

GBCS SCHEME



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15ME832

Eighth Semester B.E. Degree Examination, Aug./Sept.2020 Experimental Stress Analysis

Time: 3 hrs.

Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.

ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With the help of neat sketch, explain generalized measurement system. (06 Marks)
- b. Explain the environmental effects on the performance of strain gauge. (06 Marks)
- c. What are the functions of Backing Material? (04 Marks)
- 2 a. Derive the equation for sensitivity of the potentiometer circuit. (08 Marks)
- b. Define strain sensitivity of metal and derive the equation for gauge factor. (08 Marks)

Module-2

- 3 a. Sketch the different configurations of the strain rosette. (06 Marks)
- b. The apparent strains measured by a rectangular rosette are $Q_a = -1000 \mu\text{m/cm}$, $Q_b = 327 \mu\text{m/cm}$, $Q_c = 200 \mu\text{m/cm}$ with transverse sensitivity of $K = 0.01$. The Poisson's ratio of the material on which rosette mounted is 0.3. Calculate principal stresses and strains. Take $E = 200 \text{ GPa}$ and $\nu = 0.285$. (10 Marks)
- 4 a. Explain the corrections for transverse strain effects. (06 Marks)
- b. A delta rosette yields the following strain indications $\epsilon_a = -845 \mu\text{m/cm}$, $\epsilon_b = 1220 \mu\text{m/cm}$, $\epsilon_c = 710 \mu\text{m/cm}$. Calculate maximum principal stresses and strains, principal strain direction and shear stress. $\nu = 0.285$, $e = 2 \times 10^6 \text{ kg/cm}^2$. (10 Marks)

Module-3

- 5 a. Derive stress optic law. (06 Marks)
- b. Derive equation for Intensity of light coming out of plane polariscope and explain formation of Isoclinic and Isochromatic Fringes. (10 Marks)
- 6 a. Elaborate the shear difference method of stress separation. (08 Marks)
- b. What are the ideal properties of 2D photoelastic model materials? (08 Marks)

Module-4

- 7 a. With neat sketch, explain scattered light polariscope. (08 Marks)
- b. Explain stress freezing method of three dimensional photoelasticity. (08 Marks)
- 8 a. Explain with neat sketch reflection polariscope. (08 Marks)
- b. Derive equation for Birefringence coating stresses. (08 Marks)

Module-5

- 9 a. Elaborate the various crack patterns obtained in Brittle coating. (08 Marks)
- b. Explain the different crack detection methods used in Brittle coating method. (08 Marks)
- 10 a. Describe the displacement approach for Moire Fringe analysis. (08 Marks)
- b. Explain the Moire Fringes produces by mechanical interference. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.