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B. TECH
(SEM III) ODD SEMESTER EXAMINATION 2016-17
ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

[Time: 3 hrs] **[Max.Marks:100]**

Note: Answer all five questions

1. Answer any **FOUR** parts **[5X4=20]**

a) Explain the terms
   i) Static error
   ii) Static correction
   iii) Relative error
   iv) Percentage relative error
   v) Accuracy.
b) List the advantages of electronic instruments over electrical and mechanical instruments.
c) Define limiting error. Derive the expression for relative limiting error.
d) The meter constant of a single phase 240v energy meter is 400 revolutions per kWh. What is the speed of the meter disc for a current of 10 amps at 0.8 pf lagging?
e) Explain the working principle Electrodynamic type instruments.
f) Explain (with phasor for star connection) how power can be measured in a three phase circuit with the help of two-wattmeter?

2. Answer any **TWO** parts **[10X2=20]**

a) A current transformer with a bar primary has 300 turns in its secondary winding. The resistance and reactance of the secondary circuit are 1.5 ohm and 1.0 ohm respectively including the transformer winding. With 5A flowing in the secondary winding, the magnetizing mmf is 100A and the iron loss is 1.2 W. Determine the ratio and phase errors.
b) What are the sources of error in instrument transformers? Draw the equivalent circuit and phasor diagram of a potential transformer.
c) What are the different methods of measurement of frequency in power frequency range? Explain the construction and working of Ferro-dynamic type frequency meter. Draw the phasor diagram under different power factor conditions.

3. Answer any **TWO** parts **[10X2=20]**

a) Derive the equations for balance in the case of Hay's Bridge. Draw the phasor-diagram for balance condition.
b) Explain the principle of working of a Kelvin's Double Bridge and explain how the effect of contact resistance and resistance of lead is eliminated.
c) Explain the working of Q meter. A circuit consisting of a coil, a resistance and a variable capacitor connected in series is tuned to resonance using a Q meter. If the frequency is 500 kHz, the resistance 0.5Ω and the variable capacitor set to 350pf. calculate the effective inductance and resistance of the coil, if the Q meter indicates 90.

4. Answer any **TWO** parts **[10X2=20]**

a) Explain the working of a Ballistic Galvanometer and prove that charge is proportional to first swing of moving coil

b) Explain the Gall-Tinsley rectangular type AC potentiometer on the basis of its connection diagram, standardization and measurement of unknown emf.

c) In the measurement of power by a polar potentiometer the following readings were obtained

Voltage across a 0.2 **Ω** standard resistance in series with the load= $1.46\angle 32^{o}$

Voltage across a 200:1 potential divider across the line= $1.37\angle 56^{o}$V

Estimate the current, voltage, power factor of the load.

5. Answer any **TWO** parts **[10X2=20]**

a) Explain the functioning of a integrating type digital voltmeter with suitable block diagram.

b) Explain the basic concept of Digital measurement. Describe and explain the circuit of a digital frequency meter.

c) Describe how frequency and phase angle measurement can be made with the use of a CRO. Also explain dual beam and dual trace CRO.