

AE 2352/EXPERIMENTAL STRESS ANALYSIS

1. Explain in detail with neat sketches the working of a mechanical and optical extensometer.
2. Explain with neat sketch the working of various types of extensometer.
3. Explain how the modulus of elasticity and Poisson's ratio of an engineering material are determined with the help of electrical resistance type gauge.
4. Derive an expression for output voltage of Wheatstone bridge circuit for strain measurement.
5. Calculate circuit sensitivity when all the gauges are active. When $R_g=120$, $I_g=50\text{mA}$, $S_g=2$.
6. What is meant by compensation in photo elasticity?
7. Explain any one type of compensation method in detail with its advantages over other methods.
8. Explain separation technique in photo elasticity and name the various methods.
9. Explain two separation techniques used in photoelasticity.
10. Explain fringe sharpening and fringe multiplication technique used in photoelasticity.
11. Explain in detail about ultrasonic testing, eddy current testing and brittle coating testing.
12. Write short note on acoustic emission technique.
13. Explain about moiré technique.
14. Explain holography and ultrasonic C-scan non-destructive testing methods with its application.
15. Derive an expression for the strain experienced by electrical resistance type strain gauge.
16. Explain how the electrical resistance type gauge can be used to determine the modulus of elasticity and Poisson's ratio of engineering materials.
17. Show how the change in output voltage is related to change in resistance of Wheatstone bridge used for strain measurement.
18. Derive an expression for principal stress in terms of the rosette strain measurement.
19. A beam of uniform circular section is fixed at one end and free at other end. It is subjected to a shear force P at free end and torque T at the end. Explain the arrangement regarding the position of strain gauge.
20. Derive an expression for principal strain and its direction in terms of strain measured in a three element rectangular rosette.
21. Derive the relation between stress, relative retardation, material fringe value and thickness of photo elastic module.
22. Show that the intensity of light emerging from circular polariscope is a function of principal stress difference.
23. Explain any one of the compensation techniques used for getting accuracy in fringe order determination.
24. List the various methods of separation technique and explain any one.
25. Explain separation technique based on the equilibrium equation.
26. What are the methods used in three dimensional photo elasticity and explain any one.
27. Explain in detail any two methods used for three dimensional photo elasticity analyses.
28. Derive the expression for state of stress in brittle coating in terms of the stresses in the specimen and the properties of material.
29. Write short note on Moiré's technique, acoustic emission technique.
30. What are the three different measurements that can be used to estimate the stress in material?
31. What is load cell? How is it used to measure load? Explain.
32. Explain the principle of operation of linear variable differential transformer with a neat sketch. Also discuss its performance characteristics.

33. Explain the principle construction and working of any one mechanical strain gauge and optical strain gauge.
34. From the observation $\xi_0 = -200$, $\xi_{45} = 400$, $\xi_{90} = 100$, $E = 210$, Poisson's ratio $= 0.3$. Determine the principle strain, principle stress and principle angles. Find the maximum shear stress.
35. Describe the application of photo elastic technique in the analysis and design of structures.
36. Explain in detail the principles and procedure involved in the determination of stress values.
37. Explain the principle of ultrasonic testing of structures.
38. Write briefly about acoustic emission technique
39. Discuss in detail about fiber-optic sensors.
40. What are the basic elements of a dynamic strain measuring system? Discuss its function briefly.
41. What are strain rosettes? How is it used to measure state of strain at a point.
42. Describe any one method used for the calibration of the material used for photo elasticity investigation.
43. How will you use the laser in testing of structures? Explain in detail.