Paper Code: EE-403	**Roll No.**									

B.Tech.
(SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
INSTRUMENTATION & PROCESS CONTROL

[Time: 3 hrs.] **[Max. Marks: 100]**

Note:- Attempt All questions. All questions carry equal marks.

1. Attempt any two parts of the following: - **[10x2=20]**

(a) Describe the different criteria for selection of transducers for a particular application.
(b) For a transducer, describe the following
  (i) Input Characteristics
  (ii) Transfer Characteristics
  (iii)Output Characteristic
(c) Describe the constructional details of a resistance potential divider and derive the expression for its output voltage when connected across a meter of finite impedance. Derive the condition for maximum error.

2. Attempt any four parts of the following: - **[5x4=20]**

(a) Explain the construction of wire wound strain gauge and derive the expression for the gauge factor.
(b) What are the thermistors. Explain their different form of construction.
(c) Explain the construction and principle of working of a linear voltage differential transformer.
(d) Describe the different modes of operation of piezo-electric transducer and explain the application of piezo-electric transducers.
(e) Describe the method of measurement of different pressure using inductive and capacitive transducers.
(f) Explain the theory of radiation pyrometer.

3. Attempt any four parts of the following: - **[5x4=20]**

(a) What are the different types of tele metring systems. Explain the land line telemetering system.
(b) Define amplitude modulation and modulation index. Use a sketch of a sinusoidally modulated AM waveform to help explain the definition.
(c) An AM broadcast station is transmitting at its assigned frequency of 880 kHz. The carrier is modulated by a 3.5 kHz sin wave. Determine the transmitted frequencies.
(d) Describe the salient features of AM and FM telemetery and compare and contrast them.
(e) Explain digital data acquisition systems.
(f) For an FM signal represented by the equation: $e = 10 \sin (8 \times 10^8 t + 7 \sin 6 \times 10^4 t)$ V.
  Determine (i) carrier frequency (ii) modulating frequency (iii) modulation index (iv) maximum deviation.

4. Attempt any four parts of the following: - **[5x4=20]**

(a) A $4\frac{1}{2}$ digit voltmeter is used for voltage measurements. (a) find its resolution (b) how would 12.98 V be displayed on 10 V range
(b) Explain the functions of a ramp type digital voltmeter.
(c) What is an XY recorder? How do you distinguish it from a X-t recorder.
(d) Explain the FM method of magnetic tape recording and explain its advantages and disadvantages.
(e) Explain fibre optic transducers.
(f) Describe smart sensors

5. Attempt any two parts of the following:- **[10x2=20]**

(a) Using operational amplifier realize a PID controller with separated P, I and D blocks. How the proportional, integral and derivative gains can be adjusted.
(b) Describe the construction of pneumatic relay. What do you mean by the term derivative over run and integral windup?
(c) Draw and explain the architecture of a PLC.