

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

**PAPER ID : 0209**

Roll No.

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**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**

1. 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  $I = 6.13 \angle 12^\circ$ .
  - (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.

## Section – B

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

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 =  $0.1 \Omega$ ; standard resistance =  $0.0038 \Omega$ . 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

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

4. (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
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
6. (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
7. (a) 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
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