GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Design Syllabus (Industrial Design)

Subject Code : 10130305

Subject Name : Materials and Production Processes I

WEF Academic Year :	2024-25
Semester :	3
Category of the Course :	**Core**

Prerequisite :	Materials and Processes
Rationale :	Understanding and knowledge of various materials and production processes for manufacturing is vital for designing products. Ability to make informed decisions for choice of any specific material, production process, finishes, detailing and assembly forms an indispensable competency of a designer in practice. Ability to engage with production and engineering teams in exploring possibilities and engaging with thorough knowledge is vital to design optimisation and decision making.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
2	0	0	2	70	30	30	20	150
Continuous marking based on classroom assignments pertaining to different aspects of visual Design Elements. Final internal presentation in form of course documentation. End semester evaluation by external jury to evaluate extent and quality of explorations, initiative, originality of visual ideas and overall understanding of various visual elements of form and aesthetics.								

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Unit I: Understanding Metals and Processes** Properties and sources of ferrous and Non-ferrous metals like steel, brass, copper, bronze, aluminum, titanium and their available forms, profiles with tactile, mechanical, economic and aesthetic attributes. Different manufacturing and fabrication processes of metals and their advantages and limitations- sand casting, lost wax casting, die casting, extrusion, spinning, forming etc. Joinery types for different metals such as welding, brazing, adhesives, fasteners.	9	30
2	**UNIT II: Non-conventional Manufacturing Processes and Methods** Laser Deposition, Micro-Plasma Powder Deposition, Chemical vapor Deposition, Micro Welding, Powder Casting, Metal 3D Printing, Powder Deposition 3D printing; Extruded Filament 3D printing, Clay 3D printing, Stereolithography,Electrochemical machining, Electro-Discharge machining, Ultrasonic Machining, Laser Beam Machining, Water jet machining, Abrasive Jet Machining, Plasma Arc machining, Water Jet Cutting, Plasma Cutting, Laser Cutting, Electro-Discharge Wire Cutting; Abrasive Jet Cutting.	9	30
3	**Unit III: Surface finishing** Laser Etching, Acid/Base Etching, Electrochemical Etching, Sandblast Etching, Ultraviolet Etching, Photochemical Machining, Electrochemical Polishing, electroplating, polishing, coating, printing, *Visits to different markets and industries to experience different production processes and forms of raw materials available.*	10	40
	Total	28	100

Reference Book:

- Thompson R, 'Manufacturing process for design professionals', Thames and Hudson, London, 2007.
- Ashby, Michael, Johnson, Kara, 'Materials and Design: The Art and Science of Material Selection in Product Design', Butterworth-Heinemann, 2002.
- Garratt J, 'Design and Technology', Cambridge University Press, UK, 2004
- Vijay K. Jain, Advanced Machining Processes. Allied Publishers, New Delhi, 2007
- P. C. Pandey and H.S. Shan, Modern Machining Processes, Tata McGraw-Hill, New Delhi, 2007
- G.F. Benedict, Non-traditional Manufacturing Processes, Marcel Dekker Inc., New York, 1987 McGeough, Advanced Methods of Machining, Chapman and Hall, London, 1998

- Paul De Garmo, J.T. Black, and Ronald A. Kohser, Material and Processes in Manufacturing, Prentice Hall India, 2001.
- Bell, Victoria, Ballard, Rand, Partick, Materials for Design 2, 2014
- Kalpakjian, Serope, Schmid, Steven R., AICTE Recommended| Manufacturing processes for engineering materials | By Pearson 2018
- Thompson, Rob, Thompson, Martin, The Materials Sourcebook for Design Professionals, 2017

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level*
01	Enable thorough understanding of metals as materials for design decisions of new products.	
02	Provide an informed judgment to analyze and select suitability of materials, properties and production processes.	
03	Provide insights into emerging non-conventional processes and technologies in manufacturing.	
04	develop sound understanding of various aspects of joinery, finishing, assembly and aesthetic qualities of metals.	
05	Enable selection and use of different techniques, methods, skills and judgment about contemporary engineering tools and machinery for production.	
06	provide conceptual clarity of various principles of production and their advantages and limitations	

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

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