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National Institute of Technology, Delhi

Name of the Examination: B.Tech. (Mid Sem Exam)

March 2020

Branch	: B.Tech (ECE)	Semester	: IV
Title of the Course	: Electronics Measurement and Instrumentation	Course Code	: ECB 254
Time: 1 Hour 30 Minutes		Maximum Marks	: 25

Note: All questions are compulsory.

Q1. Define the Accuracy and Precision within application? An 820 Ω resistance with an accuracy of ± 10% carries a current of 10 mA. The current was measured by an analog ammeter on a 25 mA range with an accuracy of ±2%, of full scale. Calculate the power dissipated in the resistor, and determine the accuracy of the result. **[3 Marks]**

Q2. The expected value of the voltage across a resistor is 80 V. However, the measurement gives a value of 79 V. Calculate (i) absolute error, (ii) % error (iii) relative accuracy, and (iv) % of accuracy. **[3 Marks]**

Q3. By using a "micrometer screw", the following readings were taken of a certain physical length: 1.34, 1.38, 1.56, 1.47, 1.42, 1.44, 1.53, 1.48, 1.40, and 1.59 all are in mm. calculate the following; (i) Arithmetic mean, (ii) Average deviation (iii) Standard deviation, and (iv) Variance. **[4 Marks]**

Q4 Discuss substitution method for measurement of medium resistance. A digital voltmeter has a read out reading from 0 to 9,999 counts. Determine the resolution of the instrument in volt. When the full scale reading is 9.999 V. **[3 Marks]**

Q5. Explain Wheatstone bridge and derive the expression for bridge sensitivity. Each of the ratio arms of a laboratory type Wheatstone bridge has guaranteed accuracy of ± 0.05%, while the standard arm has a guaranteed accuracy of ± 0.1%. The ratio arms are both set at 100 Ω and bridge is balanced with standard arm adjusted to 3154 Ω. Determine the upper and lower limits of the unknown resistance, based upon the guaranteed accuracies of the unknown bridge arms. **[5 Marks]**

Q6. The value of high resistance is measured by loss of charge method. A capacitor having a capacitor of 2.5 μF is charged to a potential of 500 V dc and is discharged through the high resistance. An electrostatic voltmeter, kept across the resistance, reads the voltage as 300 V at the end of 60 seconds. Calculate the high resistance. **[3 Marks]**

Q7. Identify the bridge used for measurement of inductance and explain the construction and operation of this bridge. In the AC bridge circuit shown in Fig. 1, the supply voltage is 20 V at 500 Hz. Arm **ab** is 0.25 μF pure capacitance; arm **bc** is 400 Ω pure resistances and arm **ad** has a 120 Ω resistance in parallel with a 0.15 μF capacitor. Find resistance and inductance or capacitance of the arm **cd** considering it as a series circuit. **[4 Marks]**

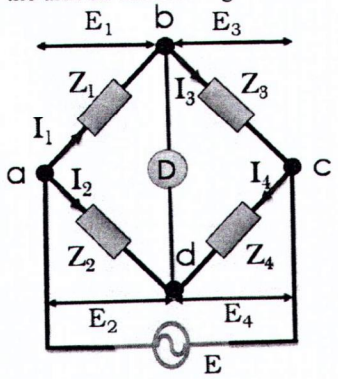

Fig.1 A. C. Bridge