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Question Paper Code : 80255

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Third Semester

Robotics And Automation Engineering

MT 8591 - SENSORS AND INSTRUMENTATION

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate active and passive transducers.
2. Why are sensor celibration required?
3. Give the types of encoders.
4. In LVDT why the frequency of excitation of primary winding kept very high as compared to the frequency of signal being detected?
5. Give the Gyroscopes Principle.
6. What is gauge factor of a strain gauge?
7. List the applications of piezo electric transducers.
8. Draw the resistance-temperature characteristics of Thermistor.
9. Write the principle of Nano Sensors.
10. Draw the circuit diagram of 'sample and hold' circuit.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the dynamic characteristics of instruments.

Or

(b) (i) With a neat block diagram explain the generalized measurement system.

(ii) With stating on the choice of senser based on basis of senser characteristic based on one example. (6+7)

12. (a) Describe with neat diagram the contact type of encoders and explain why Gray code is used in them.

Or

(b) 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.

13. (a) Explain the construction, working principle and applications of (i) Hall effects sensor (ii) Magnetic sensors. (7+5)

Or

(b) Explain the construction of (i) Wire wound strain gauge with deriving the expression for guage factor (ii) Load cell. (7+6)

14. (a) Explain with a neat sketch the principle of operation and construction of a photovoltaic cell. Also brief why it is very useful for space applications.

Or

(b) Describe the method of measurement of sensor signal with the use of

(i) Resistance Temperature Detector

(ii) MEMS sensor.

15. (a) Based on choice of required sensors explain (i) environmental monitoring (ii) Automobile application.

Or

(b) Give the need for signal conditioning and elaborate the steps involved in signal conditioning for a data acquisition system.

PART C — (1 × 15 = 15 marks)

16. (a) In a test, temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections the results are

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

Calculate the (a) arithmetic mean (b) mean deviation (c) standard deviation (d) the probable error of one reading (e) probable error of the mean.

Or

(b) Explain with neat sketch the arrangements of various components in a data logger and its application for the recoding of temperature over a period of time.

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