ENGINEERING FRACTURE MECHANICS

PROF. K. RAMESH
Department of Applied Mechanics
IIT Madras

TYPE OF COURSE: Rerun | Core/Elective | UG/PG
COURSE DURATION: 12 weeks (20 Jul'20 - 09 Oct'20)
EXAM DATE: 17 Oct 2020

PRE-REQUISITES: Basic course on Strength of Materials. Course on Theory of Elasticity desirable
INDUSTRIES APPLICABLE TO: HAL, Honeywell, GE, GM, NAL, DMRL, DRDO, BEML, Mahindra&Mahindra, Tata Motors, L&T, VSSC, Defense and Atomic energy Laboratories

COURSE OUTLINE:

ABOUT INSTRUCTOR:
Prof. K. Ramesh is currently a Senior Professor at the Department of Applied Mechanics, IIT Madras; as its Chairman during (2005-2009) and formerly a Professor at the Department of Mechanical Engineering, IIT Kanpur. He received his undergraduate degree in Mechanical Engineering from the Regional Engineering College, Trichy (now NIT, Trichy), Postgraduate degree from the Indian Institute of Science, Bangalore and the Doctoral Degree from the Indian Institute of Technology Madras.

COURSE PLAN:
Week 01: EFM Course outline and Spectacular Failures
Week 02: Introduction to LEFM and EPFM, Fatigue Crack Growth Model
Week 03: Crack Growth and Fracture Mechanisms, Griffith TMs Theory of Fracture
Week 04: Energy Release Rate
Week 05: Review of Theory of Elasticity
Week 06: Westergaard Solution for Stress and Displacements for Mode I, Relationship between K and G
Week 07: Introduction to multi parameter stress field for Mode I, Mode II and Mixed Modes
Week 08: SIF for Various Geometries
Week 09: Modeling Plastic Deformation, Irwin TMs model, Dugdale Model
Week 10: Fracture Toughness Testing, Paris Law and Sigmoidal curve
Week 11: Crack Closure, Crack Growth Models, J-Integral
Week 12: Failure Assessment Diagram, Mixed Mode Fracture, Crack Arrest and Repair Methodologies