UPTU Notes

Printed Pages: 02
Paper Id: 1 2 0 4 0 5

Sub Code: EE405
Roll No. [redacted]

B.TECH.

(SEM–IV) EVEN SEM.THEORY EXAMINATION, 2017-18

SENSOR AND INSTRUMENTATION

Time: 3 Hours *Max. Marks: 100*

SECTION – A

1. Attempt all parts of the following. **(10*2=20)**

(a) Enlist the classification of errors.

(b) Differentiate between sensor and transducer.

(c) What do you mean by Virtual Instrumentation system?

(d) Define semiconductor strain gauge with its applications.

(e) Give the classification of Display device.

(f) Why active filters are preferred over passive filters?

(g) What is the concept of smart sensor? Where can they be used?

(h) Define the working principle of J type thermocouple.

(i) Differentiate between Modulation and Modulation index.

(j) Define the terms accuracy, precision, resolution and absolute error.

SECTION – B

2. Attempt any three parts of the following: **(3*10=30)**

(a) Explain the principle of operation of LVDT with the help of neat sketch and characteristics. Explain the advantages and disadvantages of LVDT.

(b) Explain the R/2R Ladder techniques for converting the signal from digital to analog converter.

(c) Draw the circuit diagram of inverting operational amplifier. Derive the expression for voltage gain.

(d) Explain all the basic component of a data acquisition system.

(e) Explain the working of Electromagnetic flow meter and Ultrasonic flow meter in brief.

SECTION – C

Note: - All questions are compulsory. **(5*10=50)**

3. Attempt any two parts of the following:

(a) Draw the diagram of a first order high pass filter and derive its transfer function.

(b) Explain the working of strip chart recorder.

(c) Explain the working of envelope detector with circuit diagram.

4. Attempt any two parts of the following:

(a) Explain the operation of thermocouple sensor for the measurement of temperature.

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(b) Draw the circuit diagram of differential operational amplifier. Derive the expression.

(c) Explain the working principle of linear potentiometric displacement sensor and derive the expression for output voltage.

5. Attempt any two parts of the following:

(a) Explain the feature of Lab VIEW and how it can be used to measure the input signal.

(b) Explain the principle and working of a strain gauge. Derive the expression of gauge factor.

(c) Explain the Working of LCD and differentiate between light scattering and field effect types of LCD

6. Attempt any two parts of the following:

(a) Explain frequency telemetry system for short distance case.

(b) Write a note on Taylor's principle of gauge design.

(c) Draw and explain the difference between traditional instruments and software based virtual instruments.

7. Attempt any two parts of the following:

(a) Write short notes on radio frequency telemetry.

(b) Show an assembly of a sigma comparator and list the parts.

(c) Write short notes on smart sensor.

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