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 (μ stain)	-600	300	400

   Calculate the principal strains, principal stresses and principal directions. Take E = 200GPa and Poisson ration μ = 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 photoealstic 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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