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.

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **15ME832**

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Experimental Stress Analysis

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define gauge factor and derive an expression for it. **(08 Marks)**

b. Explain briefly the following terms:
   i) Callibration
   ii) System response
   iii) Types of experimental errors
   iv) SR-4 gauges. **(08 Marks)**

OR

2 a. What is the necessity of temperature compensation? How this can be achieved? **(08 Marks)**

b. Explain any four important factors which affects the performance of strain gauges. **(08 Marks)**

Module-2

3 a. The apparent strains measured by a rectangular rosette are : $Q_a = -1000\mu/cm$, $Q_b = 327\mu/cm$ and $Q_c = 200\mu/cm$. The transverse sensitivity of gauges is one percent and the Poisson's ratio of the material on which the rosette is mounted is 0.3. Calculate the principal stresses with and without considering the effect of transverse sensitivity and the errors in principal stresses $E = 210GPa$. **(10 Marks)**

b. With neat sketches, explain briefly
   i) Force transducer
   ii) Torque transducer **(06 Marks)**

OR

4 a. A delta rosette yields the following strain indications, $\varepsilon_a = -845\mu m/m$, $\varepsilon_b = 1220\mu m/m$ and $\varepsilon_c = 710\mu m/m$. Calculate the maximum principal strain direction, the principal stresses and the maximum shear stress $E = 200GPa$, $v = 0.285$. **(10 Marks)**

b. Explain the principle of stress gage and derive the expression of stress in terms of gage output $\Delta R/R$. **(06 Marks)**

Module-3

5 a. Derive the stress optic law, as applied to two dimensional photo elasticity. **(08 Marks)**

b. Derive the equation for light passing through a stressed model in a circular polariscope. **(08 Marks)**

OR

6 a. Explain the shear difference method for the separation of principal stresses. **(08 Marks)**

b. Explain briefly the properties of an ideal photoelastic material. **(08 Marks)**

Module-4

7 a. Explain stress freezing method procedure with a neat sketch. **(08 Marks)**

b. What is birefringence? Explain how stresses and strains can be measured using birefringent coating. List various assumptions made. **(08 Marks)**

OR

8 a. Describe briefly the scattered light method of photoelastic stress analysis, specify the advantages and limitations of this method. **(08 Marks)**

b. What are strip coatings? How can they be used to separate the principal stresses? **(08 Marks)**

Module-5

9 a. What is brittle coating technique? With neat sketches discuss the crack patterns which be obtained in brittle coating under various combinations of stresses. **(10 Marks)**

b. Explain crack detection techniques in brittle coating method. **(06 Marks)**

OR

10 a. Explain the geometrical approach for Moire-Fringe analysis. **(08 Marks)**

b. Discuss briefly the applications and advantages of the Moire's method of strain analysis. **(08 Marks)**

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