

USN

--	--	--	--	--	--	--	--	--	--

10ME761

Seventh Semester B.E. Degree Examination, June/July 2016
Experimental Stress Analysis

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Define gauge factor and derive the equation to determine the gauge factor for an electrical resistance strain gauge. (10 Marks)
b. Derive the governing equation of potentiometer used for strain measurement. (10 Marks)
- 2 a. A two element rectangular rosette is used to determine the two principal stresses at a point if $E_1 = 860\mu\text{m/m}$ and $E_z = -390\mu\text{m/m}$ taking $E = 207\text{ GPa}$ and Poisson's ratio as 0.3. Find σ_1 and σ_2 . (05 Marks)
b. A delta strain rosette bonded on to the surface of a structural member yields the following strain when the structure is loaded $E_0 = +500\mu\text{m/m}$, $E_{120} = -250\mu\text{m/m}$ and $E_{240} = +250\mu\text{m/m}$. Given $K_t = -0.07$ and $V_o = 0.285$. Determine the magnitude and directions of principal strains and stresses as the point when the strain rosette is bonded. Take $E = 80\text{GPa}$ and Poisson's ratio as 0.3 for the structural member. (15 Marks)
- 3 a. Derive the stress optic law, as applied to two dimensional photoelasticity. (10 Marks)
b. Explain the calibration technique used for photoelastic circular disc under diametrical compression. (10 Marks)
- 4 a. List the important properties of an ideal photoelastic material. (10 Marks)
b. Determine the individual values of σ_1 and σ_2 using sheer difference method. (10 Marks)

PART – B

- 5 a. Explain with neat sketch, the concept of stress- freezing method. (10 Marks)
b. With the help of neat diagram, explain the scattered light polariscope. (10 Marks)
- 6 a. Discuss briefly, Birefringence coating stresses and explain the isochromatic and isoclinic fringe patterns in a Birefringence coating. (15 Marks)
b. Explain the effect of Poisson's ratio mismatch. (05 Marks)
- 7 a. List and explain types of Brittle coatings. (10 Marks)
b. Discuss briefly the advantages and applications of Brittle coating. (10 Marks)
- 8 a. Explain Moiré's method for out of plane displacement measurement. (10 Marks)
b. Discuss briefly the advantages and applications of Moiré method of strain Analysis. (10 Marks)

* * * * *