

III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020
INSTRUMENTATION AND CONTROL SYSTEMS

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

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**PART -A**

(14 Marks)

1. a) List the different sources of errors. [2M]
- b) Write the advantages of thermocouples. [2M]
- c) Write the demerits of a capacitive level indicator. [2M]
- d) Discuss the salient features and applications of electrical strain gauges. [3M]
- e) How does a psychrometer work? [3M]
- f) Write the classification of control systems. [2M]

**PART -B**

(56Marks)

2. a) Discuss the theory and construction of piezoelectric transducers. [7M]
- b) Explain the working of a capacitive transducer for the measurement of displacement. [7M]
3. a) What is a thermistor? Explain the construction and working of a thermistor with a neat sketch. [9M]
- b) Explain the working of the Mcleod pressure gauge. [5M]
4. a) Describe with neat sketches, the construction and working principle of a rotameter. [9M]
- b) Explain the working of the laser Doppler anemometer. [5M]
5. a) Explain about the electrical strain gauge. [7M]
- b) A single electrical resistance strain gauge of resistance  $120\ \Omega$  and having a gauge factor of 2 is bonded to steel having an elastic limit stress of  $400\ \text{MN/m}^2$  and modulus of elasticity  $200\ \text{GN/m}^2$ . Calculate the change in resistance (i) due to a change in stress equal to 1/10 of the elastic range (ii) due to a change of temperature of  $20^\circ$ , if the material is advanced alloy. The resistance temperature co-efficient of an advance alloy is  $20 \times 10^{-6}/^\circ\text{C}$ . [7M]
6. Write a short note on the following with a neat sketch: [14M]  
 a) Sling psychrometer    b) Load cell.
7. a) Explain in brief the elements of control systems. [7M]
- b) With suitable examples, bring out the advantages of closed-loop systems over open-loop systems. [7M]

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