

5. Attempt any **two** of the following : (10×2=20)

- (a) How does a Ramp type Digital Voltmeter work ? Draw suitable block diagram to explain the same. What are the merits of Digital Voltmeter ?
- (b) With the help of suitable block diagrams, explain the measurement of frequency using Analog Frequency meter and Digital Frequency counter.
- (c) Discuss about working of a Cathode Ray Oscilloscope. How can the frequency and phase-angle measured by using this instrument ?

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 0209**

Roll No.

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**B.Tech.**

(SEM. III) THEORY EXAMINATION 2011-12

**ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS**

*Time : 3 Hours*

*Total Marks : 100*

**Note :—Attempt all questions.**

1. Attempt any **four** of the following : (5×4=20)
  - (a) Describe various methods of measurements with the help of suitable block diagrams.
  - (b) What do you understand by the terms 'Accuracy' and 'Precision' ? How the two differ from each other ?
  - (c) Two resistances  $R_1 = 1 \text{ k}\Omega \pm 1\%$  and  $R_2 = 500 \Omega \pm 1\%$  are connected in parallel. Find the limiting error in Ohms and in percentage for the total resistance.
  - (d) Prove from the first principle that electrodynamicometer type instruments give deflection which is proportional to the product of the two currents (flowing through fixed and the moving coils) and the rate of change of mutual inductance.
  - (e) Discuss about the error in wattmeters due to pressure coil inductance. How is the reading corrected for this error ?

- (f) A 220 V, 15 A single phase energy meter has a meter-constant equal to 1750 revolution/kWh. The meter makes 350 revolutions in 275 seconds for rated load at 0.8 pf lagging. Find out the error (with sign) in the meter reading.

2. Attempt any **two** of the following : **(10×2=20)**

- (a) A PT has a nominal ratio of 4000/100 volt, RCF of 0.990 and a phase angle of  $-0.367^\circ$ . ACT has a nominal ratio of 150/5 A, RCF of 1.002 and a phase angle error of  $0.167^\circ$ . These CT and PT are used to measure the power of a single phase inductive load (where  $I_s$  leads  $I_p$ ). The meters read 105 volt 5A and 420 watts. Determine the true values of current, voltage and power of the load.

(b) Write a note on power factor meter.

- (c) Compare a moving coil type of velocity transducer with a moving magnet type of velocity transducer on the following points :

- (i) Construction
- (ii) Operation and
- (iii) Relative merits and demerits.

3. Attempt any **two** of the following : **(10×2=20)**

- (a) Explain in detail the measurement of high resistance using Loss of Charge method.

- (b) Describe the method of measuring inductance using Maxwell's inductance capacitance bridge on following points:

- (i) Circuit diagram
- (ii) Phasor diagram
- (iii) Derivation of formula
- (iv) Advantages
- (v) Limitations.

- (c) How is Q meter used to measure the characteristic impedance of a transmission line ?

4. Attempt any **two** of the following : **(10×2=20)**

- (a) Explain the Drysdale-Tinsley polar type AC potentiometer on the basis of its connection diagram, standardization and measurement of unknown emf.

- (b) Describe an experiment for obtaining flux density in a specimen of magnetic material with the help of a Ballistic Galvanometer. How is the correction made for the flux in the air between the specimen and the coil ?

- (c) The iron loss in a sample of magnetic material is 360 watt at 50 Hz with the eddy current loss 6 times as large as the hysteresis loss. At what frequency will the iron loss be doubled, keeping the frequency the same ?