A   Reg. No. :

Question Paper Code: 52B09

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Biomedical Engineering

15UBM209 - SENSORS AND MEASUREMENT TECHNIQUES

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In a measuring system quantity under measurement is termed as   CO1- R

    (a) Measurand   (b) Controllers   (c) Sensors   (d) Indicators

2. Closeness of measured value to true value is   CO1- U

    (a) Precision   (b) Accuracy   (c) Correction   (d) Uncertainty

3. For a material capacitance increases with   CO2-R

    (a) Decrease in area of plates, all other factors constant

    (b) Increase in distance between plates, all other factors constant

    (c) Decrease in distance between plates, all other factors constant

    (d) None of the above

4. Temperature sensing can be achieved by the use of   CO2- R

    (a) Thermocouples   (b) RTD   (c) Thermistor   (d) All of the above

5. Force exerted by magnetic field in Hall Effect transducers is   CO3- R

    (a) Lorentz Force   (b) Hall Effect Force   (c) Magnetic Force   (d) Electric Force

6. Input signal to smart sensor is fed from   CO3- U

   (a) Power Supply   (b) Transducer   (c) Voltmeter   (d) All of the above

7. In magnetic tape, data are recorded for   CO4- R

   (a) Storage   (b) Visualising   (c) Transfer   (d) None of the above

8. Cathode ray oscilloscope uses   CO4- R

   (a) Wide Band Amplifier

   (b) Narrow Band amplifier

   (c) Zero Band Amplifier

   (d) None of the mentioned

9. Which of the following device is used for measuring low resistance   CO5- R
   value

   (a) Wheatstone Bridge

   (b) Hay Bridge

   (c) Kelvin Bridge

   (d) Schering Bridge

10. Unknown resistance is obtained by using the relation   CO5- R

    (a) $R_x = R_1 R_3 / R_2$ (b) $R_x = R_2 R_3 / R_1$ (c) $R_x = R_2 R_1 / R_3$ (d) $R_x = R_2 / R_1$

PART – B (5 x 2= 10Marks)

11. List the functional elements of measurement systems.   CO1- R

12. Define gauge factor.   CO2- R

13. How a smart sensor differs from ordinary sensor?   CO3- U

14. Distinguish the functional difference between strip chart recorder and X-Y   CO4- U
    recorder.

15. Which bridge is suitable for low resistance measurement ? why?   CO5- U

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PART – C (5 x 16= 80Marks)

16. (a) (i) Write a short note on the following static characteristics: CO1- U   (8)

         1. Accuracy

         2. Precision

         3. Hysteresis

         4. Threshold

       (ii) Draw the basic functional block diagram of measuring system.   CO1- U   (8)

Or

(b) Classify the different types of errors in detail and explain how they are corrected?   CO1- App   (16)

17. (a) Illustrate the construction and working principle of various types of strain gauge with their advantages and disadvantages.   CO2- App   (16)

Or

(b) Explain the principle of operation, construction details, characteristics and applications of LVDT.   CO2- Ana   (16)

18. (a) Describe the basic principle of hall effect transducer and show how it can be used to measure displacement and current?   CO3- Ana   (16)

Or

(b) What is the need to adopt smart sensor? Explain the architecture of smart sensor with its essential elements.   CO3- Ana   (16)

19. (a) (i) With a neat block diagram describe the working of X-Y recorder.   CO4- U   (8)

       (ii) Explain the principle and working of CRT display with a neat diagram.   CO4- U   (8)

Or

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(b) Explain the construction and working principle of a digital storage oscilloscope. Compare its advantages over an analog CRO.   CO4- U   (16)

20. (a) Draw a neat diagram of Wheatstone bridge and explain how to measure medium resistance. Discuss the factors influencing the accuracy of measurement in Wheatstone bridge.   CO5- U   (16)

Or

(b) Elaborate the Maxwell's inductance – capacitance bridge and give its advantage and disadvantages.   CO5- U   (16)

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