goggles9. Hacksaw cutting machine10. Hand files	9
7	Gas welding: <ol style="list-style-type: none">1. Oxy acetylene gas cylinders with Regulators2. Welding torch3. Tong4. Chipping Hammer5. Steel rule6. Hand gloves7. Safety goggles8. Hacksaw cutting machine9. Hand files	10
8	Spot/Resistance welding <ol style="list-style-type: none">1. Spot welding machine2. Plier cutter3. Hammer4. Steel rule5. Anvil	11
9	Soldering/ Brazing <ol style="list-style-type: none">1. Brazing torch2. Consumables3. Tong4. Hammer	12



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	5. Anvil 6. Wire brush 7. Soldering iron & lead wire 8. Circuit holding Clamps	
10	1. Electric discharge machine 2. Ultrasonic cutting machine 3. Abrasive jet machine 4. Laser beam cutting machine 5. Electron beam discharge machine	13
11	1. CNC Lathe machine with all tools & attachments 2. CNC Milling machine with all tools & attachments	15

Suggested Project List:

Seminar by Students on manufacturing processes like forging, casting, welding process etc..
Prepare Display Board such as gas cutting kit, welding kit etc.
Prepare job to explore various welding techniques applicable in automobile Industries.
Prepare job to explore various operations using various machine tools and measuring Equipment's.
Internet Base Assignment, Teacher guided self-learning activity etc.(These could be Individual or group base.)
Each student will present and will prepare report on: a. His/her observation for the jobs made. b. His/her experience during industrial visits. Process parameters and their effects.
Select four industrial components (approved by teacher) and list various methods of manufacturing used to produce these components.
Prepare a list of household items which are prepared by joining processes.
Prepare videos of any working-job practical.
Prepare a list of industries/workshops in the nearby area which are producing Components by casting/forming/ Joining.
Identify the types of manufacturing processes used in making the main component of a car engine.



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Suggested Activities for Students: If any

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of each activity. They should also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a) Charts can be prepared.
- b) Small report on any topic given by concern faculty.
- c) Small groups of students can be formed for assigned work. Assigned work should be such that it covers market survey, team work, presentation, time management, quality development.

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