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Sub Code: REE302

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B TECH
(SEM 3) THEORY EXAMINATION 2017-18
Electrical Measurement and Measuring Instruments

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

Section A

Q.1-Attempt all question in brief.

(7*2=14)

- a. Distinguish clearly between Resolution & Precision.
- b. Explain different way of classification of electrical transducers.
- c. Differentiate between current transformer & potential transformer.
- d. Why Kelvin's bridge is preferred for low resistance measurement ?
- e. What is the major cause of creeping error in an energy meter?
- f. Discuss the advantage of digital measurement over analog measurement.
- g. What do you mean by lissajous pattern?

Section B

Attempt any Three questions in brief.

(3*7=21)

- a- Describe construction & working of electro-dynamometer type wattmeter. Derive its torque equation.
- b- A power primary C.T. Has 300 secondary turns. The total resistance and reactance for the secondary circuit are 1.5 & 1.0 secondary winding, the magnetizing mmf is 100 AT and iron loss component is 40A. Determine the ratio & phase angle of the C.T. at this load.

c-Derive the balance equation for modified De Sauty bridge. Also Explain its advantage over simple De Sauty Bridge. Also draw its phasor diagram.

d- The basic AC Bridge consists of the following constant:

Arm AB: $R = 400 \Omega$

Arm BC: $R = 150 \Omega$ is series with $C=0.2\mu\text{F}$

Arm CD: unknown

Arm DA: $R=100 \Omega$ is series with $L = 10 \text{ mH}$

The source oscillator frequency is 1 KHz .Determine the constant of the arm CD.

The source oscillator frequency is 1 KHz. Determine the constant of the arm CD.

e- Discuss the advantage of digital measurement. Draw and explain the Block diagram of Ramp type DVM.

Section C

3 .Attempt any one questions

(1*7=7)

- a- Output of an LVDT is connected to a 7V voltmeter through an amplifier. Whose amplification is 250? An output of 2mv appears across the terminals of LVDT when core move through a distance of 0.5mm. Calculate the sensitivity of the LVDT and that of whole set up. The millivolt scale has 1000 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in mm.
- b. An Hall Effect element used for measuring a magnetic field strength gives an output voltage 10mv. The element is made of silicon and is $3.0 \times 10^{-3} \text{m}$ thick and carries a current 2amp. The hall co-efficient is $4.1 \times 10^{-6} \text{vm/A-w/W}$. find magnetic field strength.

4.Attempt any one question.

(1*7=7)

- a. Describe the construction and working of Analog Storage CRO using block diagram.
- b. Explain the working of Wave analyzer with the help of suitable block diagram.

5 .Attempt any one question.

(7*1=7)

a. What is piezoelectric effect? Which crystals show this effect? Compare the materials as the basis of strength and piezoelectric activity.

b.-Define following terms.

(i) Gauge pressure

(ii) Vacuum pressure

(iii) Absolute pressure

(iv) Dynamic pressure.

6.Attempt any one question.

(7*1=7)

a. Describe the modern digital data acquisition system.

b. A single phase potential transformer has a turn ratio of 4,000/70. The nominal secondary voltage is 536V & the total equivalent resistance & leakage reactance referred the secondary side are 2Ω & 1Ω respectively. Calculate the ratio & phase angle error of PT supplying a Burdon of $(100+200j)\pi$.

7 .Attempt any one question.

(7*1=7)

a. A cable is tested by loss of charge method using a ballistic galvanometer, with following results:

Discharged immediately after electrification, deflection 200 division. Discharge after 30 Sec. and after electrification (i) deflection 126 divisions (ii) when in parallel with a resist. of $10M\Omega$, deflection 100 division. Calculate the insulation resistance of the cable.

b. What is Seeback effect ? Explain the working principle and construction of thermocouple.