Printed Pages : 3 **EEE302**

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

PAPER ID : 0209 **Roll No.** | | | | | | | | | | |

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 $\angle 51°$ through voltage ratio box of 100/1 and I = 6.13 $\angle 12°$ 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.

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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 Electrodynamometer instrument. **5**

(b) (i) A Kelvin bridge is balanced with : outer arm ratio as 100 Ω : 1000 Ω; inner ratio arm as 99.95 Ω : 1000.7 Ω; link resistance = 0.1 Ω; standard resistance = 0.0038 Ω. 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 $I_2 = 200 \pm 6$A 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**

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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