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

Paper ID : 121703/121524 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) THEORY EXAMINATION, 2015-16

ELECTRICAL INSTRUMENTATION & PROCESS CONTROL

[Time:3 hours] **[Total Marks:100]**

Section-A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

   (a) Differentiate between primary and secondary transducers with example.

   (b) A thermistor has a characterstic temperature β of 3000 K. If its resistance is 100kΩ, what will be its resistance at 600 K.

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

   (d) Define working principle of Hall Effect transducer.

   (e) Discuss criterion for the selection of transmission channel in a telemetry system.

(f) What is neutral zone in a ON/OFF controller.

(g) What is the need of data transmission and telemetry.

(h) Describe the working principle of LCD.

(i) Discuss advantages of digital oscilloscope over analog oscilloscope.

(j) What are the elements of process control.

Section-B

Attempt **any five** question from this section. (5×10=50)

2. What are different types of mechanical pressure sensing elements? Explain the measurement of pressure using capacitive transducer with the help of neat diagram.

3. What is strain gauge transducer? Give its applications.

   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 0.013 Ω. Calculate the changes in length of the steel beam and the amount of force applied to the beam.

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

5. Describe the basic components of a magnetic tape recorder and explain direct recording technique of tape recording.

6. What is three term control action? What are the changes in the overall system dynamics when a derivative action is plugged in? What are the tunable parameters of a PID controller.

7. What is a proportional controller? Discuss its characterstics and advantages.

   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.

8. 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.

9. Write short notes on following:

   (i) Photoconductive Cell.

   (ii) Total Radiation Pyrometer.

Section-C

Attempt **any two** questions from this section. (15x2=30)

10. Explain the construction of resistance potentiometer used for the measurement of linear displacement. Derive the expression for output voltage.

    A linear resistance potentiometer is 50mm long and is uniformly wound with a wire having a resistance of 10,000 ohms. Under normal conditions, the slider is at the centre of the potentiometer. Find the linear displacement when the resisstance of the potentiometer as measured by a Wheatstone bridge for two cases is: (i) 3850 ohms (ii) 7560 ohms. Are the two displacements in the same direction?

11. Write short note on following:

    (i) DSO

    (ii) Smart senors

12. (a) Describe the measurement of fluid velocity using ultrasonic flow meter. Derive the expression for velocity of fluid.

    (b) Explain different types of channels used for telemetry mentioning advantages and disadvantages of each.

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