M18002049

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **M.TECH**

M.TECH 2ND SEMESTER REGULAR EXAMINATIONS, MAY 2018
EXPERIMENTAL STRESS ANALYSIS
Branch: MD, Subject Code:MMDPC2020
Time: 3 Hours
Max Marks : 70

PART-A (10 X 2=20 MARKS)

1. Answer the following questions.

a) What are the ideal requirements of a strain gauge? [CO1]
b) What are different bonding materials used in strain gauge application? [CO1]
c) Define Gauge Factor for an electrical resistance strain gauge ? [CO1]
d) Write the conditions for a balanced Wheatstone Bridge? [CO2]
e) What is Photoelastic effect ? [CO2]
f) Calculate the thickness of a stressed model so that the polarized light passing through it breaks into two components having phase difference of π/2. Given the wave length of light λ =548 nm and refractive indices 1.31 and 1.29 respectively. [CO2]
g) State Stress Optic Law ? [CO3]
h) What Is Tardy's method in photoelasticity? [CO3]
i) Write down the advantages and disadvantages of brittle coating method. [CO4]
j) Distinguish between "Stress coat" and "All Temp" as materials used for strain indication by Brittle Coating method? [CO4]

PART-B (5 X 10=50 MARKS)

Answer any five questions from the following.

2.

a) Define the gauge factor of a resistance strain gauge. What are the essential requirements of electrical resistance strain gauge? [CO1]
b) Give briefly the operating principles of mechanical, optical, acoustic, pneumatic strain gauges. [CO1]

3.

a) The following observations were made with a rectangular rosette mounted on an aluminium specimen.

$$\varepsilon_A = -170\,\mu m/m$$
$$\varepsilon_B = +70\,\mu m/m$$
$$\varepsilon_C = +70\,\mu m/m$$

Determine the principal strains, principal stresses. For aluminium, E=68 kN/mm^2,$\mu = 0.33$. [CO1]

b) Explain the construction of the three elements Delta rosette and derive the expressions for the principal stresses and their orientations in terms of strain measurement readings. [CO1]

4.

a) Show the arrangement of all the optical elements in a circular polariscope. Explain how the circularly polarized light is available in this arrangement. [CO2]

b) When a grating of pitch 40 lines per mm is given a slight rotation θ with respect to a second grating of the same pitch, moire fringes are formed making an angle of Ø with respect to second grating. Determine the angle θ and interfringe spacing δ ,if the angle Ø is equal to (i) 60^0 and (ii) 110^0. [CO2]

5.

a) Explain the Wheatstone bridge circuit for measurement of strain from a strain gauge . [CO2]

b) Define the circuit sensitivity of the circuit with four strain gauges. What is meant by 4-arm and 2-arm circuits? [CO2]

6.

a) What do you mean by three dimensional photo elasticity? [CO3]

b) Explain in detail with a neat sketch about the Frozen stress method in 3-D. [CO3]

7.

a) Derive the expression for failure theory of the case $\sigma_c{}^x > 0 > \sigma_c{}^y$ [CO4]

b) Explain the procedure for calibration of brittle coating. [CO4]

8.**Write notes on**

a) Null-balance bridge. [CO2]

b) Moire Fringe method [CO1]

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