PART –B

AE2352EXPERIMENTAL STRESS ANALYSIS

Unit -1

1. Explain the basic generalized measuring system with neat sketch.
2. Describe the direct reading and null balance methods in strain measurement.
3. Explain the measurement of pressure with diagram
4. (a)Active and passive instruments
   (b)Null type and deflection type instruments
   (c)Analogue and digital instruments
   (d)Tolerance and dead space
5. Explain the various elements of a measurement system with a block diagram.
6. Briefly explain static characteristic of measurement.
7. Explain briefly Errors in measurement.
8. Briefly Explain Un-Bonded and Bonded Electrical strain gauges.
9. Explain briefly Optical Extensometers.
10. Explain briefly Huggenberger and Johnson Extensometers.
11. Explain briefly choice of selection of right extensometer for material testing
12. Briefly explain the working principle of LVDT.
13. Explain with neat sketches the working of a Mechanical extensometer.
14. Explain with neat sketches the working of a Electrical extensometer.
15. Explain with neat sketches the working of an acoustical extensometer.
16. What are the different types of strain gauges? What are the advantages over other types of gauges? Why foil type gauges are prepared over wire type of gauges?
17. What are the basic characteristics of a strain gauge? Which factors should be considered while selecting a strain gauge?

Unit -1I

1. Derive the expression for balanced and un-balanced Wheatstone bridge circuit
2. Derive the expression for principal strains and its direction in terms of strain measured in a three element rectangular rosette (gauge A along x- axis, gauge B along 45^0 to the x- axis and gauge C along y- axis).
3. Derive an expression for output voltage of Wheatstone bridge circuit for strain measurements.
4. Derive an expression for output voltage of Potentiometer circuit for strain gauges.
5. Determine principal stresses and principal strains with help of a delta rosette mounted on an aluminum specimen with values of $\epsilon_A = 400\mu$, $\epsilon_B = 400\mu$, $\epsilon_C = 400\mu$, $E_{al} = 70GPa$, $\gamma = 0.3$

6. Three strain gauges are applied to an area at a point in such a manner that gauge 'b' makes a positive angle of 30^0 with gauge 'a' and gauge 'c' makes a positive angle of 45^0 with gauge 'b' . The strain readings obtained from the gauges are as follows.

Gauge	Strain µm/m
a	-600
b	300
c	400

Calculate the principal strains, principal stresses and principal directions.

7. Derive the expression for principal strains and its direction in terms of strain measured in a Four element rectangular rosette
8. Derive the expression for principal strains and its direction in terms of strain measured in a Delta rosette
9. Explain briefly the NULL balance bridges.

Unit-III

1. Explain the effects of stressed model in a plane polariscope in dark-field set up.
2. What is meant by compensation in photo elasticity and explain any two fringe compensation method in detail with its advantages over other methods**.**
3. Explain the importance of isoclinic's and isochromatic with neat sketch.
4. Explain the separation technique based on the equilibrium equation.
5. Explain two separation technique used in photoelasticity.
6. Explain fringe sharpening and fringe multiplication techniques used in photo elasticity.
7. Derive the expression for the intensity of emerging light from a plane polariscope with a stressed model and show how it enables us to determine the isoclinics and the isochromatics.
8. Show the intensity of light emerging from circular polariscope is a function of principal stress difference.
9. Derive the relation between the stresses, relative retardation, material fringe value and thickness of photoelastic model.

Unit IV

1. Explain the moiré method in brief and discuss the fundamental properties of the moiré fringes. .
2. Explain briefly the Moiré method of strain analysis.
3. Explain Brittle coating technique with neat sketch.
4. Explain working principle of Holography
5. Enumerate the brittle coating crack pattern with explanation.

Unit V

1. Explain and application of the followings:

   (i) Radiography

   (ii) Ultrasonic testing

2. Explain:

   (i) Moiré method of strain analysis.

   (ii) Acoustic emission technique.

3. Explain \

   (i) Eddy current testing

   (ii) Brittle coating technique

4. Explain the working principle of Fibre optic sensors with neat sketch.

5. Explain holography and ultrasonic C-scan non-destructive testing methods with its application.

6. Explain acoustic emission technique with neat sketch.

7. Explain radiography and fluorescent penetrant

8. What is the principles of radiography and explain the production of X-rays with the help of schematic diagram.