

**B.Tech. - VIEP - MECHANICAL ENGINEERING  
(BTMEVI)**

**00103 Term-End Examination  
June, 2018**

**BIMEE-015 : INDUSTRIAL MEASUREMENT AND  
QUALITY CONTROL**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Answer any five questions. All questions carry equal marks. Use of scientific calculator is permitted.*

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1. (a) Describe an optical strain gauge. State its advantages and uses. 7
- (b) How do you measure stress by photoelastic method ? Explain with suitable illustrations. 7
2. (a) What types of electromechanical devices are available for vibration measurement ? Explain any one method. 7

- (b) A  $100\ \Omega$  strain gauge is bonded to a low carbon steel bar which has been subjected to a tensile load. The bar has a preload uniform cross-sectional area  $0.5 \times 10^{-4}\ \text{m}^2$  and the Young's modulus for low carbon steel is  $200\ \text{GN/m}^2$ . If a load of  $50\ \text{kN}$  produces a change of  $1\ \Omega$  in the gauge resistance, determine the gauge factor for the strain gauge. 7
3. (a) Explain the causes of vibration in machines. What are their harmful effects and remedies? 7
- (b) Explain any one method for non-contact type speed measurement. 7
4. (a) Describe with a neat sketch, the working of an optical pyrometer. 7
- (b) What are thermocouples? Explain different types of materials used in thermocouples, and their properties. 7
5. (a) List the various methods that are available for level measurement. Explain briefly, level measurement by electrical conductivity method. 7
- (b) How is temperature error eliminated in a strain gauge bridge? Explain with a suitable diagram. 7

6. (a) Describe the function of absorption spectrometer with a suitable diagram. 7
- (b) Discuss the basic characteristics and dynamics of measurement. 7
7. (a) How do you classify transducers ? Explain the working of a hydro-pneumatic transducer. 7
- (b) Differentiate between systematic and random errors involved in measurement. Name the typical sources of these errors. 7
8. Write short notes on any *four* of the following :  $4 \times 3 \frac{1}{2} = 14$
- (a) Force Sensors
  - (b) Strain Gauge Rosette
  - (c) Thermistors
  - (d) Accelerometers
  - (e) Bimetallic Strip Thermometers
  - (f) Stroboscopes
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