

DETAILED SYLLABUS

**OBJECTIVE:**

- To study the various experimental techniques involved for measuring displacements, stresses, strains in structural components.

**UNIT I EXTENSOMETERS AND DISPLACEMENT SENSORS**

Principles of measurements, Accuracy, Sensitivity and range of measurements, Mechanical, Optical, Acoustical and Electrical extensometers and their uses, Advantages and disadvantages, Capacitance gauges, Laser displacement sensors.

**UNIT II ELECTRICAL RESISTANCE STRAIN GAUGES**

Principle of operation and requirements, Types and their uses, Materials for strain gauges, Calibration and temperature compensation, cross sensitivity, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, Rosette analysis, stress gauges, load cells, Data acquisition, six component balance.

**UNIT III PHOTOELASTICITY**

Two dimensional photo elasticity, Photo elastic materials, Concept of light – photo elastic effects, stress optic law, Transmission photo elasticity, Jones calculus, plane and circular polariscopes, Interpretation of fringe pattern, Calibration of photo elastic materials, Compensation and separation techniques, Introduction to three dimensional photo elasticity.

**UNIT IV BRITTLE COATING AND MOIRE TECHNIQUES**

Relation between stresses in coating and specimen, use of failure theories in brittle coating, Moire method of strain analysis.

**UNIT V NON – DESTRUCTIVE TESTING**

Fundamentals of NDT, Acoustic Emission Technique, Radiography, Thermography, Ultra sonics, Eddy Current testing, Fluorescent Penetrant Testing,

**TEXT BOOKS:**

1. Dally, J.W., and Riley, W.F., "Experimental Stress Analysis", McGraw Hill Inc., New York 1998.
2. Srinath, L.S., Raghava, M.R., Lingaiah, K., Garagesha, G., Pant B., and Ramachandra, K., "Experimental Stress Analysis", Tata McGraw Hill, New Delhi, 1984.
3. Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, New Delhi, 1996.

**REFERENCES:**

1. Durelli. A.J., "Applied Stress Analysis", Prentice Hall of India Pvt Ltd., New Delhi, 1970
2. Hetenyi, M., "Hand book of Experimental Stress Analysis", John Wiley and Sons Inc., New York, 1972.
3. Max Mark Frocht, "Photo Elasticity", John Wiley and Sons Inc., New York, 1968
4. Pollock A.A., Acoustic Emission in Acoustics and Vibration Progress, Ed. Stephens R.W.B., Chapman and Hall, 1993.
5. Ramesh, K., Digital Photoelasticity, Springer, New York, 2000.