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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

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) Sketch and Explain the basic block diagram of a measurement system. (5)

b) Distinguish between precision and accuracy? (4)

c) Explain the operation of a rectifier type voltmeter and mention its advantages? (6)

2 a) Define (a) Instrumental error (b) environmental error and (c) Probable error. (6)

b) Give the equation of motion of the coil of a moving coil meter and derive the relationships that must exist if the damping of the movement is to be critical. (5)

c) What is the importance of deflecting torque and control torque in measuring instruments? (4)

3 a) Ten measurements of resistance of a resistor gave 101.2Ω, 101.7Ω, 101.3Ω, 101.0Ω, 101.5Ω, 101.3Ω, 101.2Ω, 101.4Ω, 101.3Ω and 101.1Ω.Assume that only random errors are present. Calculate (i) arithmetic mean (ii) the standard deviation (iii) average deviation (iv) probable error. (4)

b) What is the difference between primary and secondary standard? (4)

c) Describe with the aid of sketches the construction of a commonly used form of vibration galvanometer, showing how its resonance frequency is adjusted to the frequency of the supply. (7)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Describe the circuit of Kelvin double bridge used for measurement of low resistance. Derive the conditions for balance. (7)

b) State three applications of AC potentiometer. (3)

c) Derive the equations of balance for Maxwell's Inductance –Capacitance bridge. Draw the phasor diagram for conditions under balance. (5)

5 a) What are the methods used for the measurement of medium resistances? (2)

b) With a neat sketch explain the operation of a potentiometer. What is standardization? How is it achieved? (7)

c) The four arms of a Wheatstone bridge are as follows: AB=100Ω, BC=1000 Ω, CD=4000 Ω, DA=400 Ω. The galvanometer has a resistance of 100 Ω and sensitivity of 100 mm/μA and is connected across AC. A source of 4V dc across BD. Calculate the current through galvanometer and its deflection if the resistance of arm DA changed from 400 Ω to 401 Ω. (6)

6 a) Describe the working of a Carey Foster slide wire bridge. (5)

b) Explain the procedure for making measurements with Crompton's potentiometer. (8)

c) Why is the Wheatstone bridge not suitable for measuring low resistance? (2)

PART C

Answer any two full questions, each carries 20 marks.

7 a) With a neat block diagram, explain the working of a digital storage oscilloscope. (10)

b) Explain the working of a true RMS meter with a neat block diagram. (10)

8 a) Explain the function of an X-Y recorder. With the help of necessary circuit diagram, explain how the X and Y scales are set. (10)

b) What is the function of wave analyser? With the help of suitable block diagram, explain how a heterodyne wave analyser works. (10)

9 a) What are the major blocks of an oscilloscope and what does each do? (10)

b) Define ratio and phase angle errors in instrument transformers. (5)

c) What is driving torque and braking torque in an energy meter. (5)

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