

**B.TECH. - ELECTRICAL ENGINEERING**

**Term-End Examination**

**June, 2013**

**BIEE-019 : ELECTRICAL INSTRUMENTATION**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Attempt any five questions. All questions carry equal marks.*

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1. (a) Explain how displacement can be measured with the help of an inductive transducer and a capacitive transducer. Give the essential features of construction of these two types of electrical transducers. 7
- (b) Define displacement. Suggest a suitable transducer for the measurement of small linear motion. Give reasons to justify your choice. 7
2. (a) Mention some natural and synthetic materials that exhibit piezo - electric effect. Why it is desirable that piezo - electric transducers should be used for the measurement of dynamic quantities only ? 7

- (b) Explain the difference in the principle of operation of a photo emissive cell, a photo-conductive cell and a photo - voltaic cell. Give the application of each of these cells. 7
3. (a) Define loading resolution and non linearity of a potentiometric displacement transducer. 7
- (b) Explain the use of a linear variable differential transformer for the measurement of pressure differential across an obstruction meter placed in fluid flow through a pipeline. 7
4. The exhaust temperature of an internal combustion engine has been measured by a thermo-resistive temperature sensor. The sensor is connected as one limb of a wheat stone bridge arrangement and the four resistance that constitute the bridge are each 200 ohms. The bridge supply voltage is 5 volts, the output measuring instrument has an internal resistance of 50 ohms and the temperature sensitivity of the sensor is 0.01 ohm per degree temperature difference. Calculate the output voltage from the bridge corresponding to an exhaust temperature of 800°C. 14

5. (a) What do you understand by the terms data transmission and telemetry ? Explain the distinguishing feature's of voltage and current tele metering systems. 7
- (b) Explain the use of a cathode ray oscilloscope for measuring the dynamic pressure variation in the exhaust manifold of an internal combustion engine. 7
6. (a) Describe the principle of operation of an 7
- (i)  $x$ - $y$  recorder and
- (ii)  $u$ - $v$  recorder. Comment upon their frequency response limitations.
- (b) Draw block diagram of analog data acquisition system. Describe its advantages and disadvantages. 7
7. (a) For a PD controller, calculate the phase of oscillation of the manipulated variable, if the deviation change is stated to be sinusoidal. Comment upon the result you obtain. 7
- (b) Explain the essential differences between the hydraulic and pneumatic controllers. Enumerate the advantages and disadvantages of each controller. 7
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