USN [ ][ ][ ][ ][ ][ ][ ][ ][ ]　　　　　　　　　　　　　　**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 = 200GPa 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)**

* * * * *