PROF. K. RAMESH
Department of Applied Mechanics
IIT Madras

TYPE OF COURSE: Rerun | Elective | UG/PG
COURSE DURATION: 12 weeks (18 Jan’ 21 - 09 Apr’ 21)
EXAM DATE: 25 Apr 2021

PRE-REQUISITES: Basic course on Strength of Materials. Course on Theory of Elasticity desirable
INTENDED AUDIENCE: Students in Engineering Colleges and working professionals in similar areas
INDUSTRIES APPLICABLE TO: HAL, GE, GM, NAL, DMRL, DRDO, BEML, Mahindra&Mahindra, Tata Motors, L&T, VSSC, Defense and Atomic energy Laboratories

COURSE OUTLINE:
The course covers the basic aspects of experimental stress analysis that includes exhaustive treatment of the most versatile techniques like photoelasticity and strain gauges and also a brief introduction to the emerging techniques like digital image correlation. In addition it also provides the fundamental aspects of six different experimental techniques such as Moire, Brittle Coatings, Holography, Speckle Methods, Thermoelastic Stress Analysis and Caustics.

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 1: Overview of Experimental Stress Analysis
Week 2: Physical Principle of Experimental Techniques, Introduction to Various experimental Techniques
Week 3: Fringe Patterns - Richness of Qualitative Information, Multi Scale Analysis
Week 4: Selection of Experimental Techniques, Introduction to Crystal Optics
Week 5: Light Ellipse, Retardation Plates and Plane Polariscope
Week 6: Jones Calculus, Plane and Circular Polariscope analysis
Week 7: Compensation Techniques, Calibration of Photoelastic Materials
Week 8: Fringe ordering and Three-Dimensional Photoelasticity
Week 9: Photoelastic Coatings
Week 10: Brittle Coatings and Strain Gauges Introduction
Week 11: Strain Gauge Alloys, Performance of Strain Gauge System
Week 12: Correction factor for Special Applications