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10ME761

**Seventh Semester B.E. Degree Examination, Dec.2016/Jan.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. What are the factors that should be considered while selecting a strain gage? What type of gauges you would recommend for high temperature strain measurements? How would you compensate for temperature changes? (10 Marks)
- b. What do you understand by a strain rosette? List the different types of strain rosette configuration currently in use. Discuss their uses and limitations. (10 Marks)
- 2 a. Define 'Gauge factor'. Derive an expression to determine the same for an electrical resistance strain gage. (10 Marks)
- b. Three strain gauges are applied to an area at a point in such a manner that gauge 'B' makes a positive angle of 30° with gauge 'A' and gauge 'C' makes a positive angle of 45° with gauge 'B'. The strain readings obtained from the gauges are as follows:

Gauge	A	B	C
Strain ( $\mu$ stain)	-600	300	400

Calculate the principal strains, principal stresses and principal directions. Take  $E = 200\text{GPa}$  and Poisson ration  $\mu = 0.3$  for the gauge material. (10 Marks)

- 3 a. Derive the stress optic law, as applied to two-dimensional photo elasticity. (10 Marks)
- b. Explain the calibration technique used for photoelastic circular disc under diametral compression. (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 method procedure with a neat sketch. (10 Marks)
- b. Describe briefly the scattered light method of photoelastic stress analysis. Specify the advantages and limitations of this method. (10 Marks)
- 6 a. What are photoelastic coatings? What are their applications, advantages and limitations? (10 Marks)
- b. What are strip coatings? How can they be used to separate the principal stresses? (10 Marks)
- 7 a. What is Brittle coating technique? How it is useful for stress analysis? (04 Marks)
- b. Discuss the crack patterns which can be obtained in a brittle coating under various combinations of stresses. Illustrate your answer by giving sketches. (08 Marks)
- c. Describe the calibration method generally used for brittle coatings. How true threshold strains can be determined by this method? (08 Marks)
- 8 a. Explain briefly the phenomenon of Moire techniques used for the analysis of stresses. (10 Marks)
- b. Discuss briefly the applications and advantages of the Moire's method of stress analysis. Also list the limitations. (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.