

Department of Mechanical Engineering
B. E. 1st Year (Common to all Branches of Engineering and Technology)

ME10650: FUNDAMENTAL OF MECHANICAL ENGG.

CODE	SUBJECT NAME	Hours per Week			Credits			Maximum Marks				
		L	T	-	T	-	Total	Theory		-		Total
								Th.	CW	-	-	
ME 10652	FUNDAMENTAL OF MECHANICAL ENGINEERING	4	-	-	3	-	3	70	30	-	-	100

Course Objectives:

1. Gain fundamental knowledge of Thermodynamics, Fluid Mechanics and I.C. Engines.
2. Develop skills for material selection for different devices/ components.
3. Gain knowledge of steam formation and properties of steam.

Course Outcomes:

CO 1	Enhancement of fundamental knowledge of Thermodynamics.
CO 2	Enhancement of fundamental knowledge of Fluid Mechanics and I.C. Engines.
CO 3	Acquiring knowledge of materials and their properties for engineering applications
CO 4	Enhancement of analytical skills by Learning different mechanism of machines.
CO 5	Evaluate properties of steam. Demonstrate various types of boilers and their relative merits and demerits. Learning problem solving in particular domain.

COURSE CONTENTS

UNIT 1

Thermodynamics: Thermodynamics properties and processes, heat and work. Zeroth law and First law of thermodynamics. Steady flow energy equation, basic concepts of Second law of thermodynamics.

UNIT 2

Fluid Mechanics: Introduction to fluid properties, Newton's law of viscosity, Pascal's law, Hydrostatic law, types of fluid flow. Euler's equation, Bernoulli's equation & its application.

Introduction to I. C. Engine: Classification of IC engines, terminology used in I C engine; Otto, Diesel & Dual cycles; their air standard efficiencies. Principal parts of IC engine, their functions and working.

UNIT 3

Materials: Introduction, properties, crystal structures types, normal tensile shear and thermal stress and their variation in different section of beams, stress-strain diagrams for ductile and brittle materials, elastic constants and relationship between elastic constant.

UNIT 4

Mechanism and Machines: Types of motion, links, kinematic pair, types of joints, degree of freedom, classification of kinematic pairs, kinematic chain, linkage, mechanism and structure, inversions of four-bar and slider crank mechanism.

UNIT 5

(a) Boilers: Classification of boilers, boiler mountings & accessories: function, their construction and working, boiler efficiency, equivalent evaporation, chimney height.

(b) Properties of Steam: Types of steam; enthalpy, volume and internal energy of steam; critical point and triple point of steam; measurement of dryness fraction of steam.

Course Assessment: The following methods are adopted for the assessment of this course;

1. **Theory Examination** (70 Marks) on the basis of end term theory paper examination.
2. **Class Work** (30 marks) on the basis of regular evaluation of assignments, two mid semester tests and class attendance.

Books Recommended:

1. Nag, P.K., *Engineering Thermodynamics*, Tata McGraw Hill.
2. Bansal R K, *Strength of Materials*, Laxmi Publication
3. Yadav, R., *Thermodynamics*, Standard Publishers.
4. Rattan S S, *Theory of Machine*

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ME10149: ENGINEERING GRAPHICS

CODE	SUBJECT NAME	Hours per Week			Credits			Maximum Marks				
		L	T	P	T	P	Total	Theory		Practical		Total
								Th.	CW	SW	Pr.	
ME 10149	Engineering Graphics	3	-	4	2	2	4	70	30	40	60	200

PRE-REQUISITES:

Course Objectives

1. To familiarize with the drawing instruments, scales and engineering curves.
2. To familiarize with the projection of 1D, 2D and 3D elements.
3. To familiarize with the sectioning of solids and development of surfaces.
4. To familiarize with the conversion of orthographic to isometric views and vice versa.
5. To familiarize with the software for drawing and modern drafting technologies.

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

CO 1	Understand standards drawing conventions, draw curve and scale, use of drawing instruments
CO 2	Apply the concept of projection on lines, planes and solids
CO 3	Draw development of surface and section of solids
CO 4	Draw isometric and orthographic projections
CO 5	Use drafting tools for creating 2-D and 3-D shapes

COURSE CONTENTS

THEORY

Unit 1

Basic Concepts, scales and curves: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lines, lettering and dimensioning, Scales- Plain, Diagonal and Vernier Scales, Conic sections including the Rectangular Hyperbola, Cycloid, Epicycloid, Hypocycloid and Involute.

Unit 2

Projections of Line, Planes and solids: Principles of Orthographic Projections- Conventions , Projection of points and lines inclined to both planes; Projections of planes, inclined Planes -Auxiliary Planes; Solids inclined to both the planes- Auxiliary Views.

Unit 3

Sections of Solids: Section planes- AIP, AVP; Sections of geometrical solids, True shape.

Development of Surfaces: Development of surfaces of Right Regular Solids- Prism, Pyramid, Cylinder and Cone.

Unit 4

Isometric Projections: Principles of isometric projection- isometric Scale, isometric Views, Conventions, Isometric Views of Lines, Planes, Simple and compound Solids: Conversion of Orthographic Views to isometric Views.

Orthographic Projections; Conversion of isometric Views to Orthographic Views of simple machine parts.

Unit 5

Introduction to Drafting Software: Demonstrating knowledge of the theory of CAD software, Ribbon tabs, Menu system, toolbars, Drawing Area, Dialog boxes and windows, Shortcut menus, Command Line, Status bar; Different method of zoom; Select and erase objects; Setting up the drawing page and the printer; Setting up of units and drawing limits; Orthographic Constraints; Snap to objects manually and automatically ; Producing drawings by using various coordinate input entry methods to draw straight lines; Applying various ways of drawing circles; Applying dimensions to objects to objects, applying annotations to drawings; Setting up and use of layers; Computer aided Design (CAD) software modelling of parts and assemblies; Demonstration of a simple team design project.

ASSESSMENT:

The following methods shall be adopted for the assessment of this course;

1. **Theory of Examination** (70 marks) on the basis of end term theory paper examination (from Units 1 to 4)
2. **Class Work** (30 marks) on the basis of regular evaluation of assignments, two mid semester tests and class attendance.
3. **Sessional Work** (40 marks) on the basis of assignments, internal viva and attendance. Student are require to submit at least six imperial drawing sheets/ computer aided drawing print.
4. **Practical examination** (60 marks) on the basis of evaluating practical knowledge, Quiz and viva voce.

TEXT BOOKS RECOMMENDED:

1. N.D. Bhatt and V.M. Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.

REFERENCE BOOKS:

1. Agrawal Basant and Agrawal C.M. (2018), Engineering Drawing, McGraw Hill Publishing.
2. Shah, MB & Rana BC (2008), Engineering Drawing and Computer Graphics; Pearson Education.
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (Corresponding set of) CAD Software Theory and User Manuals.