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MVSE-204
M.E./M.Tech. II Semester
Examination, June 2017
Experimental Stress Analysis

Time : Three Hours

Maximum Marks : 70

Note: i) Answer any five questions. All questions carry equal marks.

ii) Assume suitable data if missing.

1. What are the basic characteristics of a strain gauge? Which factors should be considered while selecting a strain gauge? Discuss them.

2. The following readings of strain were obtained on a three-element rectangular strain rosette mounted on a aluminium for which $E = 70$ GPa, $V = 0.3$, $\varepsilon_a = +290\,\mu$ strains, $\varepsilon_b = +65\,\mu$ strains and $\varepsilon_c = 102\,\mu$ strains.

   Determine:

   i) The principal stress and its direction

   ii) The principal strains and its direction

   iii) The maximum shear stress

3. a) Discuss and classify the polarization of light.

   b) Derive an expression for the intensity of the emergent light from a plane polariscope with a stressed model.

4. a) Enumerate the properties of photo elastic material.

   b) A 120 ohm metal gage having a gage factor of 2.0 is mounted on a low carbon steel. What change is gage resistance will be produced by straining the material to its yield point?

5. Explain Griffith-Orowan-Irwin concept in detail. Also discuss the different conditions for oracle growth.

6. An edge cracked beam carries a crack in its central plane whose length is 6 mm. A load of 1200 N is applied opposite to crack so that crack would tend to open in bending. Calculate the S.I.F of crack if the beam has following dimensions. Depth of beam = 30 mm, Thickness = 12 mm Span = 100 mm.

   If two loads of 500 N each are placed at 25 mm from central plane. What would S.I.F of crack?

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 and opposite forces P, the distance between the points of application is 2L.

8. Write notes on any two of the following:

   a) Calculation of S.I.F for double cantilever beam specimen by FEM.

   b) Solution of three dimensional problems

   c) Various types of brittle coatings

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