**10ME761**

## Seventh Semester B.E. Degree Examination, June/July 2017
### 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. Derive an expression for the gauge factor of an electric resistance strain gauge. **(10 Marks)**
   b. Explain with a neat sketch, foil type strain gauge. **(04 Marks)**
   c. With reference to strain measurement. Explain what temperature compensation is and how it can be achieved in wheat stone bridge? **(06 Marks)**

2  a. Explain the effect of bridge sensitivity for one active strain gauge bridge arrangement. **(08 Marks)**
   b. A three element delta rosette is bonded onto the surface of a machine components with E = 207 GPA and Poisson's ratio = 0.3. The observation made are $\epsilon_0 = 400\,\mu m/m$, $\epsilon_{120} = -200\,\mu m/m$ and $\epsilon_{240} = -200\,\mu m/m$. Determine principal strains, principal stresses and their directions. **(12 Marks)**

3  a. What is meant by polarization? Explain the methods of producing plane and circularly polarized light. **(10 Marks)**
   b. Derive an expression for the intensity of light coming out of plane polariscope when a loaded photoelectric model is placed. **(10 Marks)**

4  a. Explain with neat sketch any one method for calibration of photoelectric model material. **(08 Marks)**
   b. Explain shear difference method for separation of stresses and derive suitable mathematical expressions for applying this method. **(12 Marks)**

### PART – B

5  a. Explain stress freezing technique for determination of stresses in 3-D photoelasticity. **(12 Marks)**
   b. With a neat sketch explain scattered light polariscope **(08 Marks)**

6  a. Briefly explain the use of Birefringence coating for stress analysis. **(05 Marks)**
   b. Explain 'Poisson's ratio mismatch' with reference to birefringent coating. **(05 Marks)**
   c. Show that the difference in principal stresses in birefrigent coating is linearly related to the difference in principal stress acting on the surface of a loaded component. **(10 Marks)**

7  a. Write a note on interpretation of crack pattern data in brittle coating method. **(10 Marks)**
   b. Explain brittle coating crack detection method. **(10 Marks)**

8  a. Explain the geometrical approach for Moiré-fringe analysis. **(10 Marks)**
   b. Discuss the out-of-plane displacement measurement using Moiré technique. **(10 Marks)**

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