Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B.Tech.

Mid Semester Examination (Spring, 2023)

Branch	**: ECE**	**Semester**	**: IVth**
Title of the Course	**: Electronics Measurement & Instrumentation**	**Course Code**	**: ECB 254**

Time: 1 Hour 30 Minutes **Maximum Marks: 25**

Note: *All questions are compulsory.*

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Analyze instrument characteristics, errors and generalized measurement system.	**Understanding** (Level II)
CO2	Analyze and use the circuit for the measurement of R, L, C, F, I, V etc	**Analyzing** (Level IV)
CO3	Use of Ammeters, Voltmeter and Multimeters and CRO for measurement	**Evaluating** (Level V)
CO4	Analyze and interpret different signal generator circuits for the generation of various waveforms with the use of different display devices and recorders	**Analyzing** (Level IV)

Course Outcomes (CO's)	CO1	CO2
Questions No.	Q1, Q2, Q3	Q4, Q5 & Q6

Answer the following questions.

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. **[3Marks]**

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. Identify the bridge used for measurement of inductance and explain the **[5 Marks]**

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.

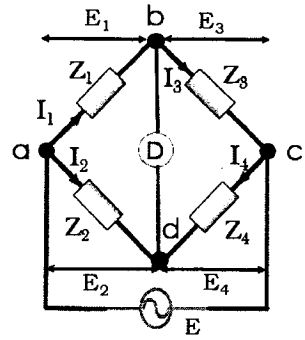
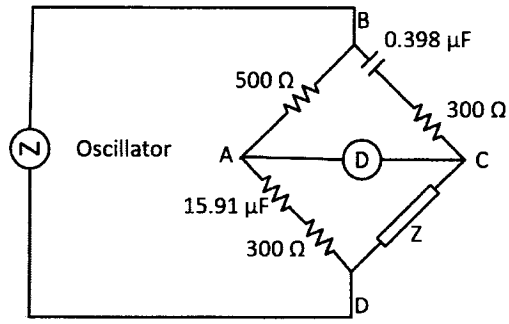


Fig.1 A. C. Bridge

Q5. Explain how a Maxwell bridge can be used for measuring an unknown inductance. **[5 Marks]**
The bridge shown in the figure is used to measure the impedance Z. If the bridge is balanced for oscillator frequency f=2 KHz, then Find the value of impedance Z.



Q6. A Schering bridge is operated on 800 V with a frequency of 500 Hz in order to measure a high voltage capacitor. The following data is given about the balanced bridge C_1 = 0.2 μF, C_3 = 2200 pF, R_3 = 1.5 kΩ, and R_4 = 12 kΩ. **[5 Marks]**
Determine :(a) value of unknown capacitor (b) dissipation factor(c) Draw the phasor diagram.