

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

Term-End Examination

December, 2015

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

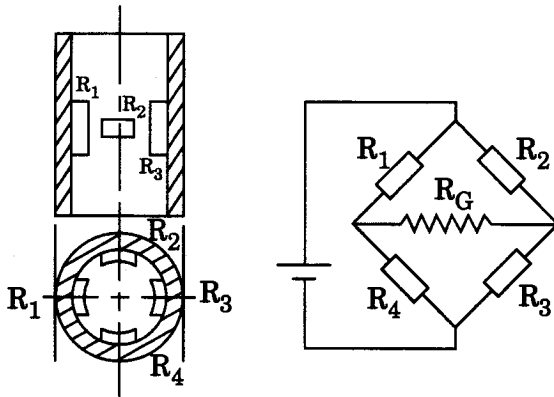
Time : 3 hours

Maximum Marks : 70

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

1. A load cell shown in the following figure is formed of a hollow steel cylinder loaded axially. The four strain gauges are so connected as to enhance the signal and compensate for temperature variation. The load cell has a cross-sectional area of 2 cm^2 . Young's modulus of steel is $2.07 \times 10^{11} \text{ N/m}^2$ and Poisson's ratio is

0.3. Strain gauge resistance = $1000\ \Omega$. Gauge factor = 2.1. The current in each strain gauge is limited to 20 mA.



Calculate

- (a) the Bridge supply voltage, and
 - (b) the current in the detector arm, if a microammeter of $500\ \Omega$ is used and the load cell is subjected to a force of $10^5\ \text{N}$. 14
2. (a) List all optical devices used in vibration measurement. Explain any one in detail. 7
 - (b) How is the calibration of vibration measuring devices carried out? Explain. 7
3. (a) List various non-electric methods which can be used in the measurement of temperature. Explain any one of them. 7

- (b) What are electrical resistance thermometers ? Describe the uses of thermistors in temperature measurement. 7
4. (a) Explain the working of spark atomic spectro-analyser. 7
- (b) List various direct and indirect methods used for level measurement. Describe any one direct method. 7
5. (a) Discuss the performance characteristics of measuring devices. 7
- (b) What do you mean by hysteresis ? Discuss its effect on the measurement process. 7
6. (a) What is signal conditioning ? Explain. 7
- (b) Discuss summing amplifier and integrating amplifier. 7
7. Write short notes on any *four* of the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Errors in Measurement
- (b) Calibration of Measuring Instruments
- (c) Analog-to-Digital Converter
- (d) Vibration Processing and Display Equipment
- (e) Optical Pyrometry
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