(Following Paper ID and Roll No. to be filled in your Answer Book)
PAPER ID : 2048 Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION
2010-11

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Time : 3 Hours   *Total Marks : 100*

Note : (1) Attempt **all** questions.

(2) All questions carry equal marks.

(3) Be precise in your answer.

1.   Attempt any **four** out of the following :   **(5×4=20)**

(a)   What are errors related to PMMC instrument ? Give its advantages and disadvantages.

(b)   What is meant by systematic errors ?

(c)   Describe the sources and null detector that are used for A.C bridges.

(d)   Mention salient features of self balancing potentiometers.

(e)   What are the different standards to represent EMF ?

(f)   What is the principle of working of flux meter ?

2. Attempt any **four** out of the following : $(5 \times 4 = 20)$

   (a) Discuss the method of determining components of iron losses on magnetic material. The measured values of iron losses of magnetic specimen of weight 10 Kg are 15 W at 40 Hz and 60 Hz at constant peak flux density. Estimate the value of hysteresis and eddy current loss at 50 Hz for same value of flux density.

   (b) Give the circuit of Sheering Bridge for measuring capacitance and draw the vector diagram for balanced condition of bridge.

   (c) Explain with the suitable diagram, how A.C. potentiometer can be used for :

       (i) Calibration of wattmeter and energy meter

       (ii) Calibration of ammeter.

   (d) A Lissajous pattern on an oscilloscope is stationary and has 5 horizontal tangencies and 2 vertical tangencies. The frequency of horizontal input is 1000 Hz. Determine the frequency of vertical input.

   (e) What are Permeameters ? The iron loss in a sample is 300 W at 50 Hz with eddy current loss component 5 times as big as the hysteresis loss component. At what frequency will the iron loss be double if the flux density is kept the same ?

3. Attempt any **two** out of the following : $(10 \times 2 = 20)$

   (a) Write short notes on any **two** of the following :

       (i) Current transformer

       (ii) Polar type AC potentiometer

       (iii) Energy meter.

(b) (i) Explain briefly Lloyds-Fisher square and Epstein square method of measurement of iron losses.

(ii) A ballistic galvanometer having a circuit resistance of 5000 ohms and a constant of 0.1 m C per scale division is connected in turn with a coil of 2 turns would round the field coil of a D.C machine and one of the 3 turns placed on the armature surface embracing the total flux per pole entering the armature. When normal field current is broken the galvanometer reading are 113 and 136 divisions ? Calculate the flux per pole and leakage coefficient.

(c) (i) Explain the circuit of a multimeter for measurement of AC voltages.

(ii) Discuss the procedure of standardization of a DC potentiometer.

I. Attempt any **two** out of the following : **(10×2=20)**

(a) Describe working of Hay's bridge : Why is this bridge suited for measurement of inductance of high Q coils ?

(b) (i) What is PT and what are its advantages ? Discuss working principle of PT and develop its vector diagram. Also derive expression for ratio error and phase angle error of a PT.

(ii) A P.T ratio 1000/100 V has following constant :
Primary resistance = 94.5 ohms; secondary resistance = 0.86 ohms; Primary reactance = 66.2 ohms; Total equivalent reactance = 110 ohms;

no load current = 0.02 A at 0.4 power factor. Calculate; phase angle error at no load, burden in VA at unity power factor at which the phase angle will be zero.

(c) (i) Explain the construction and working of co-ordinate type A.C. potentiometer. How is it standardized ?

    (ii) It is given that deflecting torque of an ammeter varies as square of current through it. If current of 7 A produces deflection of 100°; what deflection will occur for a current of 3 A when instrument is ; Spring control, gravity control ?

5. Attempt any **two** out of the following :   **(10×2=20)**

    (a) Describe the following types of oscilloscopes :
      (i) Dual trace type
      (ii) Dual beam type.

    (b) Draw the block diagram of a general purpose CRO. The deflection sensitivity of an oscilloscope is 35 V/cm. If the distance from the deflection plates is 2.5 cm, and the distance between the deflection plates is 1.2 cm. What's the acceleration anode voltage ?

    (c) Explain the functioning of a ramp type digital voltmeter ? The lowest range on a 4½ digit DVM is 10 mv full scales. What's sensitivity of this meter ?