Total No. of Questions :8] *[Total No. of Printed Pages :3*

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MVSE - 204

M.E./M.Tech., II Semester

Examination, June 2014

Experimental Stress Analysis

Time : Three Hours

Maximum Marks : 70

Note : i) Solve any five questions.
ii) Any data required but not given may be assumed suitably.
iii) Each question carry equal marks.

1. a) Explain mechanical strain gage in detail. What are the advantages of mechanical strain gages over all other types of strain gages?

   b) Write note on the following:

      i) Temperature compensation of circuitry

      ii) Brittle coatings.

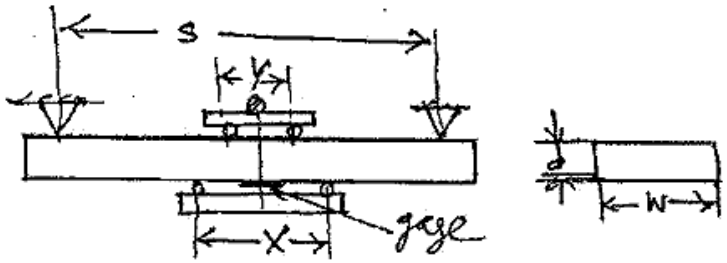
2. a) Show that the change in resistance which accompanies strain is due to geometrical changes of the resistive element and to changes in its specific resistivity.

   b) Discuss the strain-gage locations for various measured quantities.

3. a) Discuss stress analysis by photo elasticity.

   b) Explain in detail optical relationship.

4. A single strain gage is mounted on the centre of the aluminium bar. The bar is loaded with a constant moment section and the curvature is obtain by reading the dial indicator. As the bar is loaded gage resistance is measured by using a resistance-measuring bridge. From the data given, determine the gage factor for this gage.



d = 6.0 mm
w = 25 mm
s = 300 mm
X = 200 mm
Y = 150 mm

R gage (OM)	Dial Reading (0.02 mm)
121.3	0
120.7	4
120.2	8
119.5	12

5. a) What are the various basic parameter on which the development of initial cracks in a body depend? Mention the mathematical problems of fracture mechanics whose situation depend on the above parameters.

   b) Describe basic modes of deformation of crack surfaces and explain the expressions for the stress and displacement fields in the vicinity of crack tip.

6. a) An infinite plane with a straight crack is subjected to a uniform uniaxial tensile stress σ at infinity, determine the critical value of the stress σ at which the crack begins to propagate under constant external load. The crack is situated along the x axis, $|x| \leq 1, y = 0$.

   b) Explain some material characteristics used for the evaluation of crack propagation resistance.

7. a) Explain the calculation of the stress intensity factor by the method of sections.

   b) Find the critical stress for an infinite plate with a crack is loaded by two equal forces P, the distance between the points of application is 2L.

8. Write notes on any Two of the following:

   a) Multichannel recording systems.

   b) Griffith Orowan Irwin concept

   c) Material characteristics used for evaluation of crack propagation resistance.

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