Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Experimental Stress Analysis	MED 502	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam;**
II	3	3-0-0	3 Hours

Unit – I

Basic Purpose of Experimental Analysis: Strain Measurement; An ideal strain gauge; Mechanical; Optical; Acoustical; Pneumatic; Dielectric and electrical strain gauges; Differential transformer and piezoelectric transducers. **(06 Hours)**

Unit – II

Strain Gauges: Electrical wire resistance strain gauges; Bonded type gauges; Bonding agents; Foil gauges; Gauge materials; Weldable gauges; Strain gauge adhesive; Fixing of gauges; Temperature effects in bonded gauges; Gauge factor and gauge sensitivity; Measurement of stress and strain. **(08 Hours)**

Unit – III

Strain Gauge Circuits: 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; Application of strain gauge in practical problems.

(06 Hours)

Unit – IV

Photoelasticity: Whole field methods: Photo elasticity; Stress loci; Isoclinics; Isostatics and isochromatics; Stress optic law and strain optic law; Photoelestic materials; Polarization of light; Plane polarized and elliptically polarized light; Brittle coating; Crack pattern and crack detection in coating; Moire fringe geometry. **(12 Hours)**

Unit – V

Polariscope: Analysis of photo elasticity data; Polariscope; Fringes due to principal stress direction and difference; Model making; Interpretation of isoclinics and isochromatics and fractional fringe order; Calibration through tension; Beam and disc models; Reflection polariscopy. **(10 Hours)**

Unit – VI

Application and Case Studies: Application to stress concentration and stress intensity factor; Separation of stresses; Applications of the frozen-stress method; Scattered-light method. **(03 Hours)**

Recommended Books:

1. Experimental Stress Analysis; J.W. Dally and W.F. Riley; McGraw Hill, 3rd Edition, March 1991.
2. Experimental Stress Analysis; Abdul Mubeen; Dhanpat Rai and Sons, 2003.
3. Experimental Stress Analysis and Motion Measurements; R.C. Dove and P. H. Adams; Prentice Hall, 1965.
4. Elements of Experimental Stress Analysis; A. W. Hendryn; Pergamon Press, Pergamon Press, 1977.
5. Experimental Stress Analysis; Sadhu Singh; Khanna Publishers, 1996.