





12. a) i) List the characteristic advantages of Karma alloy as the sensing material in an electrical resistance strain gauge. (3)
- ii) What is the importance of the elongation limit of an electrical resistance strain gauge? (4)
- iii) Explain zero shift, linearity and hysteresis under electrical resistance strain gauge performance characteristics. (9)

(OR)

- b) i) How is the performance of an electrical resistance strain gauge affected by temperature? (4)
- ii) Explain how the Wheatstone circuit can be used with electrical resistance strain gauges for strain measurement in bars and beams. (12)

13. a) i) Sketch and list the features of a potentiometer circuit suitable for dynamic strain measurement. (4)
- ii) Consider a shaft subject to torque. Explain how the experimental evaluation of shear strain due to torque using a half-bridge Wheatstone circuit and electrical resistance strain gauges can be carried out. (12)

(OR)

- b) Explain the effect of a stressed model placed in a plane polariscope set-up. Differentiate between isoclinics and isochromatics.

14. a) i) Why are compensation, separation and fringe multiplication procedures required in photoelasticity? (7)
- ii) Give reasons for the necessity of specimen calibration before the conduct photoelastic experimental procedures. Describe a calibration procedure. (9)

(OR)

- b) i) Briefly introduce the concept behind Moire methods of strain analysis. (7)
- ii) Give examples of brittle coating crack patterns. What are the failure theories which are applicable for brittle coatings? (9)

15. a) Describe the ULTRASONICS method of non-destructive testing. What are the advantages and limitations of this method?

(OR)

- b) Explain the application of radiography as a non-destructive testing procedure for aircraft structural parts. What are the advantageous and good points of this method?