

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

PAPER ID : 2048

Roll No.

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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 : **(5×4=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 : **(10×2=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.

4. 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 ?