GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162110
Semester – VI
Subject Name: Materials Processing

Type of course: Engineering/science

Prerequisite: Basic fundamentals of introduction to materials engineering

Rationale: The syllabus is design to introduce the students the fundamentals of deformation processing related to various manufacturing processes, to obtain knowledge of various metal joining processes of various engineering alloys. To understand concepts associated with solidification and its physical metallurgy and to obtain the basic knowledge of processing of ceramic and glassy materials and their comparison with other materials.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Tutorial Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	4	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Principles of plasticity related to metal forming, cold, warm, and hot working, dynamic recovery and recrystallization. Basic metal forming processes such as Rolling, Forging, Extrusion, Wire Drawing, Sheet metal working.	**10**
2	Welding versus other joining processes, Welding processes, welding metallurgy, TTT and CCT diagrams, carbon equivalent, welding of ferrous and non-ferrous alloys, joining of dissimilar metals.	**10**
3	Casting. Thermodynamics of solidification, Nucleation and growth, undercooling, dendritic growth, structure of castings and ingots, heat transfer during solidification, types of casting processes.	**04**
4	Structure of ceramics and glassy materials, ceramic powder preparations, forming and consolidation processes.	**02**
5	Comparison of processing and applications of different materials.	**02**
	Total	**28**

Suggested Specification table with Marks (Theory):

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Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10%	**25%**	**40%**	**20%**	**5%**	**0%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Principles of Metal Casting by R. W. Haine, C. Loper, and P. C. Rosenthal. McGraw Hill Education, 2001
2. Introduction to Ceramics by Kingery, Bowen, Uhlman. Wiley India Pvt Limited, 2012
3. Welding Engineering & Technology by Dr. R.S.Parmar , Khanna Publishers, India, 2013
4. Manufacturing Processes-II, Dr. R.P.Arora, Tech-max Publication,2018.

Course Outcomes
After completing this course, students will able to,

Sr. No.	CO statement	Marks % weightage
CO-1	Classify the bulk metal processing methods.	55
CO-2	Comparison of various materials processing.	30
CO-3	Select suitable metals & alloys processing methods.	15

List of Practical:

1. To Study on process parameters of Rolling, Forging, Extrusion and Wire-drawing.
2. To Study on Classification of Welding processes.
3. To Perform Bead on Plate welding using SMAW Process & study its process characteristics.
4. To Perform Bead on Plate welding using GTAW Process & study its process characteristics.
5. To Perform Bead on Plate welding using GMAW Process & study its process characteristics.
6. To Study weld ability of dissimilar metal welding.
7. To develop metal casting and study its solidification processes.
8. To study Structure –Processing and Application of Ceramic & glassy materials.
9. Study Structure –Processing and Application of Ceramic & glassy materials.
10. Report writing on Industrial Visit.

List of Open Source Software/learning website:

http://nptel.iitm.ac.in/
www.ocw.mit.edu

Suggested Industrial Visit- Rolling mill / Foundry/ Welding Shop.