USN | | | | | | | | | | | **18EE36**

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Electrical and Electronic Measurements

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Analyze unbalanced operation of Wheatstone bride and derive bridge sensitivity.   **(08 Marks)**
    b.   Obtain the balance equation for Hay's bridge used for the measurement of inductance. Draw the phasor diagram at the balanced condition.   **(07 Marks)**
    c.   A Kelvin double bridge is balanced with the following constants, outer ratio arms 100Ω and 1000Ω, inner ratio arms 99.92Ω and 1000.6Ω. Resistance of the link 0.1Ω. Standard resistance 0.00377Ω. Calculate the unknown resistance.   **(05 Marks)**

OR

2   a.   With diagram explain how Megger can be used for measurement of very high resistance.   **(08 Marks)**
    b.   Obtain the balance equation for Schering bridge used for the measurement of capacitance.   **(06 Marks)**
    c.   The four arms of the Maxwell's capacitance bridge at balance are :
         Arm ab : unknown inductance L_1 having an internal resistance R_1
         Arm bc : A non-inductive resistance of 1000Ω
         Arm cd : A capacitor of $0.5\ \mu F$ in parallel with a resistance of $1000\ \Omega$
         Arm da : A resistance of 1000Ω
         Determine the values of R_1 and L_1.   **(06 Marks)**

Module-2

3   a.   Show that deflecting torque $T_d = VI \cos \phi$ for UPF Wattmeter.   **(07 Marks)**
    b.   With a neat sketch explain the construction and working of a single phase dynamometer type power factor meter.   **(07 Marks)**
    c.   The constant of energy meter is 750 revolutions per kwhr. Calculate the number of revolutions made by it, when connected to a load carrying 100A at 230V and 0.8 power factor in 30 seconds. If it makes 110 revolutions in 30 seconds, find the percentage error.   **(06 Marks)**

OR

4   a.   With circuit and phasor diagram explain the theory and operation of single phase induction type energy meter.   **(10 Marks)**
    b.   What is creeping in energy meter? How it is prevented?   **(04 Marks)**
    c.   Explain how reactive power can be measured with single wattmeter in a three phase circuit.   **(06 Marks)**

Module-3

5   a.   What is Shunt? How it is used to expend the range of an ammeter.   **(04 Marks)**
    b.   Write the equivalent circuit and vector diagram of a current transformer. Give the expression for its ratio and phase angle error.   **(08 Marks)**
    c.   With circuit diagram, explain the measurement of fluxdensity inside a ring specimen of magnetic material.   **(08 Marks)**

OR

6 a. Explain why magnetic measurement in Ferro – magnetic material is important. (03 Marks)
   b. Explain the theory and operation of the comparative deflection method of testing a CT by Silsbee's method. (10 Marks)
   c. A potential transformer of ratio 1000/100V has the following constants $r_p = 95\Omega$, $R_p = 0.9\Omega$, $x_p = 68\Omega$, $x_p = 120\Omega$, $I_0 = 0.02A$ at a power factor of 0.4. calculate :
      i) Phase angle error at no-load
      ii) Load in VA at Upf at which the phase angle will be zero. (07 Marks)

Module-4

7 a. What are the essentials of an electronic instrument and explain. (05 Marks)
   b. With block diagram explain the working of true RMS recording voltmeter. (07 Marks)
   c. With circuit, explain the principle of operation of electronic multimeter. (08 Marks)

OR

8 a. Mention the advantages of electronic instruments. (04 Marks)
   b. Explain with block diagram the dual slope integrating type digital voltmeter. (08 Marks)
   c. What is the working principle of Q-meter? With circuit, explain how Q-factor and inductance of an unknown coil be measured using Q-meter. (08 Marks)

Module-5

9 a. Explain :
      i) Segmental display
      ii) Dot matrix display. (06 Marks)
   b. Explain the operation of LED display. Mention its advantages. (08 Marks)
   c. With a basic circuit, explain the operation of potentiometric recorder. (06 Marks)

OR

10 a. With schematic, explain the operation of gas discharge plasma display. (06 Marks)
    b. With the help of neat block diagram, explain the operation of ECG machine. (08 Marks)
    c. Explain the operation of LVDT type recorder. (06 Marks)

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