B.Tech.(ME) (E-I 2011 Onwards)   (Sem.–6)
# EXPERIMENTAL STRESS ANALYSIS
Subject Code : DE/ME-3.5
Paper ID : [A2426]

Time : 3 Hrs.
Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   (a) Give the typical values of standard gauge resistances.

   (b) What is zero shift of a strain gauge?

   (c) Differentiate between accuracy and sensitivity.

   (d) Draw isoclinic fringe pattern for a disk under diametral load.

   (e) What do you understand by principal stresses and principal planes?

   (f) What do you understand by a displacement field?

   (g) What is the direction of crack when the coating fails?

   (h) What is the nature of light? http://www.punjabpapers.com

   (i) What is the core method in 3-D photoelasticity?

   (j) What is the use of the tilting stage in 3-D photoelasticity?

SECTION-B

2. If the state of stress at any point in a body is given by

$$\begin{bmatrix} ax + by + cz & k & nx^2 + pz^2 \\ k & dx^2 + ey^2 + fz^2 & ly + mz \\ nx^2 + pz^2 & ly + mz & gx^3 + hy^3 + iz^3 \end{bmatrix} \text{ then}$$

what equations of the body force intensities satisfy the equilibrium conditions?

3. What are the effects of temperature change on the performance of a strain gauge? How would you compensate for temperature changes?

4. What are the additional properties for 3-D photoelasticity?

5. How would you make crack detection in brittle coating?

6. Explain the Tardy's Method of compensation with neat sketches.

SECTION-C

7. Sketch the arrangement of circular polariscope and explain the function of each component. http://www.punjabpapers.com

8. What are strain rosettes? What are their uses? For a two rectangular rosette $\square_1 = 860 \times 10^{-6}$ and $\square_2 = -390 \times 10^{-6}$, determine the principal stresses. $E_{steel} = 210$ GPa and $\nu = 0.30$.

9. Discuss the effect of the following on coating analysis

   (a) Strain gradient and

   (b) Thermal field.