

B.Tech III Year I Semester (R13) Regular Examinations December 2015

ELECTRICAL MEASUREMENTS

(Electrical and Electronics Engineering)

Time: 3 hours

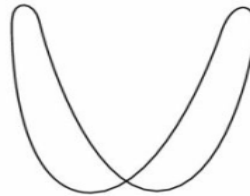
Max. Marks: 70

PART – A

(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- (a) What is 'Swamping Resistance'? What is/are its characteristic(s)?
- (b) What is the ratio of vertical to horizontal frequencies for an oscilloscope which displays the following Lissajous figure?



- (c) Frequency can be measured with which type of AC Bridge.
- (d) How is the effect of Thermo-Electric EMFs eliminated when taking the readings with Kelvin's double bridge?
- (e) What is Phantom loading? Why is it used?
- (f) Write short notes on the shape of scale of an Electrodynamometer type wattmeter.
- (g) Why should the secondary winding of a current transformer be never opened while its primary winding is energized?
- (h) Under what conditions, the phase angle error in potential transformers taken negative and under what conditions it is taken as positive ?.
- (i) What are Ballistic tests?
- (j) List the three types of methods used for measurement of iron losses in ferromagnetic materials.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) What type of instrument is used for 'AC measurements' and what type of instruments is used for DC measurements and what type of instrument is used as 'transfer instrument'?
- (b) The inductance of a moving iron ammeter with a full scale deflection of 90° at 1.5 A is given by the expression $L = 200 + 40\theta - 4\theta^2 - \theta^3$ μH , where θ is the deflection in radian from the zero position. Estimate the angular deflection of the pointer for a current of 1.0 A

OR

- 3 Draw and explain the general block diagram of a Cathode Ray oscilloscope? How is frequency measured in a cathode ray oscilloscope?

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UNIT – II

- 4 (a) What type of bridge can be used for the measurement of dielectric of insulating oil used in transformers? Justify.
(b) With a neat phasor diagram, explain how capacitance of an unknown capacitor can be determined using Schering bridge.

OR

- 5 Identify and draw the phasor diagram of the bridge whose arms of a five node bridge are as follows:

arm ab: an unknown impedance (R_1, L_1) in series with a non-inductive variable resistor r_1 ,

arm bc: a non-inductive resistor $R_3 = 100 \Omega$;

arm cd: a non-inductive resistor $R_4 = 200 \Omega$;

arm da a non-inductive resistor $R_2 = 250 \Omega$;

arm de: a non-inductive variable resistor r ,

arm ec: a loss-less capacitor $C = 1 \mu F$, and **arm be:** a detector.

An AC supply is connected between **a** and **c**.

Also calculate the resistance and inductance R_1 , and L_1 . When under balance conditions $r_1 = 43.1 \Omega$ and $r = 229.7 \Omega$?

UNIT – III

- 6 (a) Why is the measurement of power in circuits with low power factor by ordinary electro-dynamometer wattmeters is difficult and inaccurate? What special features are to be incorporated in the above type of wattmeters to make it a 'low power factor type wattmeter'?
(b) A 3-phase 500 V motor load has a power factor of 0.4. Two wattmeters are connected to measure the input. They show the input to be 30 kW. Find the reading of each meter.

OR

- 7 With a neat sketch of phasor diagram, explain the construction and working principle of a single phase Induction type energy meter.

UNIT – IV

- 8 What is the transformation ratio of a Current transformer? What are the causes of errors in current transformers? Explain the design considerations that are to be taken to minimize those errors.

OR

- 9 (a) How is DC potentiometer used in the calibration of voltmeter and ammeter?
(b) How can AC potentiometer be used for the measurement of self reactance of a coil?

UNIT – V

- 10 Explain the use of Ballistic Galvanometer for the measurement of magnetic flux.

OR

- 11 How is Hysteresis loop determined by method of reversals?
