COURSE CONTENT

ENGINEERING MECHANICS FOR CIVIL ENGINEERS								
II Semester: CE								
Course Code	**Category**	**Hours/ Week**			**Credits**	**Maximum Marks**		
2520112	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisites: NIL								

Course Overview :

Engineering Mechanics for Civil Engineers focuses on fundamentals of statics and dynamics, including forces, equilibrium, moments, friction, centroids, kinematics, and kinetics. The course develops problem-solving skills to analyze structures and mechanical systems, forming a foundation for understanding structural behavior, stability, and load transfer in civil engineering applications.

Course Objectives: This course is expected to enable the student to:

- Provide Knowledge of force systems and free body diagram to analyze rigid body equilibrium
- Comprehend the principles of Friction and solve engineering mechanics problems associated with frictional force
- Compute the centroid, first moment and second moment of an area
- Impart the concept of motion of particles and rigid bodies.
- Familiarize the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

Course Outcomes: At the end of the course, student will be able to

- Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- Interpret and implement work-energy principle and its applications.

UNIT - I

Introduction to Engineering Mechanics– Force Systems: Basic concepts, Particleequilibriumin2-D &3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant-Moment of Forces and its

Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, Ladder friction

Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT - III

Area moment of inertia - Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia: Moment of Inertia of Masses-Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles– Newton's Second Law– Differential equations of rectilinear and curvilinear motion–Dynamic equilibrium–Inertia force–D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT - V

Work-Energy Principle: Equation of translation, principle of conservation of energy, work-energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse– Momentum Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXTBOOKS:

1. G. Lakshmi Narasaiah (2023) Engineering Mechanics, B.S. Publications
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2024), Singer's Engineering Mechanics– Statics & Dynamics, B.S. Publications
3. Shames and Rao (2006), Engineering Mechanics, Pearson Education
4. S.S. Bhavikatti (2021) Engineering Mechanics, New age International Publishers.

REFERENCE BOOKS:

1. Timoshenko S. P and Young D.H, "Engineering Mechanics", McGraw-Hill International Edition, 2017.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Bee r F. P & Johnston E. R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal D.H.," Engineering Mechanics–Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam.J.L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.
8. P.C Dumiretal. "Engineering Mechanics", University press

MATERIALS ON LINE:

- Course template
- Tutorial question bank
- Tech talk and Concept Video topics
- Open-ended experiments
- Definitions and terminology
- Assignments
- Model question paper–I
- Model question paper–II
- Lecture notes
- E-Learning Readiness Videos (ELRV)