

EXPERIMENTAL STRESS ANALYSIS

PROFESSIONAL ELECTIVE - I

VI Semester								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5AE38	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	30	70	100
COURSE OBJECTIVES								
The course covers the basic concepts of the analysis and at the end of the course students will be able to								
<ol style="list-style-type: none"> 1. Explain the basic aspects of experimental stress analysis that includes exhaustive treatment of the most versatile techniques like photo elasticity and strain gauges 2. Impart a brief introduction to the emerging techniques like digital image correlation. 3. Demonstrate the fundamental aspects of six different experimental techniques 4. Understand the Moiré, Brittle Coatings, Holography, Speckle Methods, Thermoplastic Stress with practical application 								
UNIT-I	MEASUREMENTS AND EXTENSOMETERS							
Principles of measurement, Accuracy, Sensitivity, Range, Types of Error, Mechanical, Optical, Acoustical and Electrical extensometers and their use, advantage and disadvantage.								
UNIT-II	STRAIN GAUGE – PRINCIPLES AND STRAIN MEASUREMENT							
Principles and operation of electrical strain gauge, Requirement, Type and their uses, Material for strain gauge, Calibration, Bridge sensitivity, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, Strain indicator, Rosette Analysis.								
UNIT-III	PHOTOELASTICITY, FRINGE INTERPOLATION TECHNIQUES							
Concept of Light, Two dimensional Photo elasticity, Photo elastic effects, Stress optic law, Plane and circular polariscope, Interpretation of fringe pattern, Compensation and separation techniques, Photo elastic material.								
UNIT-IV	NON-DESTRUCTIVE TESTING-I							
Fundamentals of Non Destructive Testing, Radiography, Ultrasonic Inspection, Ultrasonic C-Scan, Magnetic particles Inspection, Fluorescent penetrant technique, Eddy current testing, Acoustic Emission Technique.								
UNIT-V	NON-DESTRUCTIVE TESTING -II							
Fundamentals of brittle coating methods, Analysis of brittle coatings, Industrial application of brittle coating, Introduction to Moiré Techniques, Holography, Thermography.								
Text Books:								
<ol style="list-style-type: none"> 1. Daily J. W, Riley W. F (2005), Experimental Stress Analysis, 4th edition, McGraw- Hill, New Delhi. 2. Thomas G. Beckwith, Maragoni, Lienhard (2009), Mechanical Measurements, 6th edition, Pearson Education, New Delhi. 								
Reference Books:								

1. Sadhu Singh (2009), Experimental stress Analysis, 3rd edition, Khanna Publications, New Delhi.
2. Prasad (2011), Non- Destructive Test and Evaluation of Materials, 1st edition, Tata McGraw-Hill, New Delhi.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Understand the basic concepts of experimental stress analysis
2. Demonstrate the principles of major types of extensometers
3. Apply the knowledge of Strain gauges in aeronautical domain
4. Understand the principles of Rosette analysis and fringe techniques
5. Understand NDT techniques used in the structural analysis