Roll No. ⟨1 4 0 4 3 3 d o 1 3⟩

B.Tech.
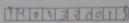## THIRD SEMESTER EXAMINATION 2015-16
EEE302
ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Time: 3 hours   Max Mark: 100

Note

- Attempt all questions.
- Marks and number of question to attempt from the section is mentioned before each section.
- Assume missing data suitably .Illustrate the answer with suitable sketch.

1. Attempt any four questions from the followings

[4x5]

    a. Describe the deflection type and null type instrument.

    b. Describe the error and types of error in measurement.

    c. An electrostatic voltmeter reading up to 1000 V is controlled by a spring with a torsion constant of $5*10^{-6}$ Nm/rad has a full scale deflection of 90^0. The capacitance of zero voltage is $10\mu F$.what is the capacitance when the pointer indicates 1000V.

    d. What are the characteristics of measuring instrument? Explain in detail

    e. Explain the construction and working of Electrostatic type instruments with advantage and disadvantages.

    f. Write a short note on AC voltmeter with expression using Half Wave rectifier.

2. Attempt any four questions from the followings:

[4x5]

    a. Explain the electrodynamometer type instrument and also its advantages and disadvantages of electrodynamometer type instrument and its application.

    b. Explain the working principle of thermocouple instruments and draw the neat diagram to illustrate the working of contact type, non-contact type and bridge type.

    c. A 1000/5 A, 50 Hz current transformer has a secondary burden comprising a non inductive impedance 0f 1.6Ω. The primary winding has one turn calculate the flux in the core and ratio error at full load. Neglect the leakage reactance and assume the iron loss in the core to be 1.5 W at full load.

    d. A current transformer with 5 primary turns has a secondary burden consisting of a resistance of 0.16 ohm and inductive reactance of 0.12 ohm when the primary current is 200 A, the magnetizing current is 1.5 A and iron loss current is 0.4 A. find the number of

    secondary turns needed to make the current ratio 100.1 and the phase angle.

    e. Write a shot note on Weston frequency meter and electrodynamometer type power factor.

    f. What are the different methods of measurement of speed? Explain the construction and working principle of any one of them.

3. Attempt any two questions from the followings:

[2x10]

    a. Describe how the high current measured with the help of instrument transformers with suitable diagram. Describe the advantages of instrument transformer

    b. In a dynamometer wattmeter the moving coil has 500 turns of mean diameter 30mm, estimate the torque if the axes of the field and the moving coils are at (i) 60^0 (ii) 90^0
    When the flux density produced by field coils is $15*10^{-3}$ Wb/m^2, the current in moving coil is 0.05 A and the power factor is 0.866.

    c. Describe the working of hay's bridge for measurement of inductance. Derive the equations for balance condition and draw the phasor diagram under balance condition. Why is this bridge suited for measurement of inductance of high Q coil?

4. Attempt any two questions from the followings:

[2x10]

    a. Draw and explain the circuit of flux meter. Explain the advantages and disadvantages of it.

    b. Draw the circuit of a Kelvin bridge and explain its working and advantage also explain how the effect of contact resistance of leads is eliminated.

    c. Describe the construction and working of co-ordinate type ac potentiometer. How is it standardized?
    Explain how an unknown voltage can be measured with it.

5. Attempt any two questions from the followings:

[2x10]

    a. Describe the following type of cathode ray oscilloscopes
       i) Dual trace type
       ii) Dual beam type

    b. Draw and explain the structure and main components of conventional Cathode-rays tube.

    c. Explain how to measure phase difference and frequency from lissajous pattern.