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Seventh Semester B.E. Degree Examination, Dec.2015/Jan.2016
Experimental Stress Analysis

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Derive an expression for the gauge factor of an electrical conductor of length L, cross sectional area A, resistance R and resistivity ρ . Why for some materials the value of the gauge factor is away from the normal value of 2.0? (10 Marks)
b. Explain with a neat sketch : i) Bonded wire strain gauge ii) Weldable strain gauge. (10 Marks)
- 2 a. Define a strain rosette and mention the different types of strain rosette configuration. (08 Marks)
b. The following readings of strain were obtained on a rectangular strain rosette mounted on aluminium for which $E = 70 \text{ GPa}$, $\nu = 0.32$, $\epsilon_a = 285 \times 10^{-6}$, $\epsilon_b = 65 \times 10^{-6}$, $\epsilon_c = 102 \times 10^{-6}$. Determine the principal strains, principal strain direction, principal stresses and maximum shear stress. (12 Marks)
- 3 a. Derive stress optic law in two dimensional photoelasticity. (10 Marks)
b. Explain the method of calibration of photo elastic model material using a tension specimen. (10 Marks)
- 4 a. List the commonly used stress separation techniques. Explain shear difference method. (10 Marks)
b. What are the properties of 2D photo elastic model materials and material for 2D photo elasticity? (10 Marks)

PART – B

- 5 a. Describe the phenomenon of scattered light as polarizer. (10 Marks)
b. What is the difference between transmitted type photoelasticity and scattered light photoelasticity? (10 Marks)
- 6 a. i) Explain the birefringent coating method. (02 Marks)
ii) Derive an expression for stresses and strain in the specimen in terms of coating thickness. (08 Marks)
b. Explain the working of a reflection polariscope. (10 Marks)
- 7 a. Explain the principle of brittle coating technique and enumerate the advantages and disadvantages. (10 Marks)
b. Describe the calibration method generally used for brittle coatings. How true threshold strains can be determined by this method? (10 Marks)
- 8 a. Explain briefly the mechanism of formation of moiré fringes. (10 Marks)
b. Explain with a neat sketch, the displacement field approach to moiré – fringe analysis. (10 Marks)

Important Note : 1. On completing 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.