4F 27 (3)

CBCS SCHEME

USN | | | | | | | | | | 18CAE321

Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Experimental Mechanics

Time: 3 hrs. Max. Marks: 100

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 an example. **(12 Marks)**

b. Discuss the type of errors that may cause uncertainty in experimental measurement. **(08 Marks)**

OR

2 a. The following readings are taken of a certain physical length compute the mean reading standard deviation, variance and average of absolute value of deviation using the 'biased' basis :

Reading	1	2	3	4	5	6	7	8	9	10
x(cm)	5.30	5.73	6.77	5.26	4.33	5.45	6.09	5.64	5.85	5.75

(10 Marks)

b. Write a brief note on following :
i) Probability distributions
ii) Chi-square test of goodness fit. **(10 Marks)**

Module-2

3 a. What are the major elements of data acquisition and processing system? Explain with block diagram major elements of data acquisition system. **(08 Marks)**

b. What are the difference between active and passive filters? **(04 Marks)**

c. With a net sketch explain the following : i) Proving Ring ii) Prony Brake. **(08 Marks)**

OR

4 a. A three element rectangular rosette is mounted on a loaded member one of the axis of strain gauge is along x-axis and other axis along two direction which makes an angle of 45° and 90° with the reference axis. The indicated strains are $\varepsilon_0 = 850\mu m/m$, $\varepsilon_{45} = -50\mu m/m$, $\varepsilon_{90} = 850\mu m/m$, considering a transverse sensitivity factors $K_t = 0.06$ determine :
i) Actual strains
ii) Principal strain and stress
iii) Error in principal stress value if indicated strains are used. Assume E = 200GPa, Poisson ratio = 0.285. **(14 Marks)**

b. With neat sketch, describe the Wheatstone bridge circuit used for strain measurement. **(06 Marks)**

Module-3

5 a. State and explain stress-optic law for 2-D photo-elasticity and derive an expression for fringe order using stress optic law. **(08 Marks)**

b. Give a physical interpretation of formation of Isoclinics and Isochromatics in a plane polariscope interposed with a 2-D photoelastic model in a plane stress condition. **(12 Marks)**

OR

6 a. Sketch and explain oblique incidence method of separation of principal stresses. **(08 Marks)**

b. Write a detailed note on following :

i) Calibration of photo-elastic material

ii) Fringe multiplication technique. **(12 Marks)**

Module-4

7 a. Explain stress Freezing technique for 3-D photoelastic model. Explain how this technique can be descried using spring–Ice analogy. **(12 Marks)**

b. Explain in brief how shear difference method of separation can be applied for stress frozen 3-D model. **(08 Marks)**

OR

8 a. Explain the principle of scattered light photo-elasticity. Explain how this scattering techniques can be used as polarizer and analyzer. **(12 Marks)**

b. With net sketch, explain the working of scattered light polariscope. **(08 Marks)**

Module-5

9 a. Explain theory of Birefringence coating and derive the expression for principal stress difference in terms of photo-elastic data obtained at a point. **(12 Marks)**

b. Explain the principle of Brittle coating technique and enumerate the advantages and disadvantages of this technique. **(08 Marks)**

OR

10 a. State the two approaches used to analyze fringes in Moiré method. Explain the geometric approach used for pure extension without rotation case of Moiré model. **(08 Marks)**

b. What is holography? Explain with sketch Recording and Reconstruction process in Holography. **(12 Marks)**

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