

**B. TECH.****THEORY EXAMINATION (SEM-IV) 2016-17**  
**SENSOR & INSTRUMENTATION****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. Attempt all of the following questions: **10 x 2 = 20****

- (a) What do you mean by Primary & Secondary Transducer, give example?
- (b) Write OP-Amp Ideal characteristics.
- (c) Explain Thompson effect in thermocouple?
- (d) What is piezo-resistive effect, in which Transducer it is observed?
- (e) A linear resistance potentiometer is 5 cm long and uniformly wound with a wire having a resistance of  $10 \text{ K}\Omega$ . Under normal conditions the slider is at centre of the potentiometer. What will the linear displacement when resistance of potentiometer is  $3.8 \text{ K}\Omega$
- (f) Explain Electronic Nose system application in Food Industry.
- (g) What do you mean by Level Multiplexing?
- (h) Draw Sample & Hold circuit & explain its purpose in Instrumentation.
- (i) Explain the following terms (i) Accuracy (ii) Precision.
- (j) A 4 bit DAC has input is 0110. Find its output voltage?

**SECTION – B****2. Attempt any five of the following questions: **5 x 10 = 50****

- (a) A Strain Gauge having a Resistance of  $120\Omega$  gauge factor of 2 is connected in series with a ballast resistance of  $120 \Omega$  across a 12v supply. Calculate the difference between the output voltage (voltage across strain gauge) with no stress applied & with a stress of  $140 \text{ MN/m}^2$ . Modulus of elasticity of the member undergoing strain is  $200 \text{ GN/m}^2$ .
- (b) Derive the Expression for Output voltage for an Active high pass filter, also find cutoff Frequency and draw its frequency response.
- (c) Explain the working principle of LVDT with its advantages & disadvantages.
- (d) Explain the purpose of Frequency division multiplexing in telemetry system.
- (e) What is strip chart recorder? Describe its working also write its advantages & disadvantages.
- (f) Explain the Working of LCD and differentiate between light scattering and field effect types of LCD.
- (g) Explain an importance of automation and robotics in food industry
- (h) Draw and explain the difference between traditional instruments and software based virtual Instruments

**SECTION – C****Attempt any two of the following questions: **2 x 15 = 30****

- 3. (i) Explain working principle of RTD with its characteristics graph, why platinum is most preferred in RTD & write its limitation.
- (ii) Draw and explain the block diagram of simple oscilloscope (CRO)
- 4. (i) With the help of neat sketch explain the working of Ultrasonic flow meter, Electromagnetic Flow meter.
- (ii) Why Analog – Digital conversion is required, Explain Flash, Dual Slope type of Analog to digital converter with diagram.
- 5. (i) Explain Working Principle of texture analyzer in Food Process Industry.
- (ii) Describe fruits & vegetable processing through a neat diagram.