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B.TECH.

THEORY EXAMINATION (SEM–IV) 2016-17

ELECTRICAL INSTRUMENTATION AND PROCESS CONTROL

Time : 3 Hours *Max. Marks : 100*

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) Differentiate between primary and secondary transducers.

(b) Mention the use of capacitive transducer.

(c) Differentiate between primary and secondary transducers.

(d) Why platinum is preferred over gold to construct RTD?

(e) Define working principle of Hall Effect transducer

(f) Categorize resistive transducers on the basis of applications.

(g) Define the piezoelectric effect.

(h) What is the need of data transmission and telemetry?

(i) Describe the working principle of LCD.

(j) Discuss the advantages of digital oscilloscope over analog oscilloscope.

SECTION – B

2 Attempt any five of the following questions: **5 x 10 = 50**

a) Explain the measurement of low pressure using diaphragm with the help of a diagram.

b) A strain gauge is bonded to a beam 0.1m long and has a cross sectional area $4cm^2$. Young's modulus for steel is 207 GN/m^2. 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 gauge changes by 0.013Ω. Calculate the changes in length of the steel beam and the amount of force applied to the beam.

c) Explain why it is essential to use radio frequency telemetry? Compare the salient features of PAM and PCM telemetry techniques.

d) Describe the basic components of magnetic tape recorder and application using direct techniques.

e) Discuss the advantages of SMART sensor over a sensor on the basis of construction and applications.

f) A proportional controller is used to control temperature within 50° C to 130°C. A set point is 73.5°C. The set point is maintained with 50 as output of controller. Find the proportional offset which requires 55 % of controller output when proportional gain is: i) 0.1 ii) 10.0.

g) What are the advantages of Digital data acquisition system over Analog data acquisition system? Explain in brief the building blocks of Modern digital data acquisition system.

h) **Write short note with examples on:**

(i) Optoelectronic sensors.

(ii) Self Regulation in a process.

SECTION – C

Attempt any two parts of the following questions: **2 x 15 = 30**

3. Explain the operating principle of an LVDT with a neat sketch. Draw its characteristics. Write down two applications. An LVDT with a secondary voltage of 5V has a range of ±25 mm. (a)

Find the output voltage when the core is -18.75mm from the centre. (b) Plot the output voltage versus core position for a core movement going from +18.75mm to -10 mm.

4. Describe the three control action terms. What are the changes in the overall system dynamics when a derivative action is plugged in? Give the tunable parameters of a PID controller?

5. What is spectrum analyzer? Discuss which is better an Analog tape recording or Digital tape recording. Compare various digital techniques employed in digital tape recording with the help of waveforms.