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

PAPER ID : 1255 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2013-14

ELECTRICAL AND ELECTRONICS MEASUREMENTS AND INSTRUMENTS

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** questions.

SECTION–A

1. Attempt **all** parts : (2×10=20)

   (a) What is the difference between absolute error and relative error ?

   (b) Differentiate between reproducibility and drift.

   (c) Draw connection diagram of current transformer in single-phase system.

   (d) Define meter constant in single-phase induction type energy meter.

   (e) What are sources of error in ac bridge circuits ?

   (f) Classify resistances from the point of view of measurements.

   (g) Define standardization of AC Potentiometer.

(h) How would 12.98 V and 0.6973 V be displayed on 10 V range of a 4½ digit display ?

(i) Explain wave analyzer in measurement system.

(j) Enlist difficulties encountered in measurement of high resistances.

SECTION–B

2. Attempt any three parts : **(10×3=30)**

(a) (i) What are different types of systematic error ? Discuss.

(ii) Describe the constructional details of single phase induction type energy meter.

(b) A current transformer with a bar primary has 300 turns in its secondary winding. The resistance and reactance of secondary circuit are 1.5 Ω and 1.0 Ω respectively including the transformer winding with 5 A current flowing in secondary winding, the magnetizing mmf is 100 A and the iron loss is 1.2 W. Determine the ratio and phase angle error.

(c) Derive the equation of balance for modified De Santy bridge. Draw the phasor diagram for balance condition.

(d) Describe an experiment for obtaining flux density in a specimen of magnetic material with the help of a Ballistic galvanometer. How is the correction made for the flux in the air between the specimen and the coil ?

(e) Draw a suitable block diagram to explain the working of Ramp type digital voltmeter.

SECTION–C

Note :– Attempt **all** questions : **(5×10=50)**

3. Three resistors have the following ratings $R_1 = 200\ \Omega \pm 5\%$, $R_2 = 100\ \Omega \pm 5\%$, $R_3 = 50\ \Omega \pm 5\%$. Determine the magnitude of resultant resistance and limiting errors in percentage and ohms, if the above resistances are connected in (i) Series (ii) Parallel.

OR

A dynamometer wattmeter is used to measure the power factor of a 20 μF capacitor. The pressure coil of the wattmeter having a resistance 1000 Ω and an inductive reactance of 15 Ω is connected across a 50 Hz supply. The current coil of the wattmeter, a variable resistor R and the capacitor are connected in series across the same supply. The wattmeter deflection is made zero by adjusting the value of R to 1.65 Ω. If the current coil resistance is 0.1 Ω and its inductance negligible, determine the power factor of the capacitor.

4. Attempt any **two** parts : **(5×2=10)**

   (a) Explain the method of turns compensation used in current transformers to reduce ratio error with the help of a suitable example.

   (b) Explain the methods for demagnetisation of the core of a current transformer whose secondary circuit has been accidentally opened when the primary winding was energised.

   (c) Explain the working of mechanical resonance type frequency meter.

5. Draw the circuit of a Kelvin's Double bridge used for measurement of low resistances. Derive the condition for balance.

OR

Derive the equation of balance for a low voltage Schering bridge. Draw the phasor diagram.

6. 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 ?

OR

Describe step by step method for determination of B-H curve of a magnetic material.

7. Attempt any **two** parts : **(5×2=10)**

   (a) Draw and explain the circuit of Digital Frequency Meter.

   (b) Draw the circuit and describe the working of wave analyzer for audio-frequency range.

   (c) Explain with the help of a block diagram, the working of Integrating type digital voltmeter.