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RM-6483

B. E. - II (Sem. IV) (ECC) Examination

May / June – 2010

Electrical Measuring Instruments

Time : **3** Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (Sem. 4) (ECC)**

Name of the Subject :

☛ **Electrical Measuring Instruments**

☛ Subject Code No. : **6 4 8 3** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Assume suitable data if required.

(4) Support your answers with neat sketches.

(5) Figures to the right indicate maximum marks.

SECTION - I

1 (a) Do as directed

(i) List the methods of measuring high resistance. **2**

(ii) List factors causing errors in a.c. bridge circuit. **2**

(iii) What is use of Brooks deflectional potentiometer? **1**

(iv) How a vibration galvanometer is tuned? **1**

(v) Fill in the blank :

(a) Kelvin's double bridge is used for measurement of _____ resistance. **1**

(b) Sphere gaps are used for measurement of _____. **1**

(c) In Marx's circuit, the capacitors are charged in _____ and discharged in _____. **2**

(b) (i) Explain the function and working of Wagner Earth device. **6**

(ii) Explain difficulties in measurement of high resistance. **4**

2 (a) List different methods of measuring inductance and explain Hay's bridge method. Also draw phasor diagram for balance condition. **8**

(b) Explain how electric strength of insulating oil is determined using High Voltage Oil testing set. **7**

OR

(b) Describe carry foster slide wire bridge and derive an expression for unknown resistance. **7**

3 Attempt any **three** : **15**

(i) Explain construction and working of magger.

(ii) Describe basic principle of operation of d.c. potentiometer and explain standardization.

(iii) Explain construction and working principle of D'arsonval type of galvanometer.

(iv) Explain Cock-Croft Walton circuit for production of high voltage d.c.

(v) A sheet of bakelite 4.5 mm thick is tested at 50 Hz between electrodes 0.12 m in diameter. The schering bridge employs a standard air capacitor C_2 of 106 pF capacitance, a non-reactive resistance R_4 of $1000/\pi\ \Omega$ in parallel with a variable capacitor C_4 and a non-reactive variable resistance R_3. Balance is obtained with C_4=0.5 μF and $R_3 = 260\,\Omega$. Calculate capacitance C_1 and r_1 series resistance of the capacitor.

SECTION - II

4 (a) Do as directed : **10**

(i) A milliammeter of resistance 100 Ω is connected in series with a circuit. Its power consumption is 0.1 mW. Supposing it is replaced with a milliammeter of 200 Ω resistance the power consumption will be _____. **2**

(ii) The controlling torque in a Megger is not required (T/F) **1**

(iii) In a moving iron voltmeter, how frequency error can be reduced? **1**

(iv) In an electrodynamometer type of wattmeter_____ coil is made fixed and _____ coil is made movable. **2**

(v) The ratio of transformation in case of potential transformers decreases with increase in power factor of secondary burden. (T/F) **1**

(vi) The readings of instruments used in conjunction with instrument transformers do not depend upon their resistance, inductance etc. (T/F) **1**

(vii) Induction Method of testing is used to locate ground fault. (T/F) **1**

(viii) Accuracy of Blavier test is lower as compared to other methods. (T/F) **1**

(b) (i) What are the basic differences between current transformer and potential transformer? **4**

(ii) Explain Murray loop test for localizing short circuit fault. **6**

5 (a) Explain Blavier test for localizing ground fault. 8

(b) A current transformer of turns ratio 1:199 is rated as 1000/5 A, 25 VA. The core loss and magnetizing component of the primary current are 4 and 7A under rated conditions. Determine the phase angle and ratio errors for rated burden and rated secondary current at 0.8 p.f. leading. Neglect the resistance and leakage resistance of secondary winding. 7

OR

5 (a) Draw vector diagram of C.T. and derive an expression for Ratio error. 8

(b) In a Murray loop test for localization of earth fault of a 500 metre long cable having a resistance of 1.10 Ω per 1,000 metres, the faulty cable is looped with a sound cable of the same length but having a resistance of 2.20 Ω per 1,000 metres. The resistance of the other two arms of the testing network, at balance, are in the ratio of 2.5:1. Calculate the distance of the fault from the testing end of the cable. 7

6 Attempt any **three** : 15

(i) Explain phenomena of creeping in $1-\phi$ induction type of energy-meter.

(ii) Give merits and demerits of PMMC type of instruments.

(iii) Explain two different methods of connection of wattmeter.

(iv) What are the different methods of daming used in analog indicating instruments? Explain air friction damping.

(v) Explain various torques in indicating instruments.
