

**Total No. of Questions : 09**

**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?
- (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.
8. What are strain rosettes? What are their uses? For a two rectangular rosette  $\epsilon_1 = 860 \times 10^{-6}$  and  $\epsilon_2 = -390 \times 10^{-6}$ , determine the principal stresses.  $E_{\text{steel}} = 210 \text{ GPa}$  and  $\nu = 0.30$ .
9. Discuss the effect of the following on coating analysis
  - (a) Strain gradient and
  - (b) Thermal field.