

GOVERNMENT OF GUJARAT
LUKHDHIRJI ENGINEERING COLLEGE, MORBI
 Mechanical Engineering Department

Course Teaching-Learning-Evaluation Strategy

Subject: **Manufacturing Technology (3151912)**

Academic Year: 2022-23

Sem: 5th Semester (Div: A & B)

Faculties: Prof.J.M.Pujara & Prof.J.H.Solanki

Course Outcomes (Cos)

CO Nos.	CO statement	Weightage (Marks %)
1.	Interpret foundry practices like pattern making, mold making, Core making and Inspection of defects.	25
2.	Differentiate various metal forming processes	25
3.	Select appropriate metal joining Processes to join similar or dissimilar metals.	25
4.	Classify different plastic moulding processes and application	13
5.	Distinguish different Super Finishing Technology	12

Teaching and Examination Scheme:

Teaching Scheme			credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESEI	PA(M)	ESE(V)	PA(I)	
3	0	2	4	70	30	30	20	150

Distribution of marks Weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Marks% Weightage	10	30	30	10	10	10
70 marks	7	21	21	7	7	7
30 marks	3	9	9	3	3	3

Course Content with lecture plan:

Sr. No.	Chapter	Course outcome(s)	Lecture(s) require	Faculty
1	Manufacturing Technology: Importance of manufacturing, economic and technological definition of manufacturing, Classification of manufacturing processes, Selection of Manufacturing process.	CO1	3	JMP
2	Foundry Technology: Patterns practices: Types of patterns, allowances and material used for patterns, moulding materials, moulding sands, Moulding sands; properties and sand testing; grain fineness; moisture content, clay content and permeability test, core materials and core making, core print; core boxes, chaplets, gating system design. Moulding practices: Green, dry and loam sand moulding, pit and floor moulding; shell moulding; permanent moulding; carbon dioxide moulding. Casting practices: Fundamental of metal casting, Sand casting, Shell-Mould casting, Mold casting (plaster and ceramic), Investment casting, Vacuum casting, Permanent mould casting, Slush casting, Pressure casting, Die casting, Centrifugal casting, Continuous casting, Squeeze casting, Casting alloys, Casting defects, Design of casting, Gating system design, and riser design. Melting furnaces- rotary, Pit electric, Tilting and cupola. Metallurgical considerations in casting elements of gating system, and risers and their design.	CO1	10	JMP
3	Metal Joining Processes: Principle of welding, soldering, Brazing and adhesive bonding. Classification of welding and allied processes. Gas welding and gas cutting, Principle, Oxyacetylene welding equipment, Oxyhydrogen welding. Flame cutting. Arc welding, Power sources and consumables, Gas welding and cutting, Processes and Equipment. Resistance welding, Principle and Equipment, Spot, Projection and seam welding process, Atomic hydrogen, ultrasonic, Plasma and laser beam welding, Electron beam welding, and special welding processes e.g. TIG, MIG, friction and explosive welding, welding of C.I. and Al, Welding defects. Electrodes and Electrode Coatings, Welding positions.	CO3	10	JMP
4	Forming and Shaping Processes: Metal working, Elastic and plastic deformation, Concept of strain hardening, Hot and cold Working, Rolling: Principle and operations, Roll pass sequence, Extrusion, Wire and tube drawing processes. Forging: Method of forging, Forging hammers and presses, Principle of forging tool design, Cold working processes: Shearing, Drawing, Squeezing, Blanking, Piercing, deep drawing, Coining and	CO2	10	JHS

	embossing, Metal working defects, cold heading, Riveting, Thread rolling bending and forming operation.			
5	Plastic Technology: Introduction, Classification of Plastics, Ingredients of Moulding compounds, General Properties of Plastics, Plastic part manufacturing processes such as compression moulding, Transfer moulding, Injection moulding, Extrusion moulding, Blow moulding, Calendaring, Thermoforming, slush moulding, laminating.	CO4	6	JHS
6	Advance Super finishing Technology: Introduction, Lapping, Honing, Buffing, Barrel Tumbling, Burnishing, Powder coating, and Polishing.	CO5	6	JMP

Reference Books:

1. Production technology, by R.K. Jain, Khanna publishers.
2. Production Technology by P.C. Sharma S Chand & Co Ltd.
3. Manufacturing Technology Vol-II, By P.N. Rao, Tata McGraw Hill.
4. Manufacturing Engg. And Technology By S. Kalpakajain, PHI/Pearson.
5. Welding technology, by O.P.Khanna, DhanpatRai publishers.

Course Evaluation Plan

	Direct Assessment				
	Internal Evaluation			External(Uni.) Evaluation	
	Mid Sem Exam (continue evaluation) (Theory)	Lab. Work	Assignment/ Quiz	Practical/ Viva (IF)	Uni. Exam (Theory)
Max. Marks	30	20	20	30	70
Weightage	30%			70%	
CO1	15	5	4	6	14
CO2	15	5	4	6	14
CO3	0	5	4	6	14
CO4	0	5	4	6	14
CO5	0	0	4	6	14

Course articulation matrix correlation

CO No.	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO1	3	3							1					2
CO2	3	3							1					2
CO3	3	3	2						1					2
CO4	3								1					2
CO5	3								1					2

Justification(s) of correlation between Co and Pos/PSOs

Mapping	Justification(s)
3151912-1 WITH PO1, PO2, PO9, PSO2	3151912-1 mapped with PO1, PO2, PO9 and PSO2 because through 3151912-1 students are able to demonstrate the ability to think in core concept of their engineering applications by studying manufacturing processes in mechanical engineering.
3151912-2 WITH PO1, PO2, PO9, PSO2	3151912-2 mapped with PO1, PO2, PO9 and PSO2 because the student will demonstrate the ability to apply process parameters of different manufacturing processes to obtain qualitative solutions.
3151912-3 WITH PO1, PO2, PO3, PO9, PSO2	3151912-3 mapped with PO1, PO2, PO3, PO9 and PSO2 because students able to select manufacturing techniques for real life applications.
3151912-4 WITH PO1, PO9, PSO2	3151912-4 mapped with PO1, PO9 and PSO2 by understanding effect of process parameters of various manufacturing processes.
3151912-5 WITH PO1, PO9, PSO2	3151912-5 mapped with PO1, PO9 and PSO2 because students able to distinguish among various super finishing process.

Tagging of Cos with POs, PSOs, Cognitive Level, Knowledge Categories and the number of sessions (R-Remember, U-Understand, Ap- Apply, An-Analyse, E-Evaluate and C-Create)

Knowledge categories (F – Factual, C – Conceptual, P – Procedural and M – Metacognitive)

CO No.	Statement	POs	PSOs	Cognitive Level	Knowledge Categories
CO1	Interpret foundry practices like pattern making, mold making, Core making and Inspection of defects.	PO1 PO2 PO9	PSO2	R,U,An,Ap,E	C,P,M
CO2	Differentiate various metal forming processes	PO1 PO2 PO9	PSO2	R,U,An,Ap,E	C, P,M
CO3	Select appropriate metal joining Processes to join similar or dissimilar metals.	PO1 PO2 PO3 PO9	PSO2	R,U,An,Ap,E	C, P,M
CO4	Classify different plastic moulding processes and application	PO1 PO9	PSO2	An, Ap	C, P
CO5	Distinguish different Super Finishing Technology	PO1 PO9	PSO2	An, Ap	C, P

List of Experiments:

Sr. No.	Title	COs	POs	PSOs	Marks
1	To study about different basic manufacturing processes.	CO1	PO1 PO2 PO9	PSO2	1
2	To study about different types of pattern.	CO1	PO1 PO2 PO9	PSO2	1
3	To calculate pattern allowance and hands on Exercise on Pattern Making.	CO1	PO1 PO2 PO9	PSO2	2
4	To study about advance casting processes.	CO1	PO1 PO2 PO9	PSO2	1
5	To study about Gas welding.	CO3	PO1 PO2 PO3 PO9	PSO2	1
6	Demonstration of arc welding process.	CO3	PO1 PO2 PO3 PO9	PSO2	2
7	To evaluate different welding parameters in resistance welding.	CO3	PO1 PO2 PO3 PO9	PSO2	2
8	To study about metal forming processes.	CO2	PO1 PO2 PO9	PSO2	2
9	To study about sheet metal forming Methods.	CO2	PO1 PO2 PO9	PSO2	3
10	To study about plastic technology.	CO4	PO1 PO9	PSO2	5

Online Links:

1. <https://nptel.ac.in/courses/112/104/112104301/>
2. <https://nptel.ac.in/courses/112/107/112107250/>
3. <https://nptel.ac.in/courses/112/103/112103279/>

List of Open Source Software/learning website:

NPTEL notes and videos