



CBCS SCHEME

15ME832

Eighth Semester B.E. Degree Examination, June/July 2019 Experimental Stress Analysis

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various standards for linear measurements. (08 Marks)
- b. Explain the types of error which occur during experiments. (08 Marks)

OR

- 2 a. Derive an expression for gauge factor for an electrical resistance strain gauge. (08 Marks)
- b. Explain any four types of Adhesives used for construction and installation of strain gauges. (08 Marks)

Module-2

- 3 The following readings of strain were obtained in a three element rectangular rosette mounted on aluminium specimen for which $E = 70 \text{ GPa}$ and Poisson's ratio = 0.32, $\hat{\epsilon}_A = 850 \mu\text{m/m}$, $\hat{\epsilon}_B = -1200 \mu\text{m/m}$ and $\hat{\epsilon}_C = 1000 \mu\text{m/m}$. The transverse sensitivity and Poisson's ratio of gauge material is 0.07 and 0.28 respectively. Determine (i) Corrected strains, (ii) Principal strains, (iii) Principal stresses and their directions and (iv) Maximum shear stress. (16 Marks)

OR

- 4 a. With neat sketches explain the measurement of Axial force and Torque using strain gauge transducers. (12 Marks)
- b. Briefly discuss the three element rectangular and delta strain gauge rosette arrangement. (04 Marks)

Module-3

- 5 a. Derive an expression for stress-optic law for two dimensional photoelasticity. (08 Marks)
- b. Explain with neat sketch any one method for calibration of photoelastic model material. (08 Marks)

OR

- 6 a. Explain shear difference method of separation technique for separation of principal stresses. (08 Marks)
- b. Discuss the properties of photoelastic model materials. (08 Marks)

Module-4

- 7 a. With neat sketches explain the stress freezing method in three dimensional photoelasticity. (08 Marks)
- b. With neat sketch explain the working of scattered light polariscope. (08 Marks)

OR

- 8 a. Derive an expression for the difference in principal stresses in Birefringent coating is linearly related to the difference in the principal stresses acting on the surface of machine part. (08 Marks)
- b. Explain with suitable sketch the separation of principal stresses in Birefringent coating. (08 Marks)

Module-5

- 9 a. With neat sketches explain the steps involved in a typical brittle coating application on flat tension model to study incipience of cracks. (08 Marks)
- b. Explain with neat sketch the calibration of Brittle coating materials. (08 Marks)

OR

- 10 a. Explain the movie fringe analysis by Geometric approach. (08 Marks)
- b. Explain any one method of Moire technique for out of plane problems. (08 Marks)
