GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering

Level: Diploma

Branch: Mechanical Engineering/Mechanical Engineering (CAD/CAM) /Mechatronics Engineering

Course / Subject Code: DI02000111

Course/Subject Name: Engineering Workshop Proficiency

w.e.f. Academic Year:	2024-25
Semester:	2nd
Category of the Course:	ESC

Prerequisite:	NIL
Rationale:	The Engineering Workshop Proficiency course is designed to provide diploma-level mechanical engineering students with practical skills essential for their professional development. The hands-on experience gained through this course enables students to understand the operation of various hand tools, ensuring they can perform fundamental mechanical tasks efficiently. By exploring fitting, carpentry, welding, and plumbing operations, students build a strong foundation in practical engineering techniques. This course also emphasizes the importance of safety, and adherence to industry standards, preparing students for real-world challenges in mechanical engineering environments.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Apply safety measures and practices while handling tools, machines, and materials in various workshop environments to ensure safe operations.	**A**
02	Demonstrate proficiency in using fundamental tools and techniques for mechanical tasks, including measurements, marking, and basic engineering operations	**A**
03	Perform fitting, carpentry, sheet metal, welding, and plumbing operations to fabricate simple components.	**A**
04	Outline piping systems and their industrial applications, including material selection, layout design, and component identification.	**U**
05	Interpret codes and standards relevant to mechanical engineering practices.	**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
				Theory		Tutorial/ Practical		
L	T	PR	C	ESE (E)	PA/CA (M)	PA/CA(I)	ESE (V)	
0	0	6	3	0	0	20	30	50

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1	Prepare workshop layout with general specifications of equipments available in various shops.	04	04
2	**Workshop Safety Practices** 1. Demonstration of Safety Practices • Demonstrate safety protocols in a workshop environment. • Highlight the use of personal protective equipment (PPE) and safe handling of tools and materials. 2. Interpretation of Industrial Safety Data Sheet • Emphasize understanding hazard symbols, handling instructions, and emergency procedures. 3. Demonstration of Fire Extinguisher Operations • Provide hands-on training on the types and uses of fire extinguishers.	04	04
3	**Fundamentals of unit Conversions, Mechanical Measurements, Materials and Engineering Specifications.** (1) Hands-On Practice in Mechanical Measurements • Perform measurements using standard basic tools and equipment (Vernier caliper, micrometer, dial indicators, protractor, etc.) • Understand units of measurement and practice their conversions. (2) Tolerances, Limits, and Fits • Demonstration of the principles of tolerances, limits, and fits in mechanical engineering applications.	12	13

	(3) Geometric Properties • Demonstration of the Importance of geometric properties such as straightness, flatness, squareness, parallelism, perpendicularity, roundness, concentricity, etc. (4) Standard Sizes and Costs of Raw Materials • Learn about the standard sizes of commonly used raw materials in the Indian market (e.g., round bars, square bars, hex bars, angles, and channels). • Prepare a table outlining the costs of these materials. (5) Fasteners and their Specifications • Understand the standard sizes and specifications for fasteners (e.g., nuts, bolts, screws, etc.) commonly used in Indian markets. • Create a reference table for their costs and specifications. (6) Geometric Calculations • Calculate the area, volume, mass, and material costs of various geometric shapes. • Assign 3-4 components for students to complete geometric calculations.		
4	Demonstration of Hand Tools and Power Tools with general Specifications.	04	04
5	**FITTINGSHOP:** Prepare at least one Fitting job incorporating operations such as Marking, Punching, Filing, Chamfering, etc. as per drawing.	14	16
6	**CARPENTRY SHOP:** Prepare at least one Carpentry job incorporating operations such as Measuring, Marking, Cutting, Assembly, and Joint Preparation (T-Joint, Dovetail Joint etc.) as per drawing.	14	16
7	**SHEET METAL WORKING:** Prepare at least one Sheet Metal job incorporating operations such as Cutting, Bending, Edging, Riveting, etc. as per drawing.	10	11
8	**WELDING SHOP :** (1) **Demonstration of Gas and Arc Welding Setups:** • Understand the equipment and process parameters for gas and arc welding.	12	14

	(2) **Practice of Arc Welding:** • Perform a simple arc welding job, including edge preparation as per drawing. (3) **Practice of Gas Welding:** • Complete a simple gas welding job as per the given requirements. (4) **Demonstration and Practice of Soldering and Brazing:** • Learn and perform basic soldering and brazing techniques.		
9	**PLUMBING:** (1) **Demonstration of Plumbing Tools and Pipe Fitting Accessories:** • Learn about various plumbing tools and fittings, including their uses and specifications. (2) **Plumbing Layout Preparation:** • Design and prepare a plumbing layout incorporating components such as elbows, tees, reducers, unions, couplings, crosses, caps, swage nipples, plugs, bushings, adapters, outlets, valves, and flanges. (3) **Overview of Industrial Piping Components & system** (Valves, Fittings & Flanges, Joints & connectors) (4) **Group Task:** • Collaborate in groups of four to five students to create a domestic plumbing model using UPVC/CPVC materials.	10	11
10	**Overview of Codes and standards- Application in mechanical engineering.** 1. Introduction to Codes and Standards: o Understand the importance of codes and standards in ensuring safety, quality, and consistency in mechanical engineering practices. 2. Key Mechanical Engineering Standards: o ASME (American Society of Mechanical Engineers): Overview of its significance and applications in mechanical systems. o ASTM (American Society for Testing and Materials): Learn about its role in material testing and specifications. o ISO (International Organization for Standardization): Introduction to its global standards for mechanical engineering	06	07

	processes and systems. 3. Practical Application: ○ Identify real-life examples where these standards are applied in mechanical engineering. ○ Assign a task to prepare a brief report or presentation on one selected standard and its industrial applications.		
	Total	**90**	**100**

References/Suggested Learning Resources:

(a) Books:

S. No	Title of Book	Author	Publication with place, year and ISBN
1	Workshop Practice	H.S. Bawa	McGraw Hill Education, Noida ISBN: 978-0070671195
2	A Textbook of Manufacturing Process (Workshop Technology)	J.K.Gupta and R.S. Kurmi	S.Chand and Co. New Delhi ISBN:81-219-3092-8
3	Introduction to Basic Manufacturing Process and Workshop Technology	Rajender Singh	New Age International, New Delhi ISBN: 978-81-224-3070-7
4	Elements Of Workshop Technology	S K. Hajra Choudhury & Nirjhar Roy	Revised & Enlarged 16 Th Edition (January 2023) MEDIA PROMOTERS & PUBLISHERS

(b) Websites:

Fire extinguisher demonstration: https://www.youtube.com/watch?v=DC2QMOM1P0M
Limits-Fits-Tolerances: https://www.youtube.com/watch?v=ArGKUSJ5m7I
Fitting Practice: https://www.youtube.com/watch?v=KgQyuCrOKoU
Fitting Practice: https://www.youtube.com/watch?v=E7Uc5hVfHro
Carpentry practice: https://www.youtube.com/watch?v=XzZWYyj2hRw

Sheet metal:
https://www.youtube.com/watch?v=D8S6r5y1zQo&list=PLl1aqfUa3ReY42aO583Ba0YvokKD3jpL_&index=1
Arc welding practice: https://www.youtube.com/watch?v=BlXOPiXLyV8
Gas welding: https://www.youtube.com/watch?v=U9sO7kpzK-Q
Plumbing: https://www.youtube.com/watch?v=iFqYhGqJiBs
Codes and Standards: https://www.asme.org/
http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf
http://www.weldingtechnology.org
http://www.newagepublishers.com/samplechapter/001469.pdf

Suggested Activities for Students:

1. **Prepare a list of specifications** for various tools, equipment, and machines used in the engineering workshop, highlighting their functions and technical details.
2. **Conduct a market survey** by visiting local dealers to gather information on the procurement of workshop tools, equipment, machines, and raw materials. Prepare a comparative report on pricing, availability, and quality.
3. **Visit local suppliers** (sheet metal traders, timber merchants, plywood merchants, and fabricators) to gather relevant information. Prepare a detailed report based on the visit, including specifications, pricing, and application of materials.
4. **Download and review instructional videos** demonstrating the correct practices for fitting, sheet metal work, carpentry, plumbing, and welding. Summarize key techniques and safety practices shown in the videos.

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