

Printed Pages: 02

Subject Code:REE302

Paper Id:

120302

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BTECH
(SEM III) THEORY EXAMINATION 2018-19
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Time: 3 Hours

Total Marks:70

Notes: Assume any Missing Data.

SECTION – A

1. Attempt all parts of the following. (7*2=14)

- a. Distinguish between direct and indirect measurement.
- b. What do you mean by sensitivity and accuracy for dynamic measurement?
- c. Explain the burden of current transformer.
- d. What is creeping in energy meter?
- e. What are the difficulties in measurement of high resistance?
- f. Why Kelvin's bridge is preferred for low resistance measurement?
- g. What do you mean by lissajous pattern?

SECTION – B

2. Attempt any three parts of the following: (3*7=21)

- a. Explain construction and working of PMMC instruments. Derive the equation for deflection torque. Also explain its advantage and disadvantage.
- b. Draw and explain the equivalent circuit and phasor diagram of a current transformer. Derive the relation for ratio and phase angle errors.
- c. A current transformer with a bar primary has 300 secondary turns. The total resistance and reactance for the secondary circuit are 1.5 & 1.0 secondary winding. With 5A flowing in the secondary winding, the magnetizing mmf is 100 AT and iron loss is 1.2W. Determine the ratio & phase angle of the C.T. at this load.
- d. Explain the working of Megger for measurement of high resistance
- e. Explain dual trace and dual beam type oscilloscope with neat and clean diagram.

SECTION C

3. Attempt any one parts of the following:

1 x 7 = 7

- a. Output of an LVDT is connected to a 4V voltmeter through an amplifier. Whose amplification is 500? An output of 1.8mv appears across the terminals of LVDT when core move through a distance of 0.6mm. Calculate the sensitivity of the LVDT and that of whole set up. The millivolt scale has 100 divisions. The scale can be read to 1/4 of a division. Calculate the resolution of the instrument in mm.
- b. Explain electro-dynamometer instrument and derive its torque equation.

4. Attempt any one parts of the following:

1 x 7 = 7

- a. Explain the working of Selective frequency wave analyzer with the help of suitable block diagram.
- b. Explain the construction and working of Weston type frequency meter.

5. Attempt any one parts of the following:

1 x 7 = 7

- a. The four arms of a Wheatstone bridge are as follows: AB=1000 Ω , BC= 1000 Ω , CD= 120 Ω and DA= 120 Ω . The bridge is used for strain measurement and supplied from 5V ideal battery. The galvanometer has sensitivity of 1mm/ μ A with internal resistance of 200 Ω . Determine the deflection of the galvanometer and its deflection if arm DA increases 121 Ω and arm CD decreases to 119 Ω .
- b. Explain Anderson's bridge method for the measurement of unknown inductance.

6. Attempt any one parts of the following:

1 x 7 = 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.

7. Attempt any one parts of the following:

1 x 7 = 7

- a. Explain the working principle of a Ramp-type digital voltmeter (DVM) with suitable diagram.
- b. How CRO can be used for frequency and phase displacement measurement?