EXPERIMENTAL STRESS ANALYSIS

PROF. K. RAMESH
Department of Applied Mechanics
IIT Madras

TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 24 Apr 2022

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