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**Question Paper Code: 54502**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Third Semester

Electronics and Instrumentation Engineering

15UEI303 - SENSORS AND TRANSDUCERS

(Common to Instrumentation and Control Engineering)

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The voltage of a circuit is measured by a voltmeter having an input impedance comparable with the output impedance of the circuit thereby causing error in voltage measurement. This error may be called
  - Gross Error
  - Random Error
  - Error caused by misuse of instrument
  - Error caused by loading effect
- Uncertainty distribution is used for
  - analysis of multi-sample data
  - analysis of single-sample data
  - analysis of both single and multi sample data
  - none of these
- In measurement systems, which of the following static characteristics are desirable
  - Accuracy
  - Sensitivity
  - Reproducibility
  - All of the above
- A pressure measurement instrument is calibrated between 10 bar and 250 bar. The scale span of the instrument is
  - 10 bar
  - 250 bar
  - 240 bar
  - 260 bar

5. Dummy strain gauges are used for
  - (a) Compensation of temperature changes
  - (b) increasing the sensitivity of bridge in which they are included
  - (c) compensating for different expansion
  - (d) calibration of strain gauges
  
6. Thermocouples are
 

(a) Passive transducers	(b) Active transducers
(c) Both active and passive transducers	(d) Output transducers
  
7. A tachometer encoder has
 

(a) one output	(b) two outputs
(c) three outputs	(d) four outputs
  
8. Piezo-electric transducer work when we apply \_\_\_\_\_ to it
 

(a) Mechanical force	(b) Vibrations	(c) Illuminations	(d) Heat
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9. An inductive proximity sensor reduces sensing range upto
 

(a) 70%	(b) 80%	(c) 60%	(d) 50%
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10. Humidity can be measured using
 

(a) Rotameter	(b) Hygrometer	(c) Thermometer	(d) Anemometer
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PART - B (5 x 2 = 10 Marks)

11. Define unit.
12. Differentiate range and span.
13. Define gauge factor.
14. Write the applications of Hall effect transducer.
15. Name any four applications of NANO sensors

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail the various classifications of errors with examples and also discuss the methods of minimizing the errors. (16)

Or

(b) Explain the criteria for selection of transducer for a particular application. (16)

17. (a) Derive the time response of a second order under damped measuring system for a unit step input. Draw the response. (16)

Or

(b) Derive an equation for time response of a first order system when subjected to unit step input. Draw the response curves and find the dynamic errors. (16)

18. (a) Describe the construction of different types of strain gauges and working principle. (16)

Or

(b) Describe the principle of operation, construction details, characteristics and applications of LVDT. (16)

19. (a) With neat sketch explain the working of a fiber optic displacement transducer. (16)

Or

(b) Discuss the theory, working and application of Hall effect Transducer. (16)

20. (a) Describe the concepts and working of smart sensor with neat diagram. (16)

Or

(b) Explain the concept of MEMS. (16)

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