



Semester – II

Subject Name: Elements of Mechanical Engineering

Subject Code: 09ME1103

Diploma branch in which subject is offered:- Mechanical Engineering / Automobile engineering

Objective: In the era of technology integration, it has become unavoidable to possess the basic knowledge of various engineering disciplines. Sometimes a technician has to know the implications and knowledge of other disciplines so as to conclude the solution of his/her own branch tasks. Hence students belonging to all branches are made to learn certain fundamental topics related to mechanical engineering so that they will have a minimum understanding of mechanical systems, equipment and process.

Main goal of this subject is to develop understanding of basic principles of Mechanical Engineering is required in various field of engineering.

Credits Earned: 5 Credits

Course Outcomes: After completion of this course, student will be able to

- To understand the fundamentals of mechanical components
- Demonstrate mechanism of power generation and conversion in automobiles.
- Demonstrate knowledge of machine tools for metal cutting.
- Employ knowledge of joining metals permanently or temporarily with application of heat.
- Apply knowledge in steam and its properties.
- To understand and appreciate significance of mechanical engineering in different fields of engineering

Pre-requisite of course: NA.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
4	0	2	5	50	30	20	25	25	150



Contents:

sr.no.	Topics	Teaching hrs.	Weightage
1	INTRODUCTION: Introduction and use of mechanical engineering; Identification criteria, major types, specifications and uses of general items(bolts, nuts, washers, bearings, bushes, belts, springs, levers, couplings, brakes, screws, rivets, keys, o' rings, oil seals, gears, pulleys, shafts, axles, etc.); Pipes and pipe fittings; Types, specifications and uses of spanners (such as fix, ring, box, pipe, allen, adjustable, etc.), hand tools (such as pliers, screw drivers, saws, hammers, chisels, cutters, planes, etc.), power tools(drill, chipper, etc.)	06	10
2	POWER TRANSMISSION: Belt drive, Chain drive, Rope drive, Gear drive; Causes and remedies of general accidents in power transmission; Safety norms to be followed in power transmission.	10	20
3	MATERIAL PROCESSING: Welding-types, concept, working, applications and precautions; Brazing and Soldering-general set up and applications; Gas cutting-working setup, applications and precautions; Casting-general process and applications; Sheet metal forming and cutting operations-concept and application; Basic machine tools.	10	20
4	STEAM GENERATION: Steam generation process and steam properties; Steam boilers-classifications, working, accessories and mountings, applications, regulation and safety requirements; Prime movers-meaning, classification and working, steam turbines (working), gas turbine (types and applications).	06	13
5	INTERNAL COMBUSTION ENGINES: Introduction, Classification, Working - petrol engine, diesel engine and gas engine, Performance parameters, Main parts and their functions, Applications, Common troubles and remedies.	08	12
6	HYDRAULIC AND PNEUMATIC DEVICES: Properties of fluids; Concept of fluid flow; Pump-types, working of centrifugal and reciprocating pumps, performance parameters, main parts of pumps and their functions, common troubles and remedies; Water turbines-working principle, types, applications, common troubles and remedies; Air compressor-working principle, types, performance parameters and applications.	08	13
7	MATERIAL HANDLING: Need of material handling; Types , principle of working and applications of material handling equipments (Hoisting equipments, Conveying equipments, Surface & overhead equipments, Earth moving machineries, Construction machineries); Selection criteria for material handling equipments; Factors affecting selection of material handling equipments; Common troubles and remedies.	08	12



References:

1. Elements of Mechanical Engineering by Nikunj V. Rachchh and Chirag J. Parekh McGraw Hill Education
2. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
3. Basic Mechanical Engineering by Pravin Kumar, Pearson
4. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
5. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
6. Introduction to Engineering Materials by B.K. Agrawal Tata Mcgraw Hill Publication, New Delhi

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	40%	25%	0	0	0

Suggested List of Experiments:

1. Demonstrate various mechanical items, hand tools and power tools.
2. Demonstrate various power transmission methods.
3. Study different material joining processes
4. Demonstrate various machining tools like lathe, drill and milling machines.
5. Understand construction and working of boiler, boiler mountings and boiler accessories.
6. Study construction and working of petrol and diesel IC engine.
7. Study construction and working of different types of pumps.
8. Study construction and working of different types of air compressors.
9. Study various types of materials handling equipment.

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.



- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory