GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: MANUFACTURING ENGINEERING - I (Code: 3331901)

Diploma Programme in which this course is offered	Semester in which offered
MECHANICAL ENGINEERING	3rd Sem

1. RATIONALE

This subject provides knowledge regarding different types of manufacturing processes used to produce high quality products with optimum cost and time. It also provides a knowledge frame that can be used to suggest and manipulate vital process parameters related to different manufacturing processes so that the component thus produced can compete in today's global market. It also inculcates safety consciousness in the student required during manufacturing of a component.

2. COMPETENCY

Manipulate various process parameters related with different manufacturing processes effectively to produce a given component as per the requirement.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L -Lecture; **T -**Tutorial/Teacher Guided Student Activity; **P -**Practical; **C -** Credit; **ESE**-End Semester Examination; **PA** -Progressive Assessment

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Introduction to Manufacturing Processes	1a. Explain the basic manufacturing processes. 1b. Describe various mechanical properties involved.	1.1 Nature, role and scope of manufacturing processes. 1.2 Role of machining, forming, casting and joining processes in manufacturing of industrial components. 1.3 Recall mechanical properties of material.
Unit – II Metal Working Processes	2a. Compare the principles of hot and cold working Process. 2b. Identify and explain various metal working processes. 2c. Suggest appropriate forming process and basic parameters for a given industrial component.	2.1 Hot and cold working processes. 2.2 Rolling, Forging, Spinning, Drawing, Extrusion, Forming, Swaging. - Working principle - Equipments used and their specifications - Process parameter - Application
Unit – III **Metal &** **Non metal Casting Processes**	3a. Appreciate the need of casting process. 3b. Calculate pattern allowances. 3c. Explain the standard colour coding on pattern as well as core. 3d. Compare various casting methods. 3e. Suggest appropriate casting method suitable for a given industrial component. 3f. Identify casting defects, their causes and suggest remedies.	3.1 Types of foundries 3.2 Pattern - Importance - Types - Drawings and colour codes - Material - Making process - Allowances and their values - Application 3.3 Cores - Types - Making materials and its properties - Testing - Sintering - Application 3.4 Furnaces - Types - Working and applications 3.5 Moulding sand - Sand properties - Sand mixing - Sand binders 3.6 Moulding equipments, their major specifications, applications. 3.7 Types of mould, mould making, mould sintering and applications of mould. 3.8 Salvage techniques. 3.9 Recovery of sand. 3.10 Casting processes - Centrifugal - Die - Investment - Shell moulding - Special castings

Unit	Major Learning Outcomes	Topics and Sub-topics
		3.11 Casting defects - Types, Causes, effects, remedies 3.12 Casting of non metallic material - Injection moulding - Blow moulding 3.15 Safety precautions in foundry.
Unit – IV Metal Joining Processes	4a. Appreciate the need of joining process to reduce cost and time. 4b. Explain different welding processes. 4c. Identify the area of application of a particular joining process. 4d. Suggest appropriate process parameters based on given joining situation. 4e. Practice standard safety norms during any joining process.	a. Introduction and classification. b. Welding - Gas welding(Oxy-acetylene, Air-acetylene, oxy-hydrogen and LPG Oxygen) - Arc welding (Carbon arc, metal arc, MIG, TIG, flux coated arc and Submerged arc) - Resistance welding (Butt, spot, seam, projection and percussion) - Thermit welding - Forged welding Working principle, setup sketch, specifications of equipment, functions of each element, process parameters for various materials, and safety precautions. c. Soldering - Working principle - Setup sketch - Specifications of equipment, tools and consumables - Functions of each element - Process parameters for various materials - Safety precautions d. Brazing - Working principle - Setup sketch - Specifications of equipment, tools and consumables - Functions of each element - Process parameters for various materials - Safety precautions e. Adhesive joining - process, applications f. Fastening process - process, applications

5 SUGGESTED SPECIFICATIONTABLE WITH HOURS & MARKS(THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Manufacturing Processes	03	04	03	00	07
II	Metal Working Processes	12	07	08	06	21
III	Metal & Non metal Casting Processes	15	05	08	08	21
IV	Metal Joining Processes	12	05	09	07	21
Total		**42**	**21**	**28**	**21**	**70**

6. SUGGESTED LIST OF STUDENT ACTIVITIES

1. Select four industrial components (approved by teacher) and list various methods of manufacturing used to produce these components.
2. Select at least two components which are made by casting only. Also sate the type of casting method used.
3. Prepare a list of household items which are prepared by joining processes.
4. Prepare a list of plastic items which are produced using different types of casting methods. Also name the process used.
5. Using internet prepare a list of industries/workshops in the nearby area which are producing components by machining, casting and forming.
6. Identify the type of manufacturing process used in making main component of a car engine.

7. SUGGESTED LIST OF EXPERIMENTS:

S. No.	Unit Number	Description of Laboratory Experiment	Hours
1	II	Prepare a job using forging process. This includes cutting of raw material and preparation of pre forged parts.	06
2	II	Demonstration of spinning process with preparation of a job.	04
3	II	Visit a nearby sheet metal/press tool industry and prepare a two page report comprises of types of item produced, quantities, different sections, equipments used with specification and consumables.	--
4	II	Visit a nearby Rolling mill/Hot-Cold material processes, allied manufacturing processes industry and prepare a two page report comprises of types of item produced, quantities, different sections, equipments used with specification and consumables.	--

5	III	Demonstration of metal melting, metal pouring, metal casting and casting finishing. Also demonstrate and prepare a report on casting defects. (Use wax in place of molten metal for the purpose of demonstration.)	06
6	III	Prepare a pattern drawing, pattern and core from the given component/drawing.	06
7	III	Prepare a mould using prepared pattern, core and moulding sand.	06
8	III	Visit a nearby foundry and prepare a two page report comprises of types of item produced, quantities, different sections, equipments used with specification and consumables.	--
9	IV	Prepare a job using arc welding. This includes cutting of raw material and preparation of pre-weld parts. Minimum 4 parts should be taken and should include tags and continuous welding.	08
10	IV	Prepare a job using gas cutting and gas welding. This includes cutting of raw material and preparation of pre-weld parts. Minimum 3 parts should be taken and should include tags and continuous welding.	08
11	IV	Prepare a job using spot/seam resistance welding. This also includes cutting of raw material and preparation of pre-weld parts.	06
12	IV	Prepare a job using brazing. This also includes cutting of raw material and preparation of pre weld parts.	06
13	IV	Visit a nearby fabrication industry and prepare a two page report comprises of types of item produced, quantities, different sections, equipments used with specification and consumables.	--

8. SUGGESTED LEARNING RESOURCES

List of Books:

Sr no.	Title of Books	Author	Publication
1.	Workshop Technology I & II	J. A. Schey	Tata MacGraw Hill Education
2.	Workshop Technology I & II	Raghuwanshi	Dhanpat Rai and Sons
3.	Workshop Technology I, II & III	W. A. J. Chapman	Arnold

4.	Manufacturing Processes	M. L. Begman	Wiley India
5.	Production Technology	R.K.Jain and S.C.Gupta	Khanna publication
6.	Welding Engineering	B.E.Rossi	Jefferson Publications
7.	Audles Welding Guide	F.D.Graham	Wiley India
8.	Foundry Engineering	P.L.Jain	Tata MacGraw Hill Education
9.	Principle of Foundry	Jain & Gupta	National Book Trust, India
10.	Manufacturing Processes	S.E.Rusinoft	Times of India Press
11.	Production Technology	H.H.Marshall	Machinery Publishing Company

(B) List of Software/Learning Websites

8. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. Mr. M. M. Jikar, HOD, Mechanical Engineering, N. G. Patel Polytechnic, Bardoli.
2. Mr. M. K. Patel, Lecturer in Mechanical Engineering, M. L. Institute of Diploma Studies, Bhandu.

Coordinator and Faculty Members from NITTTR Bhopal

1. Prof. S. K. Pradhan, Associate Professor & Head Department of Mechanical Enginnering, NITTTR, Bhopal.
2. Prof. C. K. Chug, Professor, Department of Electonic media, NITTTR, Bhopal.