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Bengaluru

Mid Term Examinations - October 2026

Date: 06/10/2026 **Time:** 02:00 PM - 03:30 PM

Course Code: MEC3050 **Course Name:** Experimental Stress Analysis

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	24	22	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Differentiate between active and dummy gauges in a Wheatstone bridge circuit utilized for temperature compensation	2	CO1	BT2
2	Explain how dual-lead construction prevents fatigue failure in electrical strain gauges.	2	CO1	BT2
3	Differentiate between the configurations of a direct stress gauge and a plane shear gauge.	2	CO3	BT2
4	Explain how the readings of a four-element rectangular rosette can be verified for accuracy.	2	CO3	BT2
5	Summarize the advantages of using cyanoacrylate cement for strain gauge installations.	2	CO2	BT2

PARTB: Answer Any 1 Following Questions. 20 M

Q.N.	Questions	M	CO	BT
06.A	Compare the functional characteristics of foil strain gauges and wire grid gauges, explaining why foil gauges are predominantly preferred. Outline the standard steps involved in sample surface preparation for a strain gauge installation	10	CO1	BT2
06.B	The following apparent strains were obtained with a two-element rectangular rosette: e'_{xx} = -200 µm/m and e'_{yy} = 700 µm/m. Determine the true strains e_{xx} and e_{yy} if the cross-sensitivity factor K = 0.01. Determine the percentage error which would have occurred in both measurements if the cross-sensitivity of the gauge had been completely neglected.	10	CO2	BT3
07.A	Explain the principle of temperature compensation using a dummy gauge in a Wheatstone bridge circuit. Discuss the curing characteristics and applications of phenolic and ceramic cements as adhesives	10	CO1	BT2
07.B	A two-element rectangular rosette produced the following apparent strain readings: e'_{xx} = 1200 µm/m and e'_{yy} = 400 µm/m. Determine the true strains e_{xx} and e_{yy} given a cross-sensitivity factor K = 0.015. Calculate the percentage error in the measurement of both strains if the cross-sensitivity was ignored.	10	CO2	BT3

PARTC: Answer Any 1 Following Questions. 20 M

Q.N.	Questions	M	CO	BT

08.A	The following strain readings were recorded using a four-element rectangular rosette mounted on an aluminium specimen: e_A = -600 µm/m, e_B = +100 µm/m, e_C = +200 µm/m, and e_D = -500 µm/m. Comment on the validity of the measurements and determine the principal strains e_1 and e_2.	10	CO3	BT3
08.B	A two-element rectangular rosette is used to evaluate the two principal stresses at a specific point on a surface. The principal stresses are known to be p_1 = 200 N/mm^2 and p_2 = 75 N/mm^2. Determine the normal stresses s_{xx}, s_{yy}, and the shear stress t_{xy} acting on the X-Y axes when the X-axis is inclined at an angle Ø = 30 degrees relative to the principal direction 1.	10	CO3	BT3
09.A	A four-element rectangular rosette mounted on an aluminium specimen provides the following observations: e_A = 300 µm/m, e_B = 200 µm/m, e_C = 600 µm/m, and e_D = 700 µm/m. Check the validity of the data, and determine the principal strains (e_1, e_2) and principal stresses (p_1, p_2). For aluminium, take Youngs Modulus (E) = 68 kN/mm^2 and Poissions Ratio (v)= 0.33.	10	CO3	BT3
09.B	A two-element rectangular rosette determines the two principal stresses at a point to be p_1 = 120 N/mm^2 and p_2 = 60 N/mm^2. Calculate the normal stresses s_{xx}, s_{yy}, and the shear stress t_{xy} if the rosette's x-axis is mounted at an angle of Ø = 20 degrees with respect to the principal direction 1.	10	CO3	BT3