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10ME761

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018

Experimental Stress Analysis

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define gauge factor. Derive an expression for gauge factor for an electrical resistance strain gauge. (10 Marks)
- b. List the desirable characteristics of an adhesive used to mount strain gauge and explain strain gauge mounting technique. (10 Marks)
- 2 a. What do you understand by a strain rosette? With the help of neat sketches, give different types of strain rosette configurations. (08 Marks)
- b. A three element rectangular rosette is bonded on a test component. The strains measured are $\epsilon_A = +800 \times 10^{-6}$, $\epsilon_B = +75 \times 10^{-6}$, $\epsilon_C = -1000 \times 10^{-6}$. Determine the magnitude of principal strains, principal stresses and the direction of principal stresses. Take modulus of elasticity $E = 200\text{GPa}$ and Poisson's ratio $\gamma = 0.3$. (12 Marks)
- 3 a. Define stress optic law and derive stress optic law as applied to 2-dimensional photoelasticity. (10 Marks)
- b. What is calibration of photoelastic material? Explain the calibration method :
i) using tension specimen ii) using the circular disc specimen. (10 Marks)
- 4 a. Explain the shear difference method for the separation of principal stresses. (10 Marks)
- b. What are the properties of an ideal photoelastic material? Discuss a few important photoelastic materials. (10 Marks)

PART - B

- 5 a. Explain stress freezing technique for determination of stresses in 3-D photoelasticity. (10 Marks)
- b. Sketch and explain scattered light polariscope. (10 Marks)
- 6 a. Explain birefringent coating technique of stress analysis and with a neat sketch, explain the working of reflection type polariscope. (10 Marks)
- b. What are the advantages, disadvantages and applications of birefringent coating technique? (10 Marks)
- 7 a. What is brittle coating technique of experimental stress analysis? What are the advantages and disadvantages of this technique? (10 Marks)
- b. With neat sketches discuss the crack patterns, which can be obtained in a brittle coating under various combination stresses. (10 Marks)
- 8 a. What are the applications of Moire's method of strain analysis. (04 Marks)
- b. Explain with neat sketch the displacement approach. (06 Marks)
- c. Explain with a neat sketch the geometrical approach of Moire's fringe analysis. (10 Marks)

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.

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