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B.Tech. - VIEP - MECHANICAL ENGINEERING

(BTMEVI)

Term-End Examination, 2019

BIMEE-005 : EXPERIMENTAL STRESS ANALYSIS

Time : 3 Hours]   [Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Use of scientific calculator is permitted. Missing data, if any, may be suitably assumed.

1.   (a)   Define Gauge Factor. Derive an expression for Gauge Factor.   [7]

     (b)   With a neat sketch, describe the working of a single pressure output pneumatic strain gauge.[7]

2.   (a)   With a neat sketch, explain the principle of a plane polariscope.   [7]

     (b)   Discuss the properties of photo-elastic material. Give at least five examples of photo-elastic material.   [7]

3. (a) List different types of strain gauge rosettes. Explain anyone of them briefly with sketch. [7]

(b) What do you understand by compensation ? List the methods of compensation. Explain anyone of them. [7]

4. (a) A rectangular rosette is mounted on a steel plate having modulus of Elasticity E=200 GPa, Poisson's ratio = 0.3. The strain measured are :

$E_1 = 500 \times 10^{-6}$

$E_2 = 400 \times 10^{-6}$

$E_3 = -100 \times 10^{-6}$

Determine the principal strains, stresses maximum shear stress and the orientation angle for the principal axis of the stress. [7]

(b) What do you mean by multiple strain gauges ? With a neat sketch, explain the method of switching active gauges individually. [7]

5. (a) With sketches, explain the geometrical approach to Moire fring analysis. [7]

(b) Derive the relation for stress optic law in terms of relative retardation. [7]

6. (a) What is optical strain gauge ? With the help of neat diagram, explain working of optical strain gauge. [7]

(b) Differentiate between unbonded wire strain gauge and bonded-wire strain gauge. [7]

7. Write short notes on **any two** of the following :[7+7=14]

(a) Machining of a photo elastic casting

(b) Mis match Technique

(c) Wheat Stone Bridge

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