Faculty of Engineering & Technology
Diploma Engineering (DE)
(W. E. F.: 2023-24)

Document ID: SUTEFETD-01

Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Diploma Engineering (DE)
Course Code	:	2DME01
Course Title	:	Basics of Mechanical Engineering
Type of Course	:	Basic Engineering (BE)
Year of Introduction	:	2023-24

Prerequisite	:	Zeal to learn the subject
Course Objective	:	Understanding of basic principles of Mechanical Engineering is required in various field of engineering.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To **Remember** the various sources of energy and basic terminology of Mechanical engineering.
	CO2	To **Understand** working and applications of steam boilers and various energy conversion systems.
	CO3	To **Understand** construction and working of IC engines and Refrigeration & Air Conditioning system.
	CO4	To **Understand** Hydraulic and Pneumatic system.
	CO5	To **Understand** various power transmission elements
	CO6	To **Understand** properties of various engineering materials with their applications and various types of manufacturing process.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
03	00	02	04	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P****– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Introduction:** Introduction of mechanical engineering; Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth law and First law.	02	05%	CO1
2	**Energy:** Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydro, Solar, Wind, and Bio-fuels, Environmental issues like Global warming and Ozone depletion	03	05%	CO1
3	**Thermal systems:** Steam generation, Steam formation process; Boilers-Introduction, Classification, Construction and working of Cochran, Lancashire, and Babcock and Wilcox boiler, functioning of different mountings and accessories; **Prime movers**- Definition, Classifications; **Steam turbine** -working and applications.	06	15%	CO1 CO2
4	**Internal Combustion Engines:** Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.	03	10%	CO1 CO3
5	**Pneumatic System:** Air Compressors-Types and operation of Reciprocating and Rotary air compressors, significance of Multistage.	03	10%	CO1 CO4
6	**Refrigeration & Air Conditioning:** Refrigerant, Vapor compression refrigeration system, Vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.	03	10%	CO1 CO3
7	**Hydraulic System:** Concept of theory of fluid flow, General properties of fluids; Pump-Working principle, Types, Construction and Working of centrifugal and reciprocating pumps; **Water turbines:** Working principle, Types, Application; Principle of working hydraulic lift, hydraulic pump, hydraulic power pack, hydraulic jack, Application.	07	15%	CO1 CO4
8	**Couplings, Clutches and Brakes:** Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and	03	05%	CO1 CO5

	Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc).			
9	**Transmission of Motion and Power:** Shaft and axle, Different arrangement and applications of Belt drive; Chain drive; Friction drive and Gear drive.	03	05%	CO1 CO5
10	**Engineering Materials:** Types, properties and applications of Ferrous & Nonferrous metals, Timber, Abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymer.	03	05%	CO1 CO6
11	**Manufacturing Processes:** Introduction of mechanical manufacturing processes, Classification of various Manufacturing processes; Basic machine tools- Introduction to lathe, drill, milling and grinding machines; Metal Joining Processes- Welding, Types, Working setup of arc and gas welding, Precautions and safety during arc and gas welding, Brazing and Soldering, General set up, Applications; Foundry, Concept, Process of casting a component, Applications; Basic metal forming processes Bending, rolling, forging and extrusion – concept and its application.	09	15%	CO1 CO6

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**25**	**25**	**20**	**10**	**-**

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

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To understand construction and working of various types of boilers.	02
2	To understand construction and working of different boiler mountings and accessories.	02
3	To understand construction and working of steam turbine.	02
4	To understand construction features of two/four stoke petrol/diesel engines.	02
5	To understand construction and working of different types of air compressors.	02
6	To demonstrate vapour compression refrigeration cycle of domestic	02

	refrigerator OR window air conditioner OR split air conditioner.	
7	To understand construction and working of pump.	02
8	To understand construction and working of water turbine.	02
9	To understand construction, working and application of clutches, coupling and brakes	02
10	To understand different arrangement and application of various power transmission system.	02
11	To understand construction and working of various types of basic machine tools.	02
12	To understand various types of Metal Joining Processes	02
13	To understand various types of Casting Processes.	02
14	To understand working of various types of Basic metal forming processes.	02

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Models of Cochran, Lancashire and Babcock and Wilcox boilers.
2	Models of various mountings and accessories.
3	Models of steam turbine.
4	Models of various types of IC engines, Single cylinder two stroke /four stroke petrol/ diesel engine
5	Models of Air Compressor.
6	Models of vapour compression refrigeration cycle of domestic refrigerator
7	Models of Pump.
8	Models of Water turbine.
9	Models of various types of brakes, coupling, clutch, drives.
10	Models of power transmission system
11	Various types of basic machine tools.
12	Arc welding setup.

Suggested Learning Websites

Sr. No.	Name of Website
1	https://nptel.ac.in
2	https://www.vlab.co.in
3	https://www.khanacademy.org/
4	http://learnerstv.in/

Reference Books

Sr. No.	Name of Reference Books
1	Elements of Mechanical Engineering by Sadhu Singh, S. Chand Publication
2	Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
3	Basic Mechanical Engineering by Pravin Kumar, Pearson Education
4	Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi

5	Elements of Mechanical Engineering by H.G Katariya, J.P Hadiya and S.M Bhatt, books India publications
6	Theory of machine by R S Khurmi & J K Gupta, Eurasia Publishing House (Pvt.) Ltd. New Delhi
7	Fluid mechanics and hydraulic machines by R.K.Bansal, Laxmi publication Pvt.Ltd. New Delhi
8	A Textbook of thermal Engineering by R. S. Khurmi & J. K. Gupta, S.chand Limited, New Delhi
9	Production Technology by HMT, Tata McGraw Hill Education
10	Production Technology by R.K. Jain and S.C. Gupta,Khanna publication