

PROFESSOR'S NAME	Dr. K. Ramesh
DEPARTMENT	Mechanical Engineering
INSTITUTE	IIT Madras
COURSE OUTLINE	The course covers the basic aspects of Engineering Fracture Mechanics. Spectacular failures that triggered the birth of fracture mechanics, Modes of loading, Classification as LEFM and EPFM, Crack growth and fracture mechanisms, Energy release rate, Resistance, Griffith Theory of fracture, Extension of Griffith Theory by Irwin and Orowan, R-Curve, Pop-in phenomena, Crack branching. Necessary and sufficient conditions for fracture, Stress and Displacement fields in the very near and near-tip fields, Westergaard, Williams and Generalised Westergaard solutions, Influence of the T-stress and higher order terms, Role of photoelasticity on the development of stress field equations in fracture mechanics, Equivalence between SIF and G, Various methods for evaluating Stress Intensity Factors, Modeling plastic zone at the crack-tip, Irwin and Dugdale models, Fracture toughness testing, Fedderson's residual strength diagram, Paris law, J-integral, HRR field, Mixed-mode fracture, Crack arrest methodologies.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	M1L1	Introduction to Engineering Mechanics I
2	M1L2	Introduction to Engineering Mechanics II
3	M1L3	Force Systems I
4	M1L4	Force Systems II
5	M2L1	Equilibrium of Rigid bodies I
6	M2L2	Equilibrium of Rigid bodies II

7	M2L3	Trusses I
8	M3L1	Trusses II
9	M3L2	Trusses III
10	M3L3	Beams I
11	M4L1	Beams II
12	M4L2	Beams III
13	M4L3	Beams IV
14	M5L1	Virtual Work I
15	M5L2	Virtual Work II
16	M5L3	Energy Relations
17	M6L1	Review Before Quiz I
18	M6L2	Friction I
19	M6L3	Friction II
20	M7L1	Friction III
21	M7L2	Particle Dynamics
22	M7L3	Circular Motion
23	M8L1	Absolute Motion
24	M8L2	Relative Motion I
25	M8L3	Relative Motion II
26	M9L1	Relative Motion III and Instantaneous Center
27	M9L2	Rotating frame of reference I- Velocity
28	M9L3	Rotating frame of reference II- Acceleration
29	M10L1	Rotating frame of reference III- Choice of rotating frame of reference

30	M10L2	RFR- IV Crank and slotted bar
31	M10L3	RFR-V Understanding Coriolis Acceleration
32	M11L1	Kinetics I
33	M11L2	Kinetics II
34	M11L3	Kinetics III
35	M12L1	3D Kinematics I
36	M12L2	3D Kinematics II
37	M12L3	3D Kinematics III

References if Any: None