Printed Pages: 02 **Sub Code: NEE 405**

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B.Tech
(SEM IV) THEORY EXAMINATION 2017-18
SENSOR AND INSTRUMENTATION

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a) Explain the concept of Smart Sensors.
b) Define & explain Accelerometers.
c) Give the definition of Signals and Signal Processing.
d) Explain the advantages of Digital Telemetry System.
e) Define Digital Printers and their applications.
f) Explain PCM Display Devices.
g) Explain the function of Digital Filtering.
h) Define DAQ System.
i) Explain the function of Proximity Sensor and Level Sensor.
j) List the types of Bridge circuits. Explain the function of bridge circuits.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a) Explain the working principle of different types of Flow Sensors. Differentiate between Ultrasonic & Electromagnetic type Flow Sensors.
b) Explain the working of Frequency to Voltage Convertor. Design a First order high pass filter with cut-off frequency 2 KHz.
c) Explain the Working of an LCD. Describe the working of a Magnetic Tape Recorder.
d) Differentiate between the following:
   i. Gross errors and Systematic errors,
   ii. Absolute and Relative errors,
   iii. Accuracy & Precision,
e) Explain the function of a Telemetry system with the help of a block diagram. Explain each block

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

(a) Explain & differentiate between Sensors & Transducers. Give a classification & characterization of the transducers.
(b) A Strain Gauge having a Resistance of 120Ω gauge factor of 2 is connected in series with a ballast resistance of 120 Ω across a 12v supply. Calculate the difference between the output voltage (voltage across strain gauge) with no stress applied & with a stress of 140 MN/m^2, Modulus of elasticity of the member undergoing strain is 200GN/ m^2.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Derive the expression for Output voltage for an Active high pass filter. Calculate the cutoff frequency and draw its frequency response.

(b) Explain the concept of modulation and demodulation. Describe the working principle of a Demodulator (Envelop Detector). State some applications.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are Recorders? Describe the working of strip chart recorder. Also write its advantages & disadvantages.

(b) Differentiate between ADC & DAC. Explain the working of sample and hold circuit.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Differentiate between Instrumentation System & Virtual Instrumentation. Explain the Instrumentation System for Temperature Measurement.

(b) Explain the concept of Virtual Instrumentation System. Explain software based virtual Instruments.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain digital modulation & Pulse code modulation techniques.

(b) With the help of a block diagram, explain a frequency modulation telemetry system. What are the disadvantages of frequency modulation?