CBCS SCHEME

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15ME832

Eighth Semester B.E. Degree Examination, Feb./Mar. 2022
Experimental Stress Analysis

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain generalized measurement system with the help of neat sketch. **(08 Marks)**

b. Elaborate the different types of experimental errors. **(08 Marks)**

OR

2 a. Derive the equation for sensitivity of potentiometer circuit. **(08 Marks)**

b. What are the environmental effects on performance of strain gauge? **(08 Marks)**

Module-2

3 a. Sketch the different strain gauge rosettes. **(06 Marks)**

b. A three element rectangular strain rosette is applied on a area in such a manner that gauge 'q' makes a positive angle of 30° with gauge 'p' and gauge 'r' makes a positive angle of 45° with gauge 'q'. The strain readings obtained from gauges are as follows :
Gauge p → 600 μcm/cm, gauge q → 300 μcm/cm and for gauge r → 400 μcm/cm
Calculate principal strains, principal stresses and principal directions.
Take $E = 2 \times 10^6$ kg/cm^2 and $\gamma = 0.3$. **(10 Marks)**

OR

4 a. Explain working of hydraulic dynamometer. **(05 Marks)**

b. Elaborate working of proving ring. **(05 Marks)**

c. Describe the use of elastic members for force measurements. **(06 Marks)**

Module-3

5 a. Define and derive stress optic law. **(08 Marks)**

b. Explain calibration of photoelastic model material using a tensile specimen. **(04 Marks)**

c. Explain fringe multiplication. **(04 Marks)**

OR

6 a. What are the ideal properties of photoelastic model material? **(08 Marks)**

b. Elaborate model to prototype scaling. **(08 Marks)**

Module-4

7 a. With neat sketch, explain scattered light polariscope. **(08 Marks)**

b. Describe stress freezing method of three dimensional photo elasticity. **(08 Marks)**

OR

8 a. Explain reflection polariscope. **(08 Marks)**

b. Derive equation relating stresses in birefringent coating and the model. **(08 Marks)**

Module-5

9 a. Elaborate the various crack detection methods. **(08 Marks)**

b. Explain the different crack patterns obtained in brittle coating. **(08 Marks)**

OR

10 a. Explain the formation of Moire fringes by mechanical interference. **(08 Marks)**

b. Describe the displacement approach for Moire fringe analysis. **(08 Marks)**

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