SE151: ENGINEERING MECHANICS

CREDITS = 6 (L=4, T=0, P=2)

1	Composition and resolution of coplanar forces. Equilibrium of a force system under coplanar forces. Moments and couples. Equilibrium of rigid bodies under coplanar forces. Analytical and graphical methods. Forces in space by vector approach.	8 Hours
2	Simple and perfect pin jointed trusses and frames. Determination of support reactions and member forces. Method of joints, Method of sections and graphical methods.	5 Hours
3	Center of gravity of plane and composite sections. Moment of inertia. Center of mass and mass moment of inertia. Relevant theorems.	5 Hours
4	Flexural members, Simple beams. Type of loads and support conditions, Shear forces and bending moment. Relation between shear force and bending moment. Diagrams for axial force, shear force, and bending moment for beams.	5 Hours
5	Equilibrium of system with friction. Rough inclined plane, ladder, bearing screw, and simple lifting machines like screw jacks. Law of machine and its efficiency. Reversible and non-reversible machines.	6 Hours
6	Dynamics of a particle. Equations of motions. Newton's 2^{nd} Law and D'Alembert's principle. Impulse and momentum, work, power, and energy. Laws of conservation of energy and momentum. Rigid bodies in linear and rotational motions. Super elevation, fly wheels. Engineering problems. Concepts of balancing of rotating masses.	2 Hours
7	Vibration of simple mechanical system like springs. Free and damped vibrations. Natural frequency and resonance.	1 Hour
8	Elasticity, Hook's Law, Axial and Lateral stresses and strains. Poisson's ratio. Relations between modulus of elasticity and rigidity, and bulk modulus. Stepped and tapered bars. Composite sections. Temperature stresses.	8 Hours

REFERENCE BOOKS:

Title: Elements of Applied Mechanics
Author: S.B.Junarkar and H.J. Shah
Publisher: Charotar Publishing House, Anand

Title: A textbook of Engineering Mechanics
Author: R.S. Khurmi
Publisher: S. Chand and Co. Ltd., New Delhi.

Title: Engineering Mechanics
Author: R.K. Bansal
Publisher: Laxmi Publications, New Delhi.

Title: Strength of materials
Author: B.C. Punmia
Publisher:

Title: Engineering Mechanics
Author: A.K. Tayal
Publisher:

Title: Engineering Mechanics
Author: Prof D J Dave
Publisher:

LIST OF EXPRIMENTS

1 **Equilibrium of a coplanar force system.**
To verify the conditions of equilibrium of a body under the action of coplanar non concurrent non parallel forces by analytical and graphical method.

2 **Coefficient of friction.**
To determine the coefficient of friction between two surfaces using inclined plane by varying load and corresponding effort.

3 **Simple lifting machine.**
To study the screw jack as a simple lifting machine and to find out its velocity ratio, mechanical advantage and efficiency.

4 **Compound pendulum.**
To obtain the periodic time and the natural frequency of an oscillating compound pendulum of different shapes like circular, square.

5 **A simple roof truss.**
To determine the forces in the members of a simple roof truss.

6 **Bending moment.**
To find bending moment at a section in the beam under the effect of concentrated loads acting vertically downward.

7 **Tension test on mild steel.**
To study stress-strain behavior of a mild steel bar within elastic limit.

8 **Compression test on various materials.**
To study the compression failure under the axial loading on materials like cement-mortar cube, brick, wood & cast iron.