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10ME761

**Seventh Semester B.E. Degree Examination, Feb./Mar. 2022**  
**Experimental Stress Analysis**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Define gauge factor. Derive an expression for an electrical resistance strain gauge. (10 Marks)  
 b. List 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 configuration. (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  $E = 200\text{GPa}$  and  $\gamma = 0.3$ . (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 shear difference method with proper sketches and equations applicable to two-D photo elasticity. (10 Marks)  
 b. What is separation technique? Explain:  
 i) Use of lateral extensometer  
 ii) At the free boundary. (10 Marks)

**PART – B**

- 5 a. Explain stress freezing technique for determination of stress in 3-D photo elasticity. (10 Marks)  
 b. Sketch and explain scattered light polariscope. (10 Marks)
- 6 a. Explain birefringent 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 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. Describe the general setup for Moire method of strain analysis. (10 Marks)  
 b. Describe the geometric approach in Moire fringe analysis. (10 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.