## FATIGUE AND FRACTURE MECHANICS

## **PROFESSIONAL ELECTIVE - I**

A5AE39       PCC       L       T       P       C       CIE       SEE       To         A5AE39       PCC       3       0       0       3       30       70       11         COURSE OBJECTIVES       The Main objective of this course is to       1       Provide the basic knowledge on the mechanics of elastic and Plastic deformation,       2       Creep, Fracture and fatigue failure, as applied to metals, composites,       3       3       0       11         Course of the practical examples of the application of the principles of fracture mechanics.       4       Provide practical examples of the application of fracture mechanics to design and Life prediction         UNIT-I       FATIGUE OF STRUCTURES         Introduction to fatigue, Endurance limits - Effect of mean stress, Goodman, Gerber and Sode elastic stress concentration factors - Notched S.N. Curves.         UNIT-II       PHYSICAL ASPECTS OF FATIGUE         Phase in fatigue life - Crack initiation - Crack growth - Final fracture - Dislocations - Fatigue frasurfaces.         UNIT-II       STATISTICAL ASPECTS OF FATIGUE BEHAVIOUR         -ow cycle and high cycle fatigue - Coffin - Manson's relation - Transition life - Cyclic strain hardiand softening - Analysis of load histories - Cycle counting techniques -Cumulative damage - M heory.         UNIT-IV       OVERVIEW OF ENGINEERING FRACTURE MECHANICS         Strength of cracked bodies - Potential energy and surface energy - Griff	C	Code	Catagany	LI.c		Maale	Creatite	N/ -		Aortes	
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1. Prashant Kumar, "Elements of Fracture Mechanics", Tata McGraw Hill, New Delhi, India, 2009.	1. Prashant	: Kumar, "E	Elements of Fracture M	1echani	cs", Ta	ata McG	Graw Hill, N	ew Delhi	, India, 20	009.	
COURSE OUTCOMES:			50.								

- 1. Ability to use simple continuum mechanics and elasticity to determine the stresses, strains, and displacements in a loaded structure.
- 2. Understanding and mathematical modeling of the elements of plastic deformation, with respect to continuum and microscopic mechanisms.
- 3. Ability to use creep data to predict the life of structures at elevated temperatures and the understanding of mechanisms of creeep deformation and fracture.
- 4. Use of fracture mechanics to quantitatively estimate failure criteria for both elastically and plastically deforming structures, in the design of life prediction strategies, and for fracture control plans, with examples from automotive, aerospace, medical, and other industries.
- 5. Understanding of fatigue and how this affects structural lifetimes of components