KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Sixth Semester

AERONAUTICAL ENGINEERING

AER114**:** Experimental Stress Analysis

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The assumption "Plane section remains plane before and after loading" used in_____ approach

   a) Theory of elasticity
   b) Strength of materials
   c) Theory of plasticity
   d) Finite element method

2. The magnification value of Porter Lipp gauge is

   a) 100
   b) 150
   c) 250
   d) 300

3. The sensitivity of Tuckerman optical gauge is

   a) 2 micro strains
   b) 4 micro strains
   c) 8 micro strains
   d) 12 micro strains

4. The smallest value of strain which can be read on a scale associated with strain gauge is

   a) Range
   b) Accuracy
   c) Sensitivity
   d) Gauge length

5. Which one of the following is not a gauge material?

   a) Elinvar
   b) Kevlar
   c) Invar
   d) Chromel-C

6. Apparent strain induced due to

   a) Thermal load
   b) Mechanical load
   c) Electrical load
   d) None of the above

7. Stress difference inversely varies with

   a) Fringe order
   b) Material fringe value
   c) Model thickness
   d) None of the above

8. Analyzer rotation causes

   a) Higher order fringe to pass through the point of interest
   b) Lower order fringe to pass through the point of interest
   c) Increase or decrease in stress value
   d) Change in strain

9. The wavelength of visible light is

   a) 150-330 nm
   b) 230-510 nm
   c) 390-700 nm
   d) 520-900 nm

10. "Light is an Electromagnetic radiation" stated by

   a) Newton
   b) Huygens
   c) Maxwell
   d) Albert Einstein

PART B (10 x 2 = 20 Marks)

11. Define Gauge factor.
12. State the difference between Accuracy and Precision.
13. List the various limitations of a mechanical strain gauge.
14. Based on Principle of operation, classify the extensometers.
15. What are the limitations of potentiometer circuit?
16. What is meant by Temperature compensation?
17. Why Tardy method of compensation is preferred over all other methods?
18. What is a stress trajectory?
19. State the importance of NDT methods in Aviation Industry.
20. What is the effect of dye-etchant on strain-sensitivity of the coating?

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain in detail the Principles of Measurements.   (10)

       (ii) Explain briefly about errors in measurement.   (4)

(OR)

    b)   Briefly explain about the following measuring instruments

            (i)Active and passive instruments (ii)Null type and deflection type instruments

            (iii) Analogue and digital instruments (iv)Tolerance and dead space

22. a) (i) Briefly explain the working principle of LVDT.   (10)

       (ii) List the various limitations of mechanical extensometers.   (4)

(OR)

b)   Explain in detail the working principle and measurement of strains from an Acoustical strain gauge with neat sketch.

23. a)   Derive an expression for change in output voltage of Wheatstone bridge circuit in terms of the change in resistances.

(OR)

b)   The strain measurements at a point with an equiangular rosette gave the following readings: ε_a=500 μ m/m, ε_b=380 μ m/m, ε_c=200 μ m/m. Determine the principal strains, principal stresses and maximum shear stress at the point. E=210GPa, υ=0.286.

24. a)   What is meant by compensation in photoelasticity and explain any two fringe compensation method in detail with its advantages over other methods.

(OR)

b)   Explain the effects of stressed model in a plane polariscope in dark-field set up.

25. a)   Write a short notes on
     (i)   Eddy current testing   (7)
     (ii)   Brittle coating technique   (7)

(OR)

b) (i)   Explain the working principle of Fibre optic sensors with neat sketch.   (7)
     (ii)   Briefly explain about the Moiré method of strain analysis.   (7)

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