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BT-4/M-13 **8405**

ELECTRONICS INSTRUMENTATION
AND MEASUREMENTS
Paper : ECE-202(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. Assume any missing data. All questions carry equal marks.

UNIT–I

1. Discuss the advantages of the Kelvin Double bridge over the conventional Wheatstone bridge for measurement of low resistance. Draw the circuit of a Kelvin's Double bridge used for measurement of low resistances and derive the condition for balance. Explain clearly how the effect of contact resistance and resistance of leads is eliminated in Kelvin's Double bridge. 5+10+5

2. (a) What are the various general characteristics of an measuring instrument ? Distinguish between Systematic error and Random error. How is random error found out and corrected for ? Also differentiate between Accuracy and Precision with the help of a suitable example. 4+3+2+3

   (b) Describe the working of a Carey Foster Slide-wire bridge. 8

UNIT–II

3. (a) Describe how an unknown capacitance can be measured with the help of D'Sauty's bridge. What are the limitations of this bridge and how are they overcome by using modified form of D'Sauty's bridge ? Draw phasor diagram to illustrate your answer. 12

   (b) Describe the working principle of a self-balancing potentiometer with the help of measurements of temperature using thermocouple. Explain clearly why d.c. potentiometer cannot be used for a.c. measurements straight away. http://www.kuonline.in 8

4. (a) Describe the principle, circuit diagram and operation of a Differential voltmeter. Explain the different modes of operation of this voltmeter. 8

   (b) What is an X-Y Recorder ? What difference do you find between X-Y recorder and X-t or a Y-t recorder ? Explain with suitable circuit diagram the working of an X-Y recorder. Describe its applications. 2+2+5+3

UNIT–III

5. (a) What do you mean from Harmonic distortion ? Define Distortion factor. Explain with the help of block diagram the working of the heterodyne harmonic analyser and also list the advantages of this method over the other methods used for measurement of harmonic distortion. 12

   (b) Explain a digital method for frequency and time interval measurement. 8

6. (a) For what useful purposes the Digital voltmeters are used ? How one can classify Digital voltmeters ? Explain the working principle, circuit diagram of Integrating Digital Voltmeter. 12

(b) What are the various Op-Amp parameters ? Explain how one can measure them. 8

UNIT–IV

7. (a) Explain Binary Weighted Resistive type DAC. Calculate the output voltages caused by each bit in a 4-bit ladder if the output levels are 0 (equal to zero volt) and 1 (equal to $V_R = 10$ volt) ? Find the output voltage corresponding to 1101 input. 12

(b) What is Data Acquisition system ? Explain the working with block diagram of Multi-channel Digital Data Acquisition system. 8

8. (a) How will you measure pressure of the order 10^{-4} torr ? Explain the working principle of Pirani and ionization vacuum gauges and give their merits and demerits. 1+9

(b) Describe the construction, principle and working of Thermocouples. Describe the Thermo-electric laws and their applications. 8+2
