1151CE104 (VTUR15)	ENGINEERING MECHANICS	L	T	P	C
		2	2	0	3

Course Category: Programme Core

A. Prerequisites:

Knowledge in Mathematics, Physics and basics of Mechanical Engineering and Civil Engineering

B. Link To Other Courses:

- Strength of Materials

C. Course Educational Objectives:

- To understand the vector and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two and three dimensions.
- To understand the principle of work and energy, the effect of friction in equilibrium, the kinematics and laws of motions and the dynamic equilibrium.
- To understand the surfaces of solids, moment of inertia and axes theorems
- To know about dynamics of particles, Displacements, Velocity and acceleration, their relationship
- Friction and its application, friction in belts, roller and rotating bodies.

D. Course Outcomes:

The students would be benefitted with the following outcomes:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Understand the principles of statics of particles to solve engineering problems.	K2
CO2	Establish various forces and moments acting on rigid bodies.	K2
CO3	Define properties and theories related to surfaces and solids.	K2
CO4	Understand the principles of dynamics of particles to solve engineering problems.	K2
CO5	Describe the principles of various types of friction.	K2

E. Correlation of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M		L	M					H	
CO2	H	H	M		L	M					H	
CO3	H	H	M		L	M					H	
CO4	H	H	M		L	M					H	
CO5	H	H	M		L	M					H	

F. Course Content:

UNIT I BASICS & STATICS OF PARTICLES 6+6

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and Triangular Law of forces – Vectors – Vectorial representation of forces and couples – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES 6+6

Free body diagram – Types of supports and their reactions – Requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis –Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS 6+6

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Second and product moments of plane area – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia

UNIT IV DYNAMICS OF PARTICLES 6+6

Displacement, Velocity and Acceleration, their relationship – Relative motion – Circular motion - Curvilinear motion – Newton's laws – Work-Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION 6+6

Frictional force – Laws of Coloumb friction – Simple contact friction – Belt friction – Roller friction - Translation and Rotation of Rigid Bodies - General Plane motion.

TOTAL: 30 + 30 = 60 Periods

G. Learning Resources:

a) TEXT BOOKS

1. Kottiswaran N., Engineering Mechanics, Sri Balaji Publications Pvt. Ltd., 2015.

2. Palanichamy M. S., and Nagan S., Engineering Mechanics (Statics and Dynamics), Tata McGraw Hill, New Delhi 2012.

b) REFERENCES

1. Timoshenko S,Young D.H, J.V.Rao, Sukumar Pati, Engineering Mechanics, McGraw Hill Education (India) Private Limited., 2013.

2. Beer F. P., and Johnston E. R., Vector Mechanics for Engineers – Dynamics and Statics, Tata McGraw-Hill, New Delhi, 2011.

3. Natarajan K.V., Engineering Mechanics, Dhanalakshmi Publishers, 2011.

4. Shames I. H., and Krishna Mohana Rao G., Engineering Mechanics (Statics and Dynamics), Dorling Kindersley India Pvt. Ltd. (Pearson Education), 2011.

5. Kumar K. L., Engineering Mechanics, Tata McGraw- Hill, New Delhi, 2011.

6. Hibbeller R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2015.

7. Rajasekaran S. and Sankarasubramanian G., Engineering Mechanics, Vikas Publishing House Pvt Ltd, 2011.