Total No. of printed pages = 5

19/5th Sem/DIE503

2021

ELECTRICAL AND ELECTRONIC MEASUREMENTS

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) From the point of view of measurement, how would you classify the resistances? 2

   (b) Describe the ammeter voltmeter method used for measurement of medium resistances. 7

   (c) A voltmeter of resistance 500Ω and a milliammeter of 1Ω resistance are used to measure a resistance by ammeter voltmeter method. If the voltmeter reads 20V and milliammeter reads 100mA, calculate the value of measured resistance:

      (i) if the voltmeter is put across the resistance and milliammeter is connected in series with the unknown resistance;

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(ii) if the voltmeter is put across the unknown resistance with ammeter connected on the supply side. 6

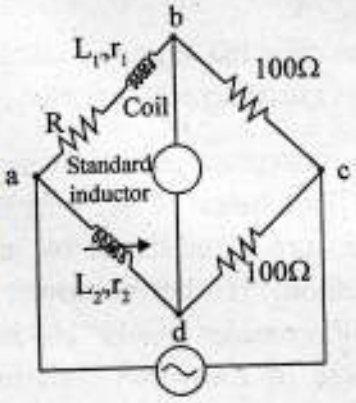
(d) Draw the circuit of Wheatstone bridge and derive the conditions of balance. 5

2. (a) Explain the principle of working a Kelvin's Double bridge and explain how the effect of contact resistance and resistance of leads is eliminated. 7

(b) Mention the detectors commonly used for a.c. bridges. 3

(c) Describe the working of a Hay's bridge for measurement of inductance. 5

(d)

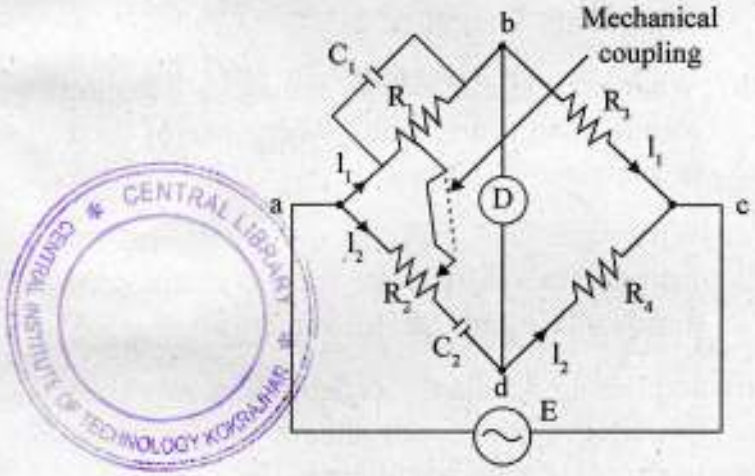


In the Maxwell's bridge above the arm "ab" Contains a coil with inductance "L1" and resistance "r1" in series with a non-inductive

resistance "R". Arm "bc" and "dc" are each a non-inductive resistance of 100Ω. Arm "ad" contains a standard variable inductor "L2" of resistance 32.7Ω (r2). Balance is obtained when L2 = 47.8mH and R = 1.36Ω. Find the value of resistance and inductance of the coil in the arm "ab". 5

3. (a) Describe the working of Heaviside Mutual Inductance Bridge for determination of mutual inductance of a coil. 6

(b)



In the Wein's bridge above, calculate the value of the frequency for the given parameters: R1= 100Ω, R2= 150Ω, C1= 0.1F and C2 = 0.05F. 4

(c) State the different effects based on which the electrical measuring instruments are working. 6

(d) Name the essential torques that can be found in an indicating instrument. 4

4. (a) The torque of an ammeter varies directly with the amount of current flowing through it. If a current of 10 A produces a deflection of 80 degree, what deflection will occur for a current of 4 A when the instrument is

(i) spring controlled

(ii) gravity controlled ? 4

(b) What are the methods to introduce damping torque in an instrument ? Which one of these is popular and why ? 5

(c) What are the sources of errors in MI Instruments ? Also, state the advantages and disadvantages of MI Instruments. 5

(d) Explain in details the construction, working, advantages and disadvantages of Electrodynamometer type instruments. 6

5. (a) Describe the constructional details and principles of operation of a d'Arsonval galvanometer. 7

(b) Why does MI instrument have non-linear scales ? 2

(c) List the advantages of electronic voltmeters. 3

(d) With a suitable diagram, explain the main parts of a CRT. 8

6. Write short notes on any *four* : 5×4=20

(a) Induction type energy meter

(b) Schering Bridge

(c) De Sauty's bridge

(d) Loss of charge method

(e) Megger.