Code: 13A02501 **R13**

B.Tech III Year I Semester (R13) Supplementary Examinations June 2016

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) A wattmeter having a range of 500 W has an error of $\pm 1.5\%$ of full scale deflection. If the true power is 50 W, what would be the range of the readings?

(b) What are the properties of spring material used in indicating instruments?

(c) What is dissipation factor? How is it related to Q – factor?

(d) Name the null detectors commonly used for AC bridges.

(e) What is meant by meter constant of an energy meter?

(f) What is the difference between an energy meter and a wattmeter?

(g) What are instrument transformers? How do they differ from power transformers?

(h) Why the secondary of current transformer is never kept open-circuited?

(i) Why are ballistic tests conducted?

(j) Why magnetic measurements are not as accurate as other types of measurements?

PART - B

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

UNIT - I

2 Explain principle, construction and working of PMMC instruments. Derive an expression for the deflection.

OR

3 What is CRT? With the help of a neat diagram, explain briefly the main parts of a CRT.

UNIT - II

4 (a) Describe with the help of diagram, the loss of charge method for determining the insulation resistance of a length of cable.

(b) The value of a high resistance is measured by loss of charge method. A capacitor having a capacitance of $2.5\ \mu F$ is charged to a potential of 500 V D.C and is discharged through the high resistance. An electrostatic voltmeter, kept across the high resistance, reads the voltage as 300 V at the end of 60 seconds. Calculate the value of high resistance.

OR

5 (a) With the help of circuit diagram, explain how capacitance can be measured by the use of a Schering bridge.

(b) In measuring a capacitance using Schering bridge, balance was obtained with the following values of elements in the AC bridge network.

Arm AB …Capacitor of $0.4\ \mu F$ in parallel with $1.5\ k\Omega$ resistance;
Arm BC …Resistance of $3\ k\Omega$;
Arm CD …Unknown capacitor C_x and R_x in series;
Arm DA …Capacitance of $0.4\ \mu F$;
Frequency …1 kHz.

Determine the following:
(i) R_x and C_x.
(ii) Dissipation factor.

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UNIT - III

6 Explain the working of dynamometer wattmeter. Derive an expression for its deflection.

OR

7 With a neat construction diagram, explain the operation of single phase induction type energy meters.

UNIT - IV

8 (a) Explain the principle of working of a PT and give expressions for the ratio and phase angle errors.

(b) A potential transformer of ratio 1000/100 has primary resistance $94.5\ \Omega$, secondary resistance $0.86\ \Omega$, primary reactance $66.2\ \Omega$, total equivalent reactance $110\ \Omega$, and no-load current 0.02 A at 0.4 power factor. Calculate the phase angle error at no-load.

OR

9 (a) What are polar potentiometers? Explain the working of drysdale polar potentiometer.

(b) The current taken by a small iron core choke coil is measured by a rectangular co-ordinate A.C potentiometer. A $1.0\ \Omega$ non-inductive resistance is connected in series with the choke coil. The voltages measured across the resistance and the coil are (0.8 –j 0.75) V and (1.2 +j 0.3)V respectively. Determine the iron loss in the coil. Assume the voltage and current to be sinusoidal.

UNIT - V

10 Explain the determination of B-H curve by the method of reversals.

OR

11 Why is the ac magnetic testing carried out? Give a brief description on iron losses. What are the factors affecting permeability and hysteresis losses?

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