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10EE35

Third Semester B.E. Degree Examination, Dec.2015/Jan.2016

Electrical and Electronic Measurements and Instrumentation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Check the following equation dimensionally. If not correct, find the error.

$$I = \frac{V\omega M}{\sqrt{(\omega^2 m^2 + R_2)^2 + \omega^2 L_1 L_2 R_1^2}}$$

Where 'M' is mutual inductance. **(10 Marks)**

b. Mention the factors on which earth resistance depends. **(03 Marks)**

c. Explain the fall of potential method used for the measurement of earth resistance. **(07 Marks)**

2 a. With a neat circuit diagram derive the balancing equation for Maxwell Inductance – Capacitance Bridge. **(05 Marks)**

b. Mention the special features of High Voltage Schering Bridge. **(05 Marks)**

c. A capacitor bushing forms arm AB of Schering Bridge and a standard capacitor of 500pF capacitance and negligible loss forms arm AD. Arm BC consists of non-inductive resistance of 300Ω. When the bridge is balanced Arm CD has a resistance of 72.6Ω, in parallel with a capacitance of 0.148μF. The supply frequency is 50Hz. Calculate the capacitance and dielectric loss angle of capacitor. **(05 Marks)**

d. An a.c bridge is balanced at 2KHz with the following components in each arm,
Arm AB = 10KΩ
Arm BC = 100μF in series with 100KΩ
Arm AD = 50KΩ
Find the unknown parameters in the Arm DC if the detector is between BD. **(05 Marks)**

3 a. What are shunts and multipliers? Derive an expression for both with reference to the meters with which they are used in electrical circuits. **(10 Marks)**

b. Draw the equivalent circuit and vector diagram of a current transformer and hence write the expression for its ratio error and phase angle error. **(08 Marks)**

c. Define transformation ratio and nominal ratio of instrument transformers. **(02 Marks)**

4 a. What is creeping? Discuss the error and adjustments in single phase energymeter. **(10 Marks)**

b. Explain the construction, working principle, advantages and disadvantages of Dynamometer type wattmeter with a neat circuit diagram. **(10 Marks)**

PART – B

5 a. With a neat sketch explain the construction and working of Weston frequency meter. **(10 Marks)**

b. Explain with a block diagram the true RMS voltmeter. **(05 Marks)**

c. Mention the advantages of electronic instruments over conventional meters. **(05 Marks)**

6 a. With a neat block diagram, explain the working of a digital storage oscilloscope. **(10 Marks)**
b. Explain with help of a block diagram, dual trace oscilloscope. **(10 Marks)**

7 a. Prove that guage factor of strain guage is given by $K = 1 + 2\mu$, where 'μ' is the Poisson's ratio. **(08 Marks)**
b. Explain the classification of transducers with the help of examples. **(06 Marks)**
c. What are the selection criteria for the transducer? **(06 Marks)**

8 a. With a neat block diagram explain the basic elements of a digital acquisition system. **(06 Marks)**
b. Write a note on LED and LCD display. **(06 Marks)**
c. With a neat diagram, explain the operation of x-y recorder. **(08 Marks)**

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