2012

ELECTRICAL AND ELECTRONIC MEASUREMENT

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) In measurement systems, which of the following static characteristic(s) is/are desirable ?

a) Accuracy b) Sensitivity

c) Reproducibility d) All of these.

ii) Frequency can be measured by using

a) Maxwell bridge

b) Schering bridge

c) Heaviside-Campbell bridge

d) Wien's bridge.

iii) In a CRT the focusing anode is located

a) between pre-accelerating and accelerating anodes

b) after accelerating anode

c) before pre-accelerating anode

d) none of these.

iv) LVDT is a

a) capacitive transducer

b) resistive transducer

c) inductive transducer

d) none of these.

v) The potentiometer is basically an instrument of

a) digital type

b) deflection type

c) null type

d) recording type.

vi) A megger is used for measurement of

a) low valued resistance

b) medium valued resistances

c) high valued resistances

d) all of these.

vii) Murray loop test is used for location of

a) short circuit fault on a cable

b) ground fault on a cable

c) both (a) and (b)

d) open circuit fault.

viii) Calibration of DC potentiometer is done with the help of standard cell of voltage

a) 1·5 V

b) 1·01864 V

c) 1·001864 V

d) 1·0864 V.

ix) Creeping is observed in

a) watt-hour meter

b) wattmeter

c) ammeter

d) power factor meter.

x) The secondary of a CT is

a) never left open circuited

b) never left short circuited

c) always kept open circuited

d) none of these.

xi) The high torque to weight ratio in an analog instrument indicates

a) high friction loss

b) low friction loss

c) nothing as regards friction loss

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Define the terms Accuracy, Precision, Resolution, Drift and Relative limiting error.

3. Explain the difference between Dynamometer type wattmeter and induction type wattmeter.

4. What is phantom loading ? Explain with an example how it is more advantageous than testing with direct loading.

5. Show that driving torque in a moving iron instrument is given by $T_D = 0.5[\ I^2 dL\ /d\theta\ ]$. Where the symbols have their usual meaning.

6. Draw and explain how low resistance is measured using Kelvin's Double bridge.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Describe in brief the construction and working principle of a single phase induction type energy meter.

b) What is Blondel's theorem ?

c) A single phase kWhr meter makes 500 revolutions per kWhr. It is found on testing that it is making 40 revolutions in 58·1 seconds at 5 kW load. Find out the percentage of error. 8 + 3 + 4

8. a) Explain the functional block diagram of CRO with neat diagram.

b) What is Lissagous figure ? Explain how phase & frequency can be measured using this figures.

c) What are the differences between dual beam CRO &

dual trace CRO ? What is the function of delay line ?

6 + (2 + 3) + (3 + 1)

9. a) Draw the circuit diagram of DC potentiometer & explain

how it works.

b) How can potentiometer be used for

i) calibration of voltmeter

ii) calibration of wattmeter.

c) What are the adjustment of induction type AC energy

meter ? 5 + 5 + 5

10. Deduce the expression of torque of electrodynamometer type

instrument. Why multiplier is used with PMMC

instrument ? What do you mean by sensitivity of PMMC

instrument ? Why sensitivity of electrodynamometer type

instrument is low ? Why the scale of moving iron instrument

is cramped at lower end ? 6 + 2 + 2 + 2 + 3

11. Write short notes on any *three* of the following : 3 × 5

a) Digital Multimeter

b) Rectifier type instrument

c) Q-meter

d) Megger

e) Piezoelectric transducer

f) LVDT.

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