

Year & Sem:	Course Code: ME3509	Course Name: Fatigue, Creep & Fracture	No. of Credits: 4	L	T&PS	P
				2	2	0

FATIGUE : Types of fatigue leading and failure, Fatigue test, endurance limit, S-N diagram; Various failure relations, Viz., Soderberg, Modified Goodman-, Gerber parabolic-, Elliptical-relations; Factors influencing fatigue strength; Influence of stress concentration on fatigue test; Fretting corrosion; Effect of environment-corrosion fatigue; Increased fatigue life due to surface protection. **CREEP** : Mechanics of creep, inter-granular, trans-granular creep, Creep test, Creep strain rate-time curves, Deformation mechanism map; High temperature properties of materials; Long time creep-stress-time relations; Creep contribution to the fracture mechanism; Creep contribution to the fracture mechanism; DVM, DVL German-standard, Hatfield time yield test.

FRACTURE : Damage tolerance analysis, residual strength in presence of cracks; Mechanisms of crack growth and fracture; Basic modes of fracture; Stress Concentration factor, state of stress at a stress concentration, load-flow-times; Measurement of Collapse strength; Griffith's theory of brittle fracture; Irwin's theory of fracture in elastic-plastic materials; Theories of linear elastic plastic fracture mechanics (LEFM); Stress intensity fracture, toughness, stress distribution at crack tip: plane stress, plane strain cases; Theories of elastic plastic fracture mechanics (EPFM); Crack opening displacement (COD) Criterion, COD tests, crack tip opening displacement (CTOD) measurement; Crack arresters; Implementation of fracture control.

References/Text Books:

1. K. Ramesh, e-Book on Engineering Fracture Mechanics, IIT Madras, 2007.
URL: http://apm.iitm.ac.in/smlab/kramesh/book_4.htm
2. Prashant Kumar, Elements of Fracture Mechanics, Tata McGraw Hill, New Delhi, India, 2009.
3. K. R.Y. Simha, Fracture Mechanics for Modern Engineering Design, Universities Press (India) Limited, 2001
4. D. Broek, Elementary Engineering Fracture Mechanics, Kluwer Academic Publishers, Dordrecht, 1986.
5. T.L. Anderson, Fracture Mechanics - Fundamentals and Applications, 3rd Edition, Taylor and Francis Group, 2005

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.

Video Lectures (Web Links):

- 1.
- 2.

Study Materials (Web Links):

- 1.
- 2.