

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0287

Roll No.

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B.Tech.

(SEM VIII) EVEN SEMESTER THEORY EXAMINATION,
2009-2010

INSTRUMENTATION AND PROCESS CONTROL

Time : 3 Hours

Total Marks : 100

Note : Attempt **ALL** questions.

1. Attempt **any two** parts of the following : (2x10=20)

(a) Define the following :

- (i) Active and Passive Transducers
- (ii) Primary and Secondary Transducers
- (iii) Transducers and Inverse Transducers
- (iv) Analog and digital transducers

(b) Explain the construction of wire wound strain gauges and derive the expression for the gauge factor.

A strain gauge is bonded to a beam 0.1 m long and has a cross-sectional area 4 cm². Young's modulus for steel is 207 GN/m². The strain gauge has an unstrained resistance of 240 Ω and a gauge factor of 2.2. When a load is applied the resistance of the gauge changes by 0.013 Ω. Calculate the change in length of the steel beam and the amount of force applied to beam.

- (c) Describe the working and construction of resistance thermometers. Describe the materials used for along with their properties.

A platinum thermometer has a resistance of $100\ \Omega$ at 25°C .

- (i) Find the resistance at 65°C if the Pt has a resistance temp. co-efficient of $0.00392/^\circ\text{C}$.
- (ii) If the thermometer has a resistance of $150\ \Omega$ calculate the temp.

2. Attempt **any two** parts of the following : (2x10=20)

- (a) Describe the construction, principle of working and any two applications of Hall effect transducers.
- (b) Describe the construction and working of total radiation Pyrometers.
- (c) Describe the working and theory of an ultrasonic flow meter. List its advantages and disadvantages.

3. Attempt **any two** parts of the following : (2x10=20)

- (a) What are the different types of telemetering system ? Explain the land-line telemetering system and describe its advantages.
- (b) Define Time division multiplexing and Frequency division multiplexing as applied to telemetry.
- (c) What is a Data Acquisition System (DAS) ? Explain the role played by different elements.

4. Attempt **any two** parts of the following : (2x10=20)

- (a) Describe the working of Galvanometer type strip chart recorders. What are the different types of tracing systems used in it? Explain with the help of suitable diagram.
- (b) Describe the basic components of a magnetic tape recorder for instrumentation applications using direct recording techniques.
- (c) Describe the different methods for digital tape recording. Explain the advantages and disadvantages.

5. Write notes on **any two** of the following : (2x10=20)

- (a) PI mode controllers
- (b) Pneumatic controllers
- (c) Electronic controllers

