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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, M.Tech. - Mechanical Engineering (MMDN)

Semester End Examination; April / May -2021

Experimental Mechanics

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Explain the concept of data acquisition, processing and analyze experimental data.

CO2: Explain electrical resistance strain gauges and strain rosettes circuits for strain measurements and potentiometer.

CO3: Apply methods of photo elasticity and analyze stress strain behavior of solid bodies.

CO4: Analyze stress strain behaviour of solid bodies using different coating techniques.

CO5: Make use of holography and moiré techniques in experimental stress analysis.

Note: I) *Answer any* ***FIVE*** *full questions, selecting* ***ONE*** *full question from each unit.*

II) *Any* ***THREE*** *units will have internal choice and remaining* ***TWO*** *unit questions are compulsory.*

III) *Each unit carries 20 marks.* ***IV)*** *Missing data, if any, may suitably be assumed.*

Q. No.	UNIT - I	Marks	BLs	COs	POs
1a.	What is data acquisition system? Explain the major elements of general data acquisition system with a block diagram.	10	L2	C1	
b.	From the following data obtain Y as a linear function of X using the method of least square.	10	L3	C1	

Y_i	1.2	2.0	2.4	3.5	3.5
X_i	1.0	1.6	3.4	4.0	5.2

UNIT - II

2 a.	Derive an expression for gauge factor of an electrical resistance gauge.	10	L3	C2	
b.	The following readings of strain were obtained on a rectangular strain rosette mounted on an aluminum for which E = 70 GPa, $\gamma = 0.32$, $\in_a = 285\times10^{-6}$, $\in_b = 65\times10^{-6}$, $\in_c = 102\times10^{-6}$. Determine the principal strains, principal strain directions, principal stresses and maximum shear stress.	10	L3	C2	

OR

2 d.	With neat circuit diagram, explain calibrations of potentiometer.	10	L2	C2	
e.	Derive an expression for principal stresses, strains, maximum shear stress and principal directions for a delta strain gauge rosette.	10	L2	C2	

UNIT - III

3 a.	State stress optic law. Derive an expression for stress optic law applied to 2-D photo elasticity.	10	L2	C3	

Contd… 2

	b.	With neat sketch, develop the expression for the effect of a stressed model in a plane polariscope dark field set up.	10	L2 C3
		OR		
3	d.	Explain Tardy's method of compensation to measure fractional fringe order at a point.	10	L2 C3
	e.	Explain shear difference method.	10	L2 C3
		UNIT - IV		
4	a.	Explain the principle of brittle coating technique. Mention their advantages and disadvantages.	10	L2 C4
	b.	What are the assumptions made while analyzing brittle coating? Derive an expression for coating stresses.	10	L2 C4
		OR		
4	d.	Explain the calibration of brittle coating material.	10	L2 C4
	e.	Explain the different types of coating materials.	10	L2 C4
		UNIT - V		
5	a.	What is holography? Explain the fundamental principle of hologram formation.	10	L2 C5
	b.	Describe the geometrical approach in Moire fringe analysis considering the case of pure extension without rotation.	10	L2 C5

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