EXPERIMENTAL STRESS ANALYSIS

Subject Code: 13ME2208   **L   P   C**
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Pre requisites: Mechanical measurements

Course Educational Objectives:
To make the student learn
1. basic knowledge of instruments used for stress and strain measurement
2. the importance of measurement of piezoelectric transducer
3. interpretation of isoclinics and isochromatics in the study of photoelasticity

Course Outcomes:
The student will be able to
1. explain the measurement of stress and strain in structures subjected to static and dynamic loads
2. use mechanical, pneumatic and electrical strain gauges for strain measurements
3. explain the applications of plane polarized and elliptically polarized lights
4. analyze photoelasticity data
5. calibrate through tension, beam and disc models

UNIT-I
Strain measurement, ideal strain gauge, mechanical, optical, acoustical, pneumatic, dielectric and electrical strain gauges, differential transformer and piezoelectric transducers.

UNIT-II
Electrical wire resistance strain gauges: bonded type gauges, bonding agents, foil gauges, gauge materials, weldable gauges.

UNIT-III
Strain gauge- adhesive, fixing of gauges, temperature effects in bonded gauges, gauge factor and gauge sensitivity, measurement of stress, stress gauge.

UNIT-IV

Measuring circuits and strain gauge rosette: potentiometer circuit, Wheatstone bridge, circuit sensitivity and output, temperature compensation and signal addition, rectangular, delta and tee- delta rosette, applications of strain gauge in practical problems.

UNIT-V

Vibration measurement: Introduction, transducers, vibration pickups, frequency measuring instruments, vibration exciters, signal analysis.

TEXT BOOK:
1. JW Dally and WF Riley, "*Experimental Stress Analysis*", McGraw-Hill Publications, 2003

REFERENCES:
1. CC Perry and HR Lissner, "*The Strain Gage Primer*" , McGraw-Hill, 2000.

2. Abdul Mubeen, "*Experimental Stress Analysis*" , Dhanpat Rai and Sons, 2001.

3. PS Theocaris, "Moire Fringes in Strain Analysis" , Pergammon Press, 2002.