

B.E. INFORMATION TECHNOLOGY FIRST YEAR SECOND SEMESTER (Old) – 2019

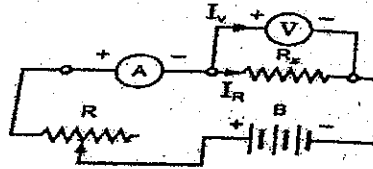
Subject: **ELECTRICAL MEASUREMENTS**

Time: **3Hr**

Full Marks: **100**

Answer any 05 (Five) questions

1. I) Find the relative error while measuring an unknown resistance R_x as shown. Consider the measured value of the resistance is R_m .



- II) A voltmeter having a sensitivity of $10\text{k}\Omega/\text{V}$ reads 70V on a 100V scale, when connected across an unknown resistor. The current through the resistor is 2mA . Calculate the % relative error.

10+10

2. I) Draw the circuit of Kelvin double ratio arm bridge and show how the effect of lead resistance is eliminated?
 II) The resistance of a shunt is measured using a Kelvin's double bridge. The following values give the resistance comprising the bridge at balance. Calculate the resistance of the shunt. Standard resistance = $2\ \mu\Omega$. Inner and outer ratio arms have same values equal to 240Ω and 2000Ω . Link resistance between shunt and standard resistance of 0.2Ω . 2000Ω resistors are on the standard side of the bridge.

10+10

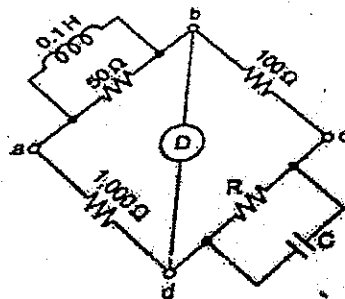
3. I) Describe the operating principle of a PMMC instrument.
 II) How to calibrate an electrical instrument?
 III) Explain different type of damping phenomenon.
 IV) Find the value of different torques in an PMMC instrument.

5+4+3+8=20

4. I) Consider the following data to state if it is possible to balance the bridge. State reason. Also identify the condition to balance the bridge if found unbalanced.

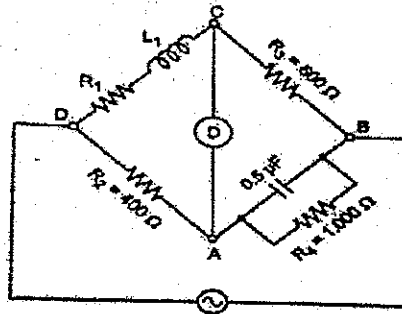
- Arm ab: $Z_1 = 400\angle 60^\circ\Omega$
 ad: $Z_2 = 800\angle -90^\circ\Omega$
 bc: $Z_3 = 300\angle 0^\circ\Omega$
 cd: $Z_4 = 600\angle 40^\circ\Omega$

- II) Find the value of unknown resistance and capacitance for the balanced bridge while a 50Hz supply is applied across a-c terminal.



10+10 = 20

5. I) Explain time constant of an RLC circuit
 II) Derive the relationship between emissivity of a plate, difference in the steady state temperature and temperature of the surrounding of the same. 12+8=20
6. I) Explain the operation of Maxwell's inductance Bridge.
 II) Find the unknown inductance and resistance for the following Maxwell's capacitance bridge. Also find the Q-factor of coil if frequency is 500Hz.



10+10=20

7. I) In a test on a sample material at 20 kV, 50 Hz by a Schering bridge, having a standard capacitor of 115 pF, balance was obtained with a capacitance of $0.45 \mu\text{F}$ in parallel with a non-inductive resistance of 365Ω , the non-inductive resistance in the remaining arm of the bridge being 165Ω . Determine the capacitance, the p.f. and equivalent series resistance.
- II) Why multiplier is used with PMMC instrument? What do you mean by sensitivity of PMMC instrument? Why sensitivity of electro-dynamometer type instrument is low? Why the scale of moving iron instrument is cramped at lower end? 9+3+3+3+2=20