100908/CE900C Engineering Mechanics

Course Contents and Course Plan

No	Topic	No. of Lectures
1	**Module 1 (10 hours)**	
1.1	Introduction to engineering mechanics ,introduction on statics and dynamics, Basic principles of statics	1
1.2	Parallelogram law, equilibrium law, Superposition and transmissibility, law of action and reaction	1
1.3	Free body diagrams. Degree of freedom, types of supports and nature of reactions, exercises for free body diagram preparation	2
1.4	Composition and resolution of forces, resultant and equilibrium equations	2
1.5	Concurrent coplanar forces, analysis of concurrent forces, methods of projections	2
1.6	Analysis of concurrent forces, methods of moment, Varignon's Theorem of Moments	2
	Module 2 (9 hours)	
2.1	Parallel coplanar forces, couple, resultant of parallel forces, centre of parallel forces	2
2.2	Equilibrium of parallel forces, Simple beam subject to concentrated vertical loads.	2
2.3	General coplanar force system, resultant and equilibrium equations	2
2.4	Friction, sliding friction, Coulomb's laws of friction, analysis of single bodies	3

3	**Module 3 (9 hours)**	
3.1	Introduction to forces in space, vectorial representation of forces, moments and couples	1
3.2	Resultant and equilibrium equations for concurrent forces in space, concurrent forces in space	2
3.3	Centroid of simple and regular geometrical shapes, centroid of figures in combination	2
3.4	Moment of inertia, parallel axis theorem	1
3.5	perpendicular axis theorem	1
3.6	Polar moment of inertia, Radius of gyration. Mass moment of inertia of ring, cylinder and uniform disc. Theorem of PappusGuldinus	2
4	**Module 4 (10 hours)**	
4.1	Dynamics, rectilinear translation, equations of kinematics	2
4.2	Kinetics, equation of motion	1
4.3	D'Alembert's principle, motion on horizontal and inclined surfaces	1
4.4	motion of connected bodies.	2
4.54	Curvilinear translation,equations of kinematics, projectile motion	1
	kinetics,equation of motion. Moment of momentum	1
	Impulse momentum equation and work energy equation	2
5	**Module 5 (9 hours)**	
5.1	Rotation, kinematics of rotation, equation of motion for a rigid body rotating about a fixed axis	1

5.2	Rotation under a constant moment	3
5.3	Plane motion of rigid body, instantaneous centre of rotation	1
	Introduction to harmonic oscillation, free vibrations, simple harmonic motion, differential equation and solution.	2
	Degree of freedom, examples of single degree of freedom (SDOF) systems, Idealisation of mechanical systems as spring-mass systems	2