

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

Term-End Examination

December, 2016

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

Time : 3 hours

Maximum Marks : 70

Note : Answer any five questions. All questions carry equal marks.

1. (a) Explain the function of optical strain gauge with neat sketch. 7
- (b) Describe strain gauge rosettes with suitable diagram. 7
2. (a) What types of electromechanical devices are available for vibration measurement ? Explain any one method. 7
- (b) A single strain gauge having a resistance of 100Ω and a gauge factor of 20 is mounted on a steel cantilever beam and connected in series with a 100Ω ballast resistor and a 12 volt battery. The bending stress at the gauge fluctuates from 0 to $19.62 \times 10^8 \text{ N/m}^2$. Assume modulus of elasticity

$E = 20.60 \times 10^{10} \text{ N/m}^2$. Compute the corresponding variation in output voltage. Can this variation be magnified to full scale on an oscilloscope? The oscilloscope has sensitivity of 10 mV/cm of trace deflection and a screen length of 10 cm. 7

3. (a) Explain the causes of vibration in machines. What are their harmful effects and remedies? 7
- (b) Name various types of instruments used for speed measurement. Explain the working of magnetic tachometer. 7
4. (a) Explain any one method for non-contact type temperature measurement. 7
- (b) What are thermocouples? Explain different types of materials used in thermocouples, and their properties. 7
5. (a) Name different techniques available for elemental analysis. Explain any one of them in detail. 7
- (b) List various methods that are available for level measurement. Explain briefly level measurement by electrical conductivity method. 7

6. (a) Define sensitivity, drift, dead zone, accuracy, errors and range. 7
- (b) Differentiate between the following : 7
- (i) Random and Systematic Errors
- (ii) Static and Dynamic Characteristics
7. Write short notes on the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Thickness Sensor
- (b) Digital Transducer
- (c) Infrared Gas Analyser
- (d) Robotics Level Measurement Method
- (e) Stress Measurement by Photoelastic Method
- (f) Generalised Data Acquisition System
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