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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 GPa and Poisson's ratio = 0.32, $\hat{\epsilon}_A$ = 850 μm/m, $\hat{\epsilon}_B$ = −1200 μm/m and $\hat{\epsilon}_C$ = 1000 μm/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)**

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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)**

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