B   **B5804**   **Pages: 2**

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018
Course Code: AE303
Course Name: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS
(AE)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks   Marks

1 a) The function switch for an analog instrument is set to 50 mA and the instrument   (4)
       accuracy is specified as ±1%. If the instrument indicates 38 mA, find relative
       error in measurement.

   b) Define the term probable error as related to measurements. For the case of a large   (4)
       number of measurements in which only random errors are present, determine the
       probable measurement error if the standard deviation is 0.0014.

   c) An 820 ohm resistance known to be accurate to ±10% carries a 10 mA current.   (7)
       The current was measured on the 25 mA range of an analog ammeter that has an
       accuracy of ±2% of full scale. Calculate the power dissipated in the resistor and
       also determine the maximum percentage error.

2 a) Sketch the basic construction of a typical permanent magnet moving coil   (8)
       instrument. Label each part of the instrument and explain its operation.

   b) Draw circuit diagram and show how a permanent magnet moving coil instrument   (4)
       can be used as a dc ammeter with a measured current greater than the meter
       current.

   c) A moving coil milliammeter having a resistance of 10 ohms gives full scale   (3)
       deflection when a current of 5 mA is passed through it. Explain how this
       instrument can be used for measurement of current up to 1 A.

3 a) Write the construction, principle and working of a thermocouple instrument for   (8)
       electrical measurements. Write advantages and disadvantages of using
       thermocouple instruments for electrical measurements.

   b) Draw the circuit of a rectifier ammeter and explain its working. Write the need   (7)
       for current transformer in this circuit.

PART B
Answer any two full questions, each carries 15 marks

4 a) Explain operation of Wheatstone's bridge and derive the balance equation, draw   (8)
       the circuit diagramshowing all voltage drops and branch current. Write one
       application of Wheatstone's bridge.

   b) Draw the Thevenin equivalent circuit of a Wheatstone bridge as seen from the   (7)
       galvanometer. Derive the equation for galvanometer current. Explain what is
       meant by the sensitivity of a Wheatstone bridge.

5 a) Explain working of Kelvin bridge and derive the equation for unknown   (8)
       resistance.

b) Draw the circuit diagram of Schering bridge and write the balance equation and function of each component. Also explain how it can be used for high voltage measurements.   (7)

6 a) Explain operation of Maxwell bridge for measuring L in terms of C. Draw the circuit diagram and derive the equation for the inductance being measured.   (8)

b) Explain Anderson bridge with circuit diagram and write how it differs from a Maxwell bridge.   (7)

PART C
Answer any two full questions, each carries 20 marks

7 a) Draw basic block diagram and explain working of a digital storage oscilloscope for sampling a waveform and storing the information. Show the waveforms that occur at each point.   (10)

b) Explain the working of LCD flat panel display as used in DSO, with suitable diagram to show its construction.   (10)

8 a) Explain with a block diagram the working of swept super-heterodyne spectrum analyser.   (10)

b) Draw basic circuit diagram of a Q meter and explain its operation.   (10)

9 a) Draw block diagram for a fundamental suppression distortion meter and explain the system operation.   (10)

b) Show how instrument transformers may be used to extend the range of a wattmeter. Explain the circuit and write the multiplication factor.   (10)

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