

Code: 13A02501

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)

- 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 94.5Ω , secondary resistance 0.86Ω , primary reactance 66.2Ω , total equivalent reactance 110Ω , 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 1.0Ω non-inductive resistance is connected in series with the choke coil. The voltages measured across the resistance and the coil are $(0.8 - j 0.75) \text{ V}$ and $(1.2 + j 0.3) \text{ V}$ 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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