

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

PAPER ID : 0209

Roll No.

1	1	1	6	1	2	1	0	4	2
---	---	---	---	---	---	---	---	---	---

B.Tech.

(SEMESTER-III) THEORY EXAMINATION, 2012-13

ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Time : 3 Hours]

[Total Marks : 100

- Notes :**
- (1) Assume suitable data wherever necessary.
 - (2) Use of Non-programmable calculator is permitted.
 - (3) Figures to the right indicate maximum marks.

Section – A

Answer the following questions in short :

2 × 10 = 20

- (a) State the classification of instruments with example.
- (b) Differentiate between “accuracy” & “precision”.
- (c) Why secondary of current transformer is never opened while its primary is energized ?
- (d) How ‘creeping’ error can be minimized in energy meters ?
- (e) Discuss the special features of potential coil in LPF wattmeter.
- (f) Justify unsuitability of Hay Bridge for measurement of low Q inductor.
- (g) Determine coil resistance if AC potentiometer reads $V = 0.75 \angle 51^\circ$ through voltage ratio box of 100/1 and $I = 6.13 \angle 12^\circ 6'$.
- (h) Why magnetic measurements are important in electrical engineering ?
- (i) Discuss dual trace and dual beam CRO.
- (j) Draw basic circuit (block diagram) of frequency meter.

Answer any **three** parts from the following :

10 x 3 = 30

2. (a) (i) Discuss, with block diagram, generalized instrumentation system. 5
(ii) Explain the construction and working of Electro-dynamometer instrument. 5
- (b) (i) A Kelvin bridge is balanced with : outer arm ratio as $100 \Omega : 1000 \Omega$; inner ratio arm as $99.95 \Omega : 1000.7 \Omega$; link resistance = 0.1Ω ; standard resistance = 0.0038Ω . Calculate unknown resistance. 5
(ii) Draw Schering bridge and derive an expression for finding unknown capacitance and its series leakage resistance. 5
- (c) (i) Describe the standardization process of Drysdale (polar type) AC potentiometer. 5
(ii) Discuss step by step method of determining hysteresis loop of magnetic material. 5
- (d) (i) Discuss different types of distortions caused by amplifier due to non-linear components. 5
(ii) Explain the construction of CRO (using block diagram). 5
- (e) (i) A current transformer with turns ratio $1 : 190$ is rated as $1000 / 5A, 25 VA$. Core loss and magnetizing component of primary current are $4A$ & $8A$ under rated conditions. Determine phase angle error and ratio error for rated burden and rated secondary current at 0.8 lag p.f. (Neglect sec. winding impedance). 5
(ii) Explain the construction and working of Weston type frequency metre. 5

Section - C

10 x 5 = 50

Answer any **two** parts from each questions :

3. (a) Currents in two parallel branches are $I_1 = 100 \pm 2 A$ and $I_2 = 200 \pm 6A$ and $I = I_1 + I_2$. Find I if errors in I_1 & I_2 are (a) limiting errors (b) std. deviation. 5
- (b) Discuss primary standard of EMF with handling precautions. 5
- (c) Explain, with phasor diagram, the power measurement in 3-phase circuit using 2-wattmeters and indicate how load pf can be determined in case of balanced load. 5

- (a) Explain, with circuit diagram, how instrument transformer can be used to measure high power. 5
- (b) Discuss the effect of secondary burden p.f. and current on errors in CTs. 5
- (c) Discuss the construction and working of 1-phase p.f. meter. 5
-
- (a) Discuss, with practical circuit, Q meter & its use to measure self capacitance of coil. 5
- (b) Discuss Maxwell inductance and capacitance bridge for measuring inductance. 5
- (c) Discuss 'loss of charge' method for high resistance measurement. 5
-
- (a) Discuss the application of AC potentiometer for power measurement. 5
- (b) Discuss wattmeter method to determine iron loss in ferromagnetic materials. 5
- (c) Discuss the construction and working of flux meter. 5
-
- Discuss the working of any one type of digital voltmeter with block diagram. 5
- (b) Discuss, with block diagram, electronic multimeter. 5
- (c) Discuss how CRO can be used for frequency and phase displacement measurement. 5
-

6177394