CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
Electronic Instrumentation

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List and explain the types of static measurement errors. **(06 Marks)**

   b. What is a thermocouple? Explain the different types of thermocouple and what are the limitations of thermocouple. **(08 Marks)**

   c. Find the voltage reading and percentage error of each reading obtained with a voltmeter on 10 V range if the instrumentation has a 20 KΩ/V sensitivity and is connected across R_b of Fig.Q1(c).

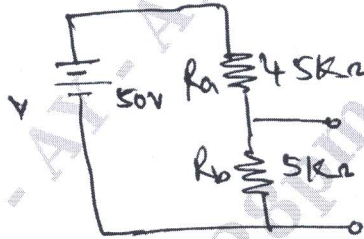Fig.Q1(c)   **(06 Marks)**

OR

2 a. The expected value of the current through a resistor is 20 mA. However the measurement yields a current value of 18 mA. Calculate:
   (i)   Absolute error
   (ii) Percentage error
   (iii) Relative accuracy
   (iv) Percentage accuracy **(06 Marks)**

   b. Explain the working of Ayrton shunt or universal shunt. **(06 Marks)**

   c. Explain with a diagram the operation of a multirange voltmeter. State the limitations of a multirange voltmeter. **(08 Marks)**

Module-2

3 a. Explain with the help of diagram the working principle of dual slope integrating type DVM (voltage to time conversion) **(08 Marks)**

   b. Explain with a diagram the working of digital PH meter. **(06 Marks)**

   c. A 4½ digit voltmeter is used for voltage measurements:
   (i)   Find its resolution
   (ii) How would 12.98 V be displayed on a 10 V range?
   (iii) How would 0.6973 be displayed on 1V and 10V ranges? **(06 Marks)**

OR

4 a. Explain with a diagram, the basic principle of a successive approximation type DVM. **(10 Marks)**

   b. Explain the working principle of a digital frequency meter. **(10 Marks)**

Module-3

5 a. Explain the operation of CRO with a neat block diagram. And also mention the function of each block. **(07 Marks)**

   b. Explain the operation of the function generator with relevant block diagram. **(07 Marks)**

   c. Explain the operation of sweep generator with suitable circuit. **(06 Marks)**

OR

6 a. Briefly explain the operation of digital storage oscilloscope with relevant block diagram. **(08 Marks)**

   b. Describe with the help of a neat block diagram the working of a standard signal generator. **(06 Marks)**

   c. State the various application of an oscilloscope. **(06 Marks)**

Module-4

7 a. Explain and derive the balance equation of wheatstone bridge and mention the limitation. **(06 Marks)**

   b. A capacitance comparison bridge is used to measure capacity impedance at a frequency of 2 kHz. The bridge constants at balance are $c_3 = 100$ μF, $R_1 = 10$ KΩ, $R_2 = 50$ KΩ, $R_3 = 100$ KΩ. Find the equivalent series circuit of the unknown impedance. **(06 Marks)**

   c. With circuit diagram, explain Q-meter and mention its application. **(08 Marks)**

OR

8 a. With neat diagram, explain the working of Wein's bridge. How it can be used as oscillator? **(08 Marks)**

   b. What is Megger? Explain basic Megger circuit. **(08 Marks)**

   c. A Maxwell bridge is used to measure an inductive impedance. The bridge constants at balance are $c_1 = 0.01$ μF, $R_1 = 470$ KΩ, $R_2 = 5.1$ KΩ and $R_3 = 100$ KΩ. Find the series equivalent of unknown impedance. **(04 Marks)**

Module-5

9 a. List the factors to be considered while selecting transducers. **(06 Marks)**

   b. Derive an expression for the gauge factor $K = 1 + 2\mu$ and explain. **(08 Marks)**

   c. What is meant by thermistor? Explain different form of thermistors. **(06 Marks)**

OR

10 a. List the advantages of LVDT and describe with the help of a diagram the construction of the LVDT. **(06 Marks)**

   b. Explain the operation of a piezo-electric transducer. **(08 Marks)**

   c. State the difference between photoemissive, photoconductive and photovoltaic transducer. **(06 Marks)**

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