

Savitribai Phule Pune University First Year of Engineering (2024 Pattern) Course Code: ESC-104-CVL Course Name: Engineering Mechanics		
Teaching Scheme	Credit	Examination Scheme
Theory : 2 Hours/Week Practical : 2 Hours/Week	02 01	CCE : 30 Marks End-Semester : 70 Marks Term Work : 25 Marks
Prerequisite Courses, if any: Basic Calculus, Trigonometry, Geometrical expressions, Laws of motion, Concept of mass, acceleration with Fundamental knowledge of Engineering Mathematics and Physics.		
Companion Course, if any: Laboratory Practical.		
Course Objectives: The objectives of this course is to make students to learn basics of engineering Mechanics concepts and its application to the real-world problems, solve problems involving Forces, loads and Moments and know their applications in allied subjects.		
Course Outcomes: On completion of the course, learner will be able to: CO1. Understand basic concept of forces, moments and couples in two-dimension force system CO2. Apply concept of free body diagram for static equilibrium in two-dimension force system CO3. Analyze the practical example involving friction and application of two force members CO4. Analyze rectilinear and curvilinear motion of particle CO5. Apply Newton's second law, work energy and impulse momentum principles for particles		
Course Contents		
Unit I	Force systems and its resultants	(06 Hours)
Introduction, type of motion, fundamental concepts and principle, force system, resolution and composition of forces, resultant of concurrent force system, moment of a force, Varignon's theorem, resultant of parallel force system, couple and resultant of general force system. Introduction, centroid of basic figures, centroid of composite figure, moment of inertia of simple geometrical figure, parallel axis theorem, perpendicular axis theorem, moment of inertia of composite figure.		
Unit II	Equilibrium	(06 Hours)
Introduction, free body diagram, equilibrium of coplanar forces, equilibrium of two forces, three force principle, equilibrium of concurrent, parallel and general force system, type of load, type of support, type of beam and support reaction.		
UNIT III	Friction and trusses	(06 Hours)
Introduction, sliding and rolling friction, laws of coulomb friction, coefficient of friction, angle of repose, angle of friction, cone of friction, friction on inclined plane, ladder friction and belt friction. Trusses: two force and multi force member, assumption of analysis, analysis of truss, identification of zero force members, method of joint and method of section.		

UNIT IV	Kinematics of particle	(06 Hours)
Introduction, basic concept, rectilinear motion: motion with uniform acceleration, gravitational acceleration and variable acceleration, curvilinear motion: rectangular components, motion of projectile, normal and tangential components.		
UNIT V	Kinetics of particle	(06 Hours)
Introduction, Newton's second law of motion, equation of motion, Newton's law of gravitation, application of Newton's second laws to rectilinear and curvilinear motion, conservative and non-conservative forces, work energy principle, conservation of energy, impulse momentum principle and impact		
List of Laboratory Experiments		
Journal consist of the following		
A. Compulsory experiments as per following list		
1. Verification of the Polygon law of forces		
2. To find support reaction of beam		
3. To determine coefficient of friction		
4. Determination of coefficient of restitution		
B. Graphical Solution of the following		
1. Equilibrium of concurrent force system		
2. Equilibrium of parallel force system		
3. Forces in the member of pin jointed truss		
4. Moment of Inertia		
C. Assignment on each unit: minimum four example on each unit		
Guidelines for Student's Lab Journal		
The students Lab Journal should contain following related to every experiment –		
1. Title of the experiment		
2. Objective		
3. Apparatus with their detailed Drawing.		
4. Brief theory related to the experiment.		
5. Observation table		
6. Sample calculations for one/two reading.		
7. Result table		
8. Graphs (if any) and Conclusions.		
Guidelines for Laboratory/ TW Assessment		
a. Continuous assessment of laboratory work is to be done based on overall performance and Laboratory performance of student.		
b. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.		
Suggested parameters for overall assessment as well as each Laboratory assignment include timely completion, performance, efficiency, punctuality, and neatness.		

Learning Resources

Text Books:

1. Engineering Mechanics, Ferdinand Singer, 3rd edition, Harper and Row
2. Engineering Mechanics (Statics and Dynamics) by Hibbeler R. C., Pearson Education

Reference Books:

1. Engineering Mechanics, S Timoshanko and Young, Tata McGraw Hill Education Pvt. Ltd. New Delhi.
2. Vector Mechanics for Engineers – Statics, Beer and Johnston, Tata McGraw Hill
3. Vector Mechanics for Engineers – Dynamics, Beer and Johnston, Tata McGraw Hill.
4. Engineering Mechanics - Statics and Dynamics, Meriam J. L. and Kraige L.G., John Wiley and Sons