No. of Pages:2

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER M.TECH DEGREE EXAMINATION, APRIL/MAY 2018

Mechanical Engineering

(Machine Design)

01ME6106 EXPERIMENTAL STRESS ANALYSIS

Answer ***any two full*** questions from ***each*** **part**

Max. Marks: 60 Duration: 3 hours

PART A

1.	a.	Explain Principal stresses and Principal strains.	(3)
	b.	What are the basic characteristics of a strain gauge?	(3)
	c.	How Moire method can be used for strain Measurements?	(3)
2.	a.	Explain the corrections for transverse strain effects and derive the equation for corrected gauge factor related to Cross sensitivity factor.	(6)
	b.	Explain Optical strain gauges.	(3)
3.	a.	Derive an expression for the principal strains using a Delta Rosette.	(4)
	b.	A rectangular Rosette mounted on a steel specimen give the following reading. ϵ_0 = -450 μm/m, ϵ_{45} = 210 μm/m, ϵ_{90} =190 μm/m, Determine the Principal strains and principal stresses at the point if E = 2 X 10^7 N/cm^2. Also find principal angles	(5)

PART B

4.	a.	Prove that Wheatstone bridge circuit sensitivity is improved by the use of multiple active gages. Also discuss the temperature compensation effect by the use of active gage in different positions.	(6)
	b.	Explain the working of Cathode Ray Oscilloscope.	(3)
5.	a.	State and explain Stress Optic Law.	(4)
	b.	Explain about photo elastic coatings and its uses.	(2)
	c.	Explain the arrangement of Optical element in a Circular Polariscope.	(3)
6.	a.	Derive an expression for the intensity of the emergent light from a plane polariscope for dark field arrangement	(7)

b. Explain about uncertainty analysis. (2)

PART C

7. a. Explain different non-destructive testing methods, their advantages and disadvantages. (7)

   b. Explain failure theories of brittle coatings. (5)

8. a. Explain the principle and working of Dye penetrates method. (5)

   b. Explain different steps in brittle coating method. (4)

   c. Explain the surface preparation of Brittle coating (3)

9. a. Explain the importance of Laser technology in NDT. (4)

   b. What is the difference between X ray and Gamma ray radiography tests? (4)

   c. Explain the advantages and disadvantages of Ultrasonic Flaw detection method. (4)