

M.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Third Semester

STRUCTURAL ENGINEERING

SEE552: Experimental Methods and Model Analysis

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Define : Strain Gauge. How do you classify strain gauges?
2. What are the advantages of acoustical strain gauges?
3. Briefly explain about unbonded wire strain gauges.
4. Define : Isochromatics.
5. What are the properties of an ideal photoelastic material?
6. What is the necessity of model analysis?
7. State Buckingham Pi Theorem
8. Explain the principle of dimensional homogeneity.
9. What are the functions of a strain gauge backing material?
10. Briefly explain Stress Optic Law

PART B (5 x 16 = 80 Marks)

11. a) Name the most popular Mechanical Strain Gauge. Explain the principle of operation.
(OR)
b) (i) What are the functions of adhesives in strain measurements? Name a few adhesives used. (8)
(ii) What are the characteristics of an ideal strain gauge (8)
- 12 a) What is a Strain Gauge Rosette? Briefly explain about three element rectangular rosette.
(OR)
b) What is an LVDT. Explain the working principle with sketches

- 13) a) (i) What are the calibration techniques to determine the material fringe value (8)
(ii) Explain how material fringe value f_{σ} is determined in the case of a simple test specimen. (8)

(OR)

- b) (i) What are the factors to be considered for selecting a birefringent coating material. (8)
(ii) Explain the procedure to determine principal stresses from isoclinic and isochromatic data (8)
- 14 a) (i) Describe the basic elements of a circular polariscope (8)
(ii) Write short notes on color matching techniques (8)

(OR)

- b) (i) Explain the effect of a stressed model in a standard circular polariscope (8)
(ii) Discuss the various methods of obtaining polarized light (8)
- 15 a) (i) Differentiate between geometrical similarity and complete similarity (8)
(ii) Explain the purpose of dimensional analysis (8)

(OR)

- b) (i) What are the methods commonly used for establishing similarity relationship between the prototype and model (8)
(ii) A half scale photoelastic model represents a prototype design. The model is loaded to 1 kN and the maximum stress is found to be 7 MPa. Determine the maximum stress in the prototype when load with 10 kN (8)
