Question Paper Code : X 10396

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020 AND
APRIL/MAY 2021

Fourth Semester

Electrical and Electronics Engineering

EE 8403 – MEASUREMENTS AND INSTRUMENTATION

(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   **(10×2=20 Marks)**

1. What is the importance of Instrument calibration ?

2. What is the resolution of a instrument ? How would a voltage of 2V be displayed on '10V range' and on '100V range' ?

3. What is cause and control effect of damping error in analog meters ?

4. Give a suitable circuit for determination of "phase difference" by digital meters.

5. Give the balance condition for a Wheatstone Bridge circuit.

6. State one cause and one protection technique for EMI effects in instruments.

7. Compare Plotters and Printers.

8. Give the principle of operation of a thermal plotter.

9. What are digital transducers ?

10. Mention 2 valid conditions in choice of sensors.

PART – B **(5×13=65 Marks)**

11. a) Explaining

    i) the need for standards and error compensation.

    ii) derive the static and dynamic characteristics through first order modeling of measuring instruments. **(7+6)**

        (OR)

  b) For the following data related to temperature range measurements of objects out of a heater :

temperature interval :	0-10	10-20	20-30	30-40	40-50	50-60
no. of objects from heater :	15	18	20	10	25	7

Discuss on a (i) how a digital data logger would function for this data logging (ii) Determine the statistical parameters mean, median, mode for this data. **(7+6)**

12. a) With neat figures, write briefly on **any two** of the following by giving their principle of operation :

    i) Three phase wattmeter

    ii) Single phase energymeter

    iii) Current transformer. **(7+6)**

        (OR)

  b) i) Explain the determination of magnetic characteristics and iron loss by use of B-H curve.

    ii) How is the magnetic flux developed in a transformer secondary measured ? **(10+3)**

13. a) Compare and design the balancing of a high – Q and a low – Q coil inductive bridge circuits. State the causes and compensation of errors in these bridges. **(10+3)**

        (OR)

  b) With neat figures, explain principle of operation with balance condition for the

    i) Wein bridge and

    ii) The Schering Bridge. **(7+6)**

14. a) i) With neat figures, explain the constructional features and working
       principle of a two channel automated digital CRO. **(10)**

    ii) How is current measured using a digital storage oscilloscope ? **(3)**

                                (OR)

   b) i) Describe the working principle of analog CRO and deliberate on how a
      input of 3 phase 440V 50Hz signal is measured in it operating in 1V/div
      and 1sec/div scale while display.

    ii) What are the functional circuit blocks within the oscilloscope required
        to measure a square wave, cosine wave ? **(10+3)**

15. a) Write briefly on **any two** of the following : **(7+6)**

     i) Smart sensor

     ii) Thermocouples

     iii) Thermal imager.

                                (OR)

   b) Write briefly on **any two** of the following : **(7+6)**

     i) Piezoelectric sensor

     ii) Hall Effect Sensor

     iii) Optical Level indicator.

                    PART – C   **(1×15=15 Marks)**

16. a) Design a simple method for establishing data acquisition system for
       measuring voltage output, temperature variation of a grid equipment using
       suitable measurement circuitry with inclusion of data acquisition for half
       hour duration. **(15)**

                                (OR)

   b) With giving the principle of operation write briefly on the measurement of
      displacement using one type of

     i) Resistive

     ii) Capacitive

     iii) Inductive transducers. **(5+5+5)**

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