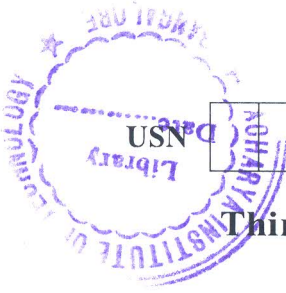


CBCS SCHEME



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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.

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

- b. Write a brief note on following : (10 Marks)
 - 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 neat 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 $\epsilon_0 = 850\mu\text{m/m}$, $\epsilon_{45} = -50\mu\text{m/m}$, $\epsilon_{90} = 850\mu\text{m/m}$, considering a transverse sensitivity factors $K_t = 0.06$ determine : (14 Marks)
 - i) Actual strains
 - ii) Principal strain and stress
 - iii) Error in principal stress value if indicated strains are used. Assume $E = 200\text{GPa}$, Poisson ratio = 0.285.
- 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)

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.

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 described 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 neat 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)
