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**Question Paper Code: 31063**

B.E. / B.Tech. DEGREE EXAMINATION, OCTOBER 2014.

Third Semester

Instrumentation and Control Engineering

01UIC303 - SENSORS AND TRANSDUCERS

(Common to Electronics and Instrumentation Engineering)

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What are the functional blocks of a measurement system?
2. The value of a resistor is specified as  $500\Omega \pm 10\%$  by a manufacturer. Find the limits of resistance between which the value is guaranteed.
3. Define Resolution.
4. Draw the step response of First order transducer.
5. State the basic principle of strain gauge.
6. List the features of capacitive transducers.
7. What do you mean by an inverse piezoelectric effect?
8. Define Hall effect.
9. Mention some important features of smart sensors.
10. Give some of the humidity sensing elements.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) How do you classify transducers? Explain various criteria to be considered. (8)
- (ii) Two resistors of  $470\Omega \pm 10\%$  and  $330\Omega \pm 5\%$  are connected in parallel. Calculate
- (a) effective resistance neglecting errors and
- (b) effective resistance taking errors into account. (8)

Or

- (b) (i) Temperature of metal bar is measured 100 times with variations in apparatus, procedure and persons. The readings are tabulated below.

Temp °C	397	398	399	400	401	402	403	404	405
Frequency	1	3	12	23	37	16	4	2	2

- Calculate
- (a) mean
- (b) mode
- (c) average deviation
- (d) standard deviation and
- (e) probable error of one reading. (8)
- (ii) What are standards? Brief discuss about its types. (8)

12. (a) Elaborate the following static characteristics of transducers.

- (i) Sensitivity
- (ii) Linearity
- (iii) Range and Span
- (iv) Hysteresis. (16)

Or

- (b) Draw and explain the output characteristics of a first order transducer with respect to ramp and step inputs. (16)

13. (a) Explain the constructional details and principle of operation of RTD with necessary diagram. Also give its advantages and disadvantages. (16)

Or

- (b) With neat sketch, describe the construction and principle of operation of LVDT. (16)

14. (a) Draw the equivalent circuit diagram of a piezo electric crystal and write the expression for the charge generated by the crystal. (16)

Or

- (b) Explain the function of the following digital transducers.

(i) Linear Displacement Digital Transducer

(ii) Fiber optic transducer. (16)

15. (a) (i) How does a seismic accelerometer work? Explain with its diagram. (8)

(ii) Briefly explain about IC temperature sensor. (8)

Or

- (b) (i) With a neat block diagram, explain about the functioning of a smart sensor. (8)

(ii) Write short notes on MEMS. (8)

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