Semester - 1

MECHANICAL AND CIVIL ENGINEERING WORKSHOP

Course Code	Teaching hours per week				Self study hours	Credits	Exam hours	Course type	CIE Marks	ESE Marks
	L	T	P	R	SS					
26NNCEL102	0	0	2	0	1	2	3 Hrs.	Lab	50	50

1. **Preamble:**

The course is designed to train students to identify and manage the tools, materials, and methods required for basic engineering activities while developing practical skills, teamwork, and safe engineering practices. The course has two parts.

Part 1: Mechanical Engineering: This part introduces basic workshop practices, engineering measurements, manufacturing processes, machine tools and fabrication activities, providing students with hands-on exposure to mechanical engineering and manufacturing techniques.

Part 2: Civil Engineering: This part introduces basic civil engineering practices including surveying, leveling, masonry work, estimation, and construction techniques.

2. **Prerequisites: Nil**

Part 1: Mechanical Engineering		
Expt. No.	**Experiments**	**Contact Hours**
1	General: Introduction to workshop practice, Safety precautions, Shop floor ethics, and Basic First Aid knowledge. Study of mechanical and measurement tools, components and their applications: (a) Tools: screw drivers, spanners, Allen keys, cutting pliers etc. and accessories (b) bearings, seals, O-rings, circlips, keys etc.(c)Vernier Calipers, Height Gauge, Depth Gauge, Micrometers, Bevel Protractor etc.	2
2	Carpentry: Understanding carpentry tools and knowledge of at least one model (1. T –Lap joint 2. Cross lap joint 3. Dovetail joint 4. Mortise joints)	2
3	Foundry: Understanding of foundry tools and knowledge of at least one model 1. Bench Moulding 2. Floor Moulding 3. Core making 4. Pattern making	2

4	Sheet Metal: Understanding sheet metal working tools and knowledge of at least one model 1. Cylindrical shape 2. Conical shape 3. Prismatic shaped job from sheet metal	2
5	Fitting: Understanding the tools used for fitting and knowledge of at least one model 1. Square Joint 2. V- Joint 3. Male and female fitting	2
6	Plumbing: Understanding plumbing tools and pipe joints, along with practicing one exercise on joining pipes using a minimum of three types of pipe joints	2
7	Smithy: Understanding the tools used in smithy. Demonstrating the forge ability of different materials (MS, Al, alloy steel and cast steels) in both cold and hot states. Observing the qualitative difference in the hardness of these materials. One exercise on smithy (Square prism).	2
8	Welding: Understanding welding equipment and practicing at least one welding technique, such as making joints using electric arc welding. Bead formation in horizontal, vertical and overhead positions	2
9	Rolling: Objective of rolling, rolling process, practical on two high rolling mill	2
10	Metrology: Common measuring instruments used in workshop, experiments to find the angle of a dovetail, angle of a taper and the radius of a circular surface. Introduction to instruments Vernier Bevel Protractor, Vernier Depth Gauge, Vernier Height Gauge.	2
11	Assembly: Demonstration only Dissembling and assembling of 1. Cylinder and piston assembly 2. Tail stock assembly 3. Bicycle 4. Pump or any other machine	2
12	Machines: Demonstration of the following machines: Shaping and slotting machine; Milling machine; Grinding Machine; Lathe; Drilling Machine.	2
13	Modern manufacturing methods (Fab lab/IDEA Lab - Demonstration only): Power tools, CNC machine tools, 3D printing, Soft Materials cutting using special machines	2
14	Use of proper Personal Protective Equipment. Measurements using Tape, Ruler, Vernier calipers, and screw gauge	2

Part 2: Civil Engineering		
Expt. No.	**Experiments**	**Contact Hours**
1	Calculate the area of a built-up space and a small parcel of land- Use standard measuring tape and digital distance measuring devices.	2
2	Finding the level difference between two points using dumpy level.	2

3	(a) Use screw gauge and vernier calliper to measure the diameter of a steel rod and thickness of a flat bar (b) Transfer the level from one point to another using a water level (c) Set out a one room building with a given plan and measuring tape	2
4	Construct a 1 and 1 ½ thick brick wall with a height of 50 cm and a minimum length of 60 cm using English bond. Check the verticality of the wall.	2
5	Construct a 1 and 1 ½ thick brick wall with a height of 50 cm and a minimum length of 60 cm using Flemish bond. Check the verticality of the wall.	2
6	Estimate the number of different types of building blocks needed to construct the walls of a room measuring 2m X 3M, accounting for standard-sized doors and windows.	2
7	Conduct a market study to understand the types, prices and general specifications of at least three materials available in the market (such as bricks, cement, aggregates, steel, plumbing items, fixtures, welding rods, fasteners etc)	2
8	Setting out of a two-roomed building using thread, tape and water tube levelling	2
9	Visit to a construction site or demonstration of modern construction materials and techniques	2
Note: Minimum of 12 experiments to be completed		

3. Course Outcomes

At the end of the course students should be able to:

Course Outcomes		Blooms Taxonomy Level
CO1	Comprehend mechanical workshop techniques and safety	**K3**
CO2	Identify various machine tools and advanced manufacturing techniques	**K3**
CO3	Construct models with different workshop operations	**K3**
CO4	Use measuring and surveying instruments for engineering measurements and levelling.	**K3**
CO5	Construct simple engineering models, masonry works, and building layouts.	**K3**
CO6	Analyze construction materials, modern manufacturing methods, and site practices.	**K4**

Note: *K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create*

4. **Mapping of Course Outcomes with Program Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	–	–	–	–	–	1	1	–	–	–
CO2	3	–	–	–	2	–	–	–	–	–	–
CO3	3	2	3	–	2	–	–	–	1	1	–
CO4	3	-	-	-	2	-	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	1	1	1
CO6	3	-	3		1				1	-	1

Course Assessment Method (CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports/Record (Continuous Assessment)	Total
5	45	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/ Design/Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

- *Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.*

5. **Text Books**

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Mechanical Workshop Practice	K C John	PHI Learning	Edition 2 2010
2	Engineering Materials	S C Rangwala	Charotar Publishing House Pvt Ltd	Edition 43 2019

3	Essentials of Civil Engineering	Dalal K.R	Charotar Publishing House Pvt Ltd	1st edition, 2012
4	Building Materials	Duggal S.K	New Age International	6th edition, 2024

6. **Reference Books**

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Elements of Workshop Technology Vol-1 Manufacturing Processes	S K Hajra Choudhury, A K Hajra Choudhury, Nirjhar Roy	MPP media promoters and publishers	2008
2	Materials for Civil and Construction Engineering	Mamlouk, M.S. and Zaniewski	Pearson Publishers	4th Edition 2021
3	Building Construction	Rangwala S C and Dalal, KB	Charotar Publishing house	34th edition 2022
4	Construction Technology, Vol 1-4	Mckay W.B. and Mckay J.K	Pearson India Education Services	5th Edition 2021

7. **Video Links or any other Reference Materials**

Sl No	Weblink, Publication Details
1	https://archive.nptel.ac.in/courses/105/106/105106206/
2	https://archive.nptel.ac.in/courses/105/106/105106201/
3	https://archive.nptel.ac.in/courses/105/104/105104101/
4	https://archive.nptel.ac.in/courses/117/106/117106108/
5	Virtual Labs https://mp-dei.vlabs.ac.in/
6	Introduction to Civil Engineering Profession https://nptel.ac.in/courses/105106201
7	Surveying http://www.digimat.in/nptel/courses/video/105104101/L01.html
8	Functions of buildings https://nptel.ac.in/courses/105102088