B. M. S. College of Engineering, Bengaluru - 560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.   Semester: III
Branch: Electrical and Electronics Engineering   Duration: 3 hrs.
Course Code: 19EE3PCEEM   Max Marks: 100
Course: Electrical and Electronic Measurements   Date: 22.09.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1. a) With a neat circuit diagram derive the balance equation of a bridge which can be used to measure the resistance of the series field winding of a D.C machine. **09**

    b) A condensor forms the arm AB of Schering bridge and a standard capacitance of 600×10^{-12} F form arm AD. The arm BC consists of resistance of 400Ω. When the bridge is balanced, the arm CD has resistance of 78.6Ω in parallel with a capacitor of $0.148\mu F$. A detector is connected in the arm BD. The supply of frequency 50Hz is connected across A and C. Determine the capacitance, dielectric loss of the capacitor in arm AB. **05**

    c) Describe the various factors that causes errors in AC bridges measurements and suggest the method of minimization for the same. **06**

OR

2. a) Derive the equations for balance in case of Maxwell's Inductance capacitance bridge. Draw the phasor diagram for balance condition. **08**

    b) A highly sensitive galvanometer can detect a current of 0.1nA. This is used in Wheatstone bridge with each arm resistance of $1000 \ \Omega$. If the battery voltage is 20V, Determine the smallest change in the resistance which can be detected by the galvanometer. The resistance of the galvanometer can be neglected. **05**

    c) Derive the expression for the current through the galvanometer in case of unbalanced Wheatstone bridge. **07**

UNIT - II

3. a) Explain the Construction and operation of single phase dynamometer type power factor meter. **08**

    b) A wattmeter has a current coil of resistance 0.2 ohm and a pressure coil of resistance 5000 ohms is connected to measure the power consumed by a **06**

load. Calculate the percentage error in the reading of the wattmeter when the load takes 22A at 240 V with 0.8 power factor, when
1. The pressure coil is connected on the supply side
2. When the current coil is connected on the supply side
3. What load current would give equal errors with the two connections

c) With a neat circuit diagram, phasor and necessary equations explain measurement of three phase reactive power using one wattmeter method. **06**

UNIT - III

4. a) With the circuit diagram explain the steps used for measurement using Crompton's type dc potentiometer. **08**

b) A 100/5A CT at its rated load or burden of 20VA has an iron loss of 0.18W and a magnetizing current of 1.4 A. It is supplying rated output to a meter having a ratio of resistance to reactance of 4. Determine the ratio and phase angle errors. **08**

c) Define the following terms as used for current transformers. **04**
   a. Transformation ratio   b. Turns ratio
   c. Ratio correction Factor   d. Nominal ratio

OR

5. a) Draw the equivalent circuit and phasor diagram of a current transformer and derive the expression for phase angle error. **08**

b) With the help of neat circuit and phasor representation explain Silsbee's method of CT testing **08**

c) Describe how a DC potentiometer can be used for measurement of power. **04**

UNIT - IV

6. a) With a neat block diagram explain the working of digital storage oscilloscope. **08**

b) Explain the advantages of using electronic meters. **04**

c) With relevant circuit diagram explain the working of servo balancing type DVM. **08**

UNIT - V

7. a) Prove that gauge factor of strain gauge is given by $G_f = 1+2u$, where u is Poisson's ratio. **08**

b) Discuss the selection criteria for the transducer. **07**

c) Explain the working principle of piezo electric transducer. **05**

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