



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

(An Autonomous Institution affiliated to VTU, Belgaum)

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

Make-up Examination; Feb - 2017

Experimental Mechanics

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer FIVE full questions, selecting ONE full question from each unit.
ii) Assume missing data if any.*

UNIT - I

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|------|--------------------------------------------------------------------------------------|----|
| 1 a. | Explain zero order instrument and first order instrument. | 10 |
| | b. Explain method of least square and chi-square test. | 10 |
| 2 a. | Define the following: | |
| | i) Accuracy ii) Calibration iii) Dimension | 10 |
| | iv) Binomial distribution v) Second order instrument | |
| b. | Explain the components of acquisition and processing system with block diagram. | 10 |

UNIT - II

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|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3 a. | A rectangular strain gauge rosette is bonded at a critical point on to the surface of a structural member. When the structural member is loaded the strain gauges show the following reading.
$\epsilon_0 = 850 \mu\text{m} / \text{m}$, $\epsilon_{45} = -50 \mu\text{m} / \text{m}$, $\epsilon_{90} = -850 \mu\text{m} / \text{m}$. The gauge factor and cross sensitivity of the gauges are 2.80 and 0.06. Find; | 10 |
| | i) Actual strains | |
| | ii) Magnitude and directions of corrected Principal strains. | |
| | iii) The error, if indicated strains $\epsilon_0, \epsilon_{45}, \epsilon_{90}$ are used to calculate the principal stresses given
$E = 200 \text{ GPa}$ and Poisson's ratio of 0.285 | |
| b. | Define Gauge factor and Derive an expression for Gauge factor for an electrical resistance strain gauge. | 10 |
| 4 a. | Explain Potentiometer with neat circuit diagram. List the equation of potentiometer range and sensitivity. | 10 |
| | b. Explain the characteristics of a strain gauge. | 8 |
| | c. What is LVDT and where it is used. | 2 |

UNIT - III

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|------|---------------------------------------------------------------------------------------------|----|
| 5 a. | Discuss the effect of stressed model in a circular Polariscope with dark field arrangement. | 10 |
| | b. Explain the shear difference method for the separation of principal stresses. | 10 |

- 6 a. Explain with neat sketches plane Polariscopes. 10
- b. Explain the fringe sharpening with partial mirrors. 10

UNIT - IV

- 7 a. Explain briefly oblique-Incidence method for separation of principal stresses in birefringent method. 10
- b. Explain Brittle coating crack patterns with neat sketches. 10
- 8 a. Explain reflection Polariscope 10
- b. List the assumptions made in brittle coating and explain coating stresses. 10

UNIT - V

- 9 a. Explain spatial coherence with the help of interferometer. 10
- b. Explain general Moire technique for strain analysis by the displacement approach. 10
- 10 a. Discuss holographic interferometry. 10
- b. Sketch and explain Moire phenomenon. 10

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