



## 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 -2016

**Experimental Mechanics**

*Time: 3 hrs*

*Max. Marks: 100*

*Note: Answer FIVE full questions, Selecting ONE full question from each unit.*

### Unit - I

- |    |    |   |    |
|----|----|---|----|
| 1. | a. | List and explain the types of experimental errors.                                | 6  |
|    | b. | With a block diagram explain generalized measurement system.                      | 6  |
|    | c. | Explain:  |    |
|    |    | i) Analog to digital and digital to analog conversion                             | 8  |
|    |    | ii) Method of least square.   |    |
| 2. | a. | With a block diagram explain the components of acquisition and processing system. | 10 |
|    | b. | Explain:  |    |
|    |    | i) Calibration standards  | 10 |
|    |    | ii) Experiment planning   |    |
|    |    | iii) Chi-Square test  |    |

### Unit - II

- |    |    |  |    |
|----|----|--|----|
| 3. | a. | With a neat sketch explain the working of LVDT.  | 6  |
|    | b. | With neat sketch explain bridge balancing in four arm wheat stone bridge   | 8  |
|    | c. | What is temperature compensation of strain gauges? Explain different methods of temperature compensation in strain gauges. | 6  |
| 4. | a. | Mention the characteristics of strain gauges.  | 4  |
|    | b. | With a circuit diagram, explain the working of a potentiometer.  | 6  |
|    | c. | What is gauge factor? Derive an expression for gauge factor for an electrical resistance strain gauges.                    | 10 |

### Unit - III

- |    |    |  |    |
|----|----|--|----|
| 5. | a. | State and explain stress optic law for 2-D photo elasticity.   | 8  |
|    | b. | With a neat sketch explain circular polariscope with darkfield arrangement.  | 6  |
|    | c. | Explain isoclinic and isochromatic fringe order at a point.  | 6  |
| 6. | a. | What is calibration of photo elastic model material? List the methods of calibration and explain Tardy's method of compensation. | 10 |
|    | b. | Explain oblique incidence method of separating the principle stress.   | 10 |

**Unit - IV**

- 7 a. Sketch and explain the working principle of reflection polariscope. 8  
b. Discuss the bire fringent strip coating method used in separation of principal stresses. 12
- 8 a. Explain different crack detection techniques. 6  
b. Explain different type of brittle coating materials. 6  
c. List and explain basic theories which govern the cracking of coating. 8

**Unit - V**

- 9 a. Derive the equations for,  
i) Plane wave travelling in direction 'S' 10  
ii) Spherical wave radiating from a point source.
- b. Discuss holographic interferometry. 10
- 10 a. Explain;  
i) Geometric approach 10  
ii) Displacement approach in Moire fringe analysis.
- b. Explain the techniques adopted in improvement of sensitivity of moiré data. 10

\* \* \*