Enrolment No. ☐☐☐☐☐☐☐

B.TECH 3ʳᵈ SEMESTER ENDTERM EXAMINATION, 2022
SUBJECT: Electrical Measurement & Measuring Instruments
CODE NO:-UEE03B11

Total Marks: 50   **Time: 2 Hours**

Group-A

Answer all the questions   [2×5=10]

Max allowable error in the measurement is specified in terms of true value

1. Define the terms:- (i) limiting error (ii) Precision _degree of freedom of measurement system from random errors._
2. What is the essential difference between Murray and Varley loop tests?
3. What is the importance of the value of earth's resistance? What are the factors on which the resistance of any earthing system depends?
4. What are the advantages and limitations of a Maxwell's inductance-capacitance bridge?
5. Why dynamometer type instruments are most suitable as transfer instruments?

Group-B

Answer any four from the following questions   [5×4=20]

1. With necessary diagram explain how will you calibrate dc ammeter by using a dc potentiometer.
2. Derive the expression for capacitance to be connected across the resistor in the pressure coil of a wattmeter so as to neutralize the effect of inductance of pressure coil circuit.
3. Explain how lag adjustment are made in single phase induction type energy meter.
4. In a Murray loop test for localization of earth fault of a 500 metre long cable having a resistance of 1.1 Ω per 1000 metres, the faulty cable is looped with a sound cable of same length but having a resistance of 2.2 Ω per 1000 metres. The resistances of the other two arms of the testing network, at balance, are in the ratio of 2.5:1. Calculate the distance of the fault from the testing end of the cable.
5. The four arms of a bridge are as follows:
   arm ab: a coil with inductance L_1 and resistance R_1; arm bc: a non-inductive resistance R_2 arm cd: a capacitor C_4 in parallel with a non-inductive resistor R_4.; arm da: a non-inductive resistance R_3. Balance is obtained when $R_2=600\ \Omega$, $R_3=400\ \Omega$, $R_4=1000\ \Omega$ and $C_4=0.5\ \mu F$. Calculate the values of L_1 and R_1.
6. With the help of suitable diagram, describe the working of a digital storage oscilloscope.

Group-C

Answer any two from the following questions   [2×10=20]

1. (a) Derive the equation of balance for an Anderson's bridge. Draw the phasor diagram for balance conditions.
   (b) The four arms of a bridge network are made up as follows:
   arm ab : an imperfect capacitor C_1 with an equivalent series resistance of r_1; arm ad: a standard capacitor of 500 pF; arm bc: a non-inductive resistance of 300 Ω; arm cd: a resistance R_4 in parallel with a capacitor C_4. The supply frequency is 50 Hz. At balance, $C_4=0.148\ \mu F$ and $R_4=72.6\ \Omega$. Calculate the value of C_1 and r_1. Also calculate the dissipating factor for this capacitor.

[(3+3) +4]

P.T.O.

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2. (a) Describe the working of a single phase induction type energy meter. Show that the total number of revolutions made by its disc during a particular time is proportional to the energy consumed.

(b) A wattmeter reads 5.54 kW when its current coil is connected in the red phase and its voltage coil is connected between the neutral and red phase of a symmetrical 3 phase system supplying a balanced load of 30 A at 400 V. What will be the reading of the instrument if the current coil remains unchanged and voltage coil be connected between blue and yellow phases. The phase sequence is RYB. What does this figure represent?

[5 +5]

3. (a) Explain the working principle of a Kelvin's Double Bridge and explain how the effect of contact resistance and resistance of lead is eliminated.

(b) Describe the principle of operation of a digital multimeter.

(c) How is dynamometer type instrument used as an ammeter for measurement of small currents?

[4 +4+2]

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