CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2026-27

Programme: **Bachelor of Technology (Mechanical Engineering)**

Semester: **I**

Course Code: **1MEC01001**

Course Title: **Engineering Workshop Practices**

Course Group: **Engineering Science Course**

Course Objectives: This course aims to provide students with fundamental knowledge and practical skills in engineering workshop practices, manufacturing processes, electrical and electronic systems, and industrial safety procedures. Students gain hands-on experience in machine shop operations, fitting, carpentry, welding, fabrication, machining, measurement, material processing, metal joining commonly used in engineering industries. The course also develops an understanding of electrical and electronic components, circuits, wiring systems, measuring instruments, electrical laws, energy consumption analysis, protective devices, earthing, electrical machines, and basic digital logic. In addition, students are introduced to modern manufacturing technologies such as CNC machining, laser and plasma cutting, and additive manufacturing (3D printing). The course enhances technical competency, safe working practices, problem-solving abilities, and the skills required to design, fabricate, inspect, test, and manufacture engineering products and systems for industrial applications.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
0	0	4	2	--	--	50 / 18	50 / 18	100 / 36

* **J**: Jury; **V**: Viva; **P**: Practical

List of Practicals / Tutorials:

1	**To study workshop layout, safety practices, different workshop machines, and introduce basic machining operations in the Machine Shop.** • Introduction to engineering workshop and its significance in manufacturing. • Study of workshop layout and safety practices. • Identification and applications of various workshop machines. • Identification of lathe and drilling machine parts.
2	**To perform Facing, Turning and Drilling operations and precision measurement of machined components.** • Drilling, counterboring and countersinking operations. • Use of Vernier Caliper and Micrometer. • Dimensional inspection.

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3	**To perform basic fitting operations using hand tools.** • Identification and use of fitting tools. • Filing and sawing operations. • Preparation of flat and square surfaces.
4	**To fabricate a fitting job using drilling and tapping operations.** • Drilling and tapping of holes. • Assembly of simple mechanical components. • Dimensional verification of fabricated parts.
5	**To study carpentry tools and perform basic woodworking operations.** • Identification and applications of carpentry tools and woodworking machines. • Wood cutting and joint preparation techniques. • Demonstration and use of Mitre Saw for accurate cutting of wooden components. • Preparation of basic wooden joints.
6	**To study CNC Wood Router and its applications in woodworking.** • Introduction to CNC Wood Router and its industrial applications. • Demonstration of CNC Wood Router for cutting, carving, and engraving operations.
7	**To perform arc welding operations and prepare welded joints.** • Welding equipment and safety practices. • Preparation of butt and lap joints. • Inspection of welded joints.
8	**To study metal joining processes and fabrication practices.** • Gas welding and cutting techniques. • Joint preparation and fabrication methods. • Quality assessment of joined components.
9	**To study the Smithy Process and perform basic forging operations.** • Study of smithy tools, equipment, and safety practices. • Heating of metal workpieces using a forge furnace. • Performing basic forging operations such as upsetting, drawing out, bending, tapering, and punching. • Shaping and finishing forged components using an anvil and hand tools. • Understanding the effects of heating and cooling on metal properties.
10	**To perform basic sheet metal operations.** • Sheet metal cutting and bending. • Riveting and assembly operations. • Fabrication of simple workshop products.
11	**To study digital manufacturing processes using CAD/CAM and CNC technologies.** • CAD/CAM workflow and manufacturing integration. • CNC plasma cutting or Laser processing.
12	**To prepare and manufacture a prototype using additive manufacturing technology.** • Creation of 3D CAD model. • STL generation and slicing process. • Operation of 3D printer and prototype fabrication. • Applications of additive manufacturing in product development.
13	**To study and verify the color code of resistor.** • Understand the Color code used to represent various Resistors.

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14	**To study series & parallel connection of resistors.** • Understand and explore series and parallel connection of Resistors.
15	**To Verify Ohm's Law and familiarize with basic electrical parameters and measuring instruments.** • Understand ohm's law • familiarize with basic electrical components, circuits, and instruments used for measuring electrical parameters such as voltage, current, power and resistance.
16	**To discuss various electrical wiring schemes and their application in the domain of domestic & commercial installations.** • fan and fan regulator wiring. • Staircase wiring, go down wiring, domestic wiring.
17	**To study wires and cables.** • Types of wires, types of cables.
18	**To compare the power consumption and energy efficiency of electromechanical ballast tube light and LED tube light for energy conservation.** • Electromechanical ballast tube light • LED Tube light
19	**To Demonstrate the operation of various protective devices (MCB & ELCB) and importance of earthing.** • Earthing and Grounding. • Importance of protective devices in electrical systems. • Protective devices: Fuses, MCB, ELCB. • Earthing: Importance and methods.
20	**To calculate electrical load and understand billing process.** • Types of Electrical Loads. • Measuring units and measurement of electrical Energy. • Load Calculation (Domestic, Commercial). • Billing process (Domestic, Commercial).
21	**To discuss the importance of electric safety and the steps involved in treatment against electric shock.** • Electric shock, risks and precautions. • First aid treatment for electric shock. • Safety measures during handling electric devices.
22	**To demonstrate construction and working of DC and AC machines.** • Fundamental principle of AC and DC machines. • Parts of AC & DC Machine. • Name Plate of Machine. • Demonstration of Machine Cut-set.
23	**To study various electronic instruments and Soldering and Desoldering Techniques.** • Electronics Instruments – DMM, Bread Board, Power Supply, CRO/DSO, Function Generator. • Soldering and Desoldering Techniques.
24	**To explore the study of digital logic gates.** • Various Logic Gates – AND, OR, NAND, NOR, EX-OR

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Reference Books:

1	**Hajra Choudhury, S. K., Hajra Choudhury, A. K., and Roy, N.**, Elements of Workshop Technology, Vol. I, Media Promoters & Publishers Pvt. Ltd., New Delhi.
2	**Hajra Choudhury, S. K., Hajra Choudhury, A. K., and Roy, N.**, Elements of Workshop Technology, Vol. II, Media Promoters & Publishers Pvt. Ltd., New Delhi.
3	**P. N. Rao**, Manufacturing Technology: Metal Cutting and Machine Tools, McGraw Hill Education, New Delhi.
4	**P. N. Rao**, Manufacturing Technology: Foundry, Forming and Welding, McGraw Hill Education, New Delhi.
5	**Mikell P. Groover**, Fundamentals of Modern Manufacturing: Materials, Processes and Systems, Wiley India.
6	**Ian Gibson, David Rosen and Brent Stucker**, Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing, *Springer.*
7	**D. C. Kulshreshtha**, "Basic Electrical Engineering", McGraw Hill, 2009.
8	**J.B. Gupta,** "Elements of Electrical Engineering", S.K. Kataria & Sons, 2009.
9	**B. L. Theraja**, "Electrical Technology –Part I and II", S. Chand and Co. 2012.
10	**N.N. Bhargava, D.C. Kulshreshtha, S.C. Gupta**, Basic Electronics and Linear Circuits, TMH, 2nd Edition, 2017.

Supplementary learning Material:	
1	NPTEL Courseson Manufacturing Processes, Workshop Technology, CNC Programming, Mechatronics, Embedded Systems, and Industrial Automation.
217	SWAYAM Platform courses related to Engineering Workshop, CAD/CAM, Industry 4.0, and Programming Fundamentals.

Internal Evaluation:

The internal evaluation comprised of combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc.

Pedagogy:

- Continuous Assessment
- Interactive Learning Methods
- Hands-on Workshop Practices
- Project-Based Learning
- Demonstration and Experimental Learning
- Group Activities and Technical Presentations

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
10	15	40	15	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of

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marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLOs):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Apply workshop safety practices, identify workshop machines and tools, and perform basic manufacturing operations including machining, fitting, carpentry, welding, foundry, and fabrication processes to produce engineering components.	**25**
SLO-2	Demonstrate proficiency in measurement, inspection, assembly, dimensional verification, and quality assessment of machined, fabricated, welded, cast, and assembled components.	**10**
SLO-3	Utilize modern manufacturing technologies including CAD/CAM, CNC machining, CNC wood routing, laser/plasma cutting, and additive manufacturing (3D printing) for design, fabrication, and prototyping of engineering products.	**15**
SLO-4	Understand basic electrical components, circuits, wiring, cables, and measuring instruments.	**20**
SLO-5	Apply electrical laws, safety, protection devices, earthing, load calculation, and energy conservation concepts.	**15**
SLO-6	Understand AC/DC machines, electronic instruments, soldering techniques, and logic gates.	**15**

Curriculum Revision:	
Version:	1
Drafted on (Month-Year):	April-2026
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	April-2029

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