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Question Paper Code : 60032

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth/Sixth Semester

Aeronautical Engineering

AE 2352/AE 54/AE 1353/080180031/10122 AE 603 — EXPERIMENTAL STRESS ANALYSIS

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name three different types of electrical extensometers.
2. Apart from good accuracy, precision, resolution and sensitivity, name three other characteristics you would look for when buying a measuring instrument.
3. Define cross-sensitivity factor.
4. How will you achieve temperature compensation using potentiometer circuit?
5. Name the different types of electrical strain gauge.
6. State stress optic law.
7. Define fringe order.
8. Define compensation technique in photoelasticity.
9. What are the limitations of magnetic particle testing?
10. What is holography? Explain briefly.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the amplification mechanism and obtain the magnification factor of any mechanical extensometer. (10)
- (ii) Define accuracy, precision, sensitivity and resolution of a measuring instrument. (6)

Or

- (b) (i) Explain with the help of a neat sketch, the working principle of an optical extensometer. (10)
- (ii) Compare the relative advantages and disadvantages of the different categories of extensometers. (6)
12. (a) Suppose a state of pure shear stress occurs (say on a circular shaft in torsion). Show how a single-element strain gauge can be employed to determine principal stresses (σ_1 and σ_2).

Or

- (b) Using principal stresses obtained from rectangular rosette, show the expression for the maximum shear stress in terms of the strains obtained a three element rectangular rosette.
13. (a) Discuss the important properties of isoclinics. How isoclinics of various parameters can be obtained?

Or

- (b) What are the important properties of an ideal photoelastic material? Discuss the important photoelastic materials.
14. (a) Derive the expression for the intensity of light for a circular polariscope arrangement.

Or

- (b) What are the assumptions made while analysing brittle coatings? Derive expression for coating stresses.
15. (a) Discuss briefly about the brittle coating methods and their applications.

Or

- (b) Write short notes on :
- (i) Thermography (8)
- (ii) Acoustic emission technique. (8)