Code: 15A02501 **R15**

B.Tech III Year I Semester (R15) Regular & Supplementary Examinations November/December 2019

ELECTRICAL MEASUREMENTS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) Mention the types of errors present in instruments.

(b) The horizontal amplifier basically serves two purposes. Explain.

(c) What are the limitations of a Wheatstone bridge?

(d) List the applications of Schering bridge.

(e) What is creeping and what is the major cause for creeping?

(f) List the errors in electrodynamometer wattmeter.

(g) Mention any two sources of errors in coordinated type A.C potentiometer.

(h) Under what conditions, the phase angle error in potential transformer taken negative and under what conditions it is taken as positive.

(i) Mention the drawbacks of flux meter over ballistic galvanometer.

(j) Discuss how iron loss of bar samples is determined.

PART – B

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

UNIT – I

2 (a) Draw the block diagram of the horizontal amplifier of an oscilloscope and explain.

(b) Explain the functioning of time base generator in C.R.O.

OR

3 (a) Explain the construction and working of the permanent magnet moving coil instruments.

(b) A moving coil instrument gives a full-scale deflection of 10mA when the potential across its terminals is 100mV. Calculate the shunt resistance for a full-scale deflection corresponding to 100A.

UNIT – II

4 (a) What are the difficulties that are encountered in measurement of high resistance?

(b) The arms of 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 Ω,

arm cd: a non- inductive resistor R_4=200 Ω,

arm da: a non- inductive resistor R_2=250 Ω,

arm de: : a non- inductive variable resistor r,

arm ec: a loss- less capacitor C = 1μF , and

arm be: a detector,

An a.c. supply is connected between a and c. Calculate the resistance and inductance R_1 and L_1 when under balance conditions r_1 = 43.1 Ω and r = 229.7 Ω.

OR

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5 (a) Draw the circuit and phasor diagrams of De Sauty bridge to determine the capacitance of an unknown capacitor

(b) The four arms of a wheat stone bridge are as follows:
AB = 100 Ω, BC = 10 Ω, CD = 4 Ω and DA = 50 Ω. The galvanometer has a resistance of 20 Ω and is connected across BD. A source of 10 V d.c. is connected across AC. Find the current through the galvanometer. What should be the resistance in the arm DA for no current through the galvanometer?

UNIT – III

6 (a) A single phase induction watt hour meter, tested at its full load rating of 240 V, 10 A, is 1% slow at unity power factor and correct at power factor 0.5 lagging. Assuming that the friction error is compensated at all power factors, estimate the error at rated VA when the Power factor of the system is: (i) 0.8 lagging. (ii) 0.8 leading.

(b) Describe the constructional details and working of a single phase electrodynamometer type of power factor meter.

OR

7 (a) Explain the working of a three phase energy meter with a neat connection diagram.

(b) List the differences between LPF and UPF wattmeters.

UNIT – IV

8 (a) A 1000/5 A, 50 Hz current transformer has a secondary burden comprising a non inductive impedance of 1.6 Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5 W at full load. The magnetizing mmf is 100A.

(b) With neat sketch, explain in brief about Gall-Tinsley A.C potentiometer.

OR

9 (a) Explain in detail about reduction of errors in potential transformers.

(b) Describe with the help of suitable diagram, how a d.c potentiometer can be used for determination of an unknown resistance.

UNIT – V

10 (a) Explain how hysteresis loop is determined by method of reversals with a neat connection diagram.

(b) Explain the operating principle of flux meter with a neat sketch.

OR

11 (a) Explain the procedure for measurement of Flux/flux density in a ring specimen with a neat connection diagram.

(b) What are the principle requirements and inaccuries in magnetic measurements?

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