

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

Paper ID : 2012379

Roll No. 

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**B.TECH.**

Regular Theory Examination (Odd Sem-III), 2016-17

**ELECTRICAL MEASUREMENTS &  
MEASURING INSTRUMENTS**

*Time : 3 Hours*

*Max. Marks : 100*

**Note: Attempt all Sections.**

**SECTION - A**

**1. Attempt All Parts of the following: (10×2=20)**

- i) Differentiate the terms “Static error” and “Limiting error”.
- ii) Why the scale of moving iron instruments is usable over about 80° of its length? Explain.
- iii) Enlist the major advantages of instrument transformers in terms of extension of range.
- iv) How does a potential transformer differ from an ordinary power transformer?
- v) What do you understand by low, medium and high resistances?

- vi) Calculate insulation resistance of a cable in which the voltage falls from 200 V to 160V in 20 sec. The capacitance is  $0.3 \mu F$ .
- vii) What is the term "standardization" in ac potentiometer.
- viii) Explain the significance of area of Hysteresis curve in magnetic measurement.
- ix) List different types of DVMs.
- x) Explain the various applications of CRO in measurement.

### SECTION - B

**Note: Attempt any FIVE Parts of the following: (5×10=50)**

- 2. Discuss and analyse the error algebra in measurement systems.
- 3. An electrostatic voltmeter reading upto 2500 V is controlled by a spring with spring constant of  $10 \times 10^{-6}$  N-m/deg and has a full scale deflection of  $80^\circ$ . The capacitance at zero voltage is 10 pF. What is the capacitance when the pointer indicates 1 kV?
- 4. A wattmeter is rated at 10 A and 25 V. The current coil has a resistance of  $0.06 \Omega$  and a reactance of  $0.02 \Omega$ . The potential coil circuit may be assumed to be purely resistive having a resistance of  $6250 \Omega$ . Find the errors due to two different connections of wattmeter coils. The

load is 10 A at p.f. of 0.174 lagging. The voltage across the load is 25V.

5. Define the following terms as used for instrument transformers:
- i) Rated current
  - ii) Nominal current
  - iii) Transformer ratio
  - iv) Nominal ratio
  - v) Turns ratio
  - vi) Burden
  - vii) Ratio correction factor
6. What are the problems associated with the measurement of low resistances and how are they Overcome in Kelvin's double bridge? Derive an expression for the unknown resistance in case of kelvin's double bridge.
7. Describe how magnetizing loss component of no-load current of a transformer can be determined by using a.c. Potentiometer.
8. With the help of block diagram explain the working of a harmonic analyzer.
9. Describe the construction and working of dual beam CRO using block diagram.

## SECTION - C

**Note:** Attempt any TWO Parts of the following: (2×15=30)

10. Explain the construction and working of single-phase electro-dynamometer type power factor meter. prove that the deflection of moving system is equal to the phase angle of the system.
11. In an Anderson's bridge for measurement of inductance  $L_1$  and resistance  $R_1$  in the arm AB, arm CD and DA have resistances of  $600 \Omega$  each and the arm CE has a capacitor of  $1.0 \mu F$  capacitance. With an AC supply at 100 Hz supplied across A and C; balance is obtained with a resistance of  $400 \Omega$  in an arm DE and  $800 \Omega$  in an arm BC. Calculate the value of  $L_1$  and  $R_1$ .
12. Describe the Lloyd Fisher square for measurement of iron losses in a specimen of laminations. Also explain how corrections for resistance of wattmeter pressure coil resistance and resistance of secondary winding are applied.

