Total No. of printed pages = 3

EE 131403

Roll No. of candidate

2019

B.Tech. 4th Semester End-Term Examination

MEASUREMENTS AND INSTRUMENTATION

(New Regulation)

(w.e.f. 2017–2018)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No. 1 and any *four* from the rest.

1. Fill in the blanks : $(10 \times 1 = 10)$

    (i) The difference between the true or exact value and the measured value of the unknown quantity is known as ———— of the measurement.

    (ii) Kelvin double bridge is used to measure ————.

    (iii) Gravity control instrument has ———— scale.

    (iv) Burden of a CT is expressed in terms of ————.

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(v) Hay's Bridge uses a resistance in series with the —————.

(vi) Schering Bridge and D'Sauty's bridge is mainly used for measurement of —————.

(vii) ————— instruments measure ac only.

(viii) Transformation ratio of a potential transformer is defined as —————.

(ix) The time base signal in a CRO is —————.

(x) LVDT windings are wound on —————.

2. (a) What are the main characteristics of a measurement system?

(b) Explain the types of errors encountered in electrical measurements.

(c) Define the terms Dead zone and Dead time.

(d) A wattmeter reads 25.34 watts. The absolute error in the measurement is –0.11. Determine the true value of power. (3+6+4+2=15)

3. (a) The four arms of a bridge are connected as follows :

Arm AB : A resistance of 100 ohm in parallel with a capacitance of 0.5µF.

Arm BC : A 200 ohm non-inductive resistance

Arm CD : A 800 ohm non-inductive resistance

Arm DA : A resistance R in series with a 1µF capacitance.

Supply is given between terminals A and C and the detector is connected between nodes B and D. Determine the value of R and the frequency at which the bridge will balance. (7)

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(b) Derive the balance equations for an Anderson's Bridge. Draw its phasor diagram under balanced condition. (4+4=8)

4. (a) Draw and explain the equivalent circuit and corresponding phasor diagram of a current transformer.

(b) Derive the expressions for ratio error and phase angle error. (10+5=15)

5. (a) Explain the procedure of standardization of a D.C. potentiometer. How it can be used for calibration of ammeter and voltmeter? (5+6=11)

(b) Differentiate between A.C. and D.C potentiometer. (4)

6. (a) Describe the constructional details and working principle of a moving iron instrument.

(b) Explain the main sources of errors in electrodynamometer instruments. (10+5=15)

7. (a) Draw the block diagram of a CRO.

(b) Describe the working of D'Arsonval Galvanometer.

(c) What is an LVDT? What are its advantages? (5+5+5=15)