

ENGINEERING MECHANICS

Sub Code:ME 203

L-T-P: 2-1-0

Total Lectures 40 hours + Contact Hours Credit: 3

Course Objectives

The main objective of a course Mechanics should be build a strong foundation, to acquaint the students with as many general methods of attack as possible , and to illustrate the application of these methods to practical engineering into consideration. The basic essence of this subject resolves around the concept of statics as well as dynamic equilibrium.

Modern day engineering mechanics idealizes the practical problems. Engineering Mechanics deals with the Mechanics of rigid bodies . -Statics and Dynamics- without taking the effect of their deformation structures separately. Therefore to meet the present -day needs , the focus of teaching engineering mechanics turned to the knowledge of proper conceptualization and modeling , assuming that rest of the things will be carried out using standard techniques.

Module 1:[2L]

Statics: Basic concepts, Scalars and vectors, parallelogram law, Lami's theorem,

Module 2:[2L]

Application of Vectors in Mechanics, Force Systems in two Dimensions;

Module 3:[4L]

Moments and Couples; Resultants and Components in concurrent coplanar forces, parallel forces in a plane, Free Body Diagram Concept.

Module 4:[4L]

Fundamentals of Friction, Limiting angle of Friction, Applications to wedges.

Module 5:[6L]

Centroid, Moment of Inertia ,

Module 6:[5L]

Plane Trusses; Frames and Machines.

Module 7:[2L]

Dynamics: Introduction to vector calculus, Definition of vectors in Dynamics .

Module 8:[5L]

Two dimensional Kinematics in Rectangular Co-ordinates, Rectilinear Motion, Curvilinear motion of particle and description of different coordinate systems, Kinetics.

Module 9:[4L]

Newton's Law and D' Alembert's principle, and application to rectilinear and curvilinear motion, constrained motion,

Module 10:[4L]

Energy and Momentum methods. Linear Impulse ; Angular Impulse and Momentum – Central Force Motion.

Module 11:[2L]

Concept of Stress and Strain , Stress-Strain Diagram of Ductile and Brittle Material ,Normal stress , shear stress etc., Relevant numericals.

Course Outcomes:

On successful completion at the End of Course, students will be able to understand and capable of answering in the following areas.

1. Drawing Free Body diagrams and determination of Resultant of forces and/or Moments.
2. Determination of the centroid and Second Moment of areas of different sections.
3. Analysis of Statically Determinate plane frame.
4. Application of Law of Mechanics to determine the efficiency of simple machines with consideration.
5. Application of Newton's Laws of motion of the moving bodies.
6. Application of D-Alembert's principle and related numerical.
7. Analysis of Plane Curvilinear motion.
8. Basic concept of Strength of materials, Understanding of Stress- Strain Diagram and related numerical.

Reference Books

1. **Engineering Mechanics by S Timoshenko , D H Young and J V Rao , Tata McGraw Hill**

2. **Engineering Mechanics (Statics & Dynamics, Volume I&II) by J.L. Meriam and L.G. Kraige, Wiley India pvt Limited.**
3. **A Text book of Engineering Mechanics by A. R. Basu ,Dhanpat Rai& Co.**
4. **Engineering Mechanics by Basudeb Bhattacharyya, Oxford University Press.**
5. **Engineering Mechanics by S S Bhavikatti, New Age International (P) Limited.**
6. **Engineering Mechanics by A. K. Tayal , Umesh Publications.**
7. **Engineering Mechanics by K L Kumar, Tata McGraw Hill**
8. **Engineering Mechanics by P.K Nag , Sukumar Pati&T.K. Jana , McGraw Hill Education (India) Private Limited.**
9. **Engineering Mechanics by B B Ghosh, S Chakrabarti& S Ghosh, Vikas Publishing House pvt Ltd.**
10. **Strength of Material by S S Ratan, McGraw Hill Education (India) Private Limited.**

Other Resources

1. **NPTEL on line courses relevant to your topic**

Source: onlinecourses.nptel.ac.in

PRACTICAL

Workshop Practice

Sub Code: ME 207

L-T-P: 0-0-3

Total :36 hours Credit: 1.5

Course Objectives

Designed for the core course on Workshop Practice offered to all first-year degree level students of engineering, Workshop Practice presents clear and concise explanation of the basic principles of manufacturing processes and equips students with overall knowledge of engineering materials, tools and equipment commonly used in the engineering field. The curriculum describes the general principles of different workshop processes such as primary and secondary shaping processes, metal joining methods. The workshop processes covered also include the hand-working processes such as bench work, fitting, welding, sheet metal work, carpentry. It also explains the importance of safety measures to be followed in workshop processes and details the procedure of writing the records of the practices. The tools and equipment used in each hand-working process are enumerated before elaborating the process.

Fitting Shop :

Introduction to different hand tools , equipment and measuring devices , sawing, filing & drilling process. Practice Jobs on Mild Steel Plate, Production of nuts and bolts.

Carpentry Shop :

Specification of wood and wood products, Introduction to Tools and equipment, different wood joints. Practice jobs on Dove Tail Notch or Dovetail Bridle Joint or Cross Joint

Forging Shop :

Demonstration of forging a Octagonal Chisel.

Welding Shop

Metal joining process ,Arc welding practice.

Sheet metal work

Sheet metal work through, production of funnel.

Course Outcomes:

At the End of Course, students will able to understand as well as familiar with carpentry, fitting, forging,welding and sheet metal work through the following areas.

1. Nomenclature , application use of different hand tools.
2. To get familiarized with the properties of different engineering materials- metals & alloys and non metals.
3. To learn about the various measuring devices and to know about the importance of sequential plans of action in manufacturing through practice in various sections.
4. Acquire knowledge about, different measuring instruments their working principle, application areas and able to handle the same .
5. Hands on practice of simple job related to Fitting shop
6. Hands on practice of simple joint related to Carpentry shop.
7. Overview of Forging Shop.
8. Sheet metal working , through Construction of Funnel.
9. Introduction to welding Process-through practice job using MMAW .

Reference Books

1. Work shop Technology (Volume- I and Volume-II , By Hazra ,Choudhary),Media Promoters & Publishers Pvt Ltd.
2. MECHANICAL WORKSHOP PRACTICE,PHI Learning Pvt. Ltd.
3. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

Engineering Drawing

Sub Code:ME 208

L-T-P: 0-0-3

Total :36 hours Credit: 1.5

Course Objectives

Primary objective of the course of Engineering Drawing is to understand the language of engineers which is very much essential for engineering career.

Students of all engineering disciplines to develop a spatial bent of mind to observe, visualize and understand the structure of objects from different perspectives.

Module:1

Engineering Lettering, Numbering

Module:2

Types of Lines and Dimensioning methods.

Module:3

Construction of Plane Scales, Diagonal Scales & Venier Scales.

Module:4

Engineering Curves – Parabola, Ellipse, Involute

Module:5

Orthographic Projection of Points, Lines, Surfaces, Solids and Section of solids.

Module:6

Introduction of Isometric projection.

Module:7

Introduction to CAD tools – basics; Introduction of Development and Intersection of surfaces.

Course Outcomes:

Course Outcomes at the End of Course, students will be able to solve the problems in the following areas.

1. Construction and Interpretation of drawing scales as per the situation.
2. Generation of simple Curves like ellipse, cycloid and Involute of circle, square.
3. Visualization and generation of Orthographic projections of points, lines and planes.
4. Visualization and generation of Orthographic projections of solids like cylinders, cones, prisms and pyramids.
5. Layout development of solids for practical situations.
6. Development of isometric projections of simple objects.

Reference Books

1. Engineering Drawing By N.D. Bhatt Pvt. Ltd.,
2. Engineering Drawing By N S Parthasarathy and Vela Murali, Oxford University press
3. A Text Book of Engineering Drawing - by R.K.Dhawan.