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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec. - 2019

Measurement and Instrumentation

Time: 3 hrs *Max. Marks: 100*

Note: i) PART - A is compulsory. **Two** marks for each question.
ii) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks
	I : PART - A	**10**
I a.	Mention any two errors caused by braking system of a single phase energy meter.	2
b.	Name any two sources and detectors used in AC bridges.	2
c.	With respect to C.T. define transformation ratio and turns ratio.	2
d.	Define transducers. Give any two advantages of the same.	2
e.	Mention any four basic types of sweeps used in oscilloscope.	2
	II : PART - B	**90**
	UNIT - I	**18**
1 a.	With a neat sketch, explain the working principle of a single phase energy meter. Also mention the adjustments that are carried out in a single phase energy meter.	9
b.	Mention any four special features incorporated in an electrodynamometer watt meter for the low power factor applications. Also explain the working of a electrodynamometer type watt meter with a neat diagram.	9
c.	Mention any two types of power factor meter. Explain the construction and working principle of a single phase dynamometer type power factor meter with a neat sketch.	9
	UNIT - II	**18**
2 a.	With the help of connection and phasor diagram of an Anderson's bridge, derive an expression for unknown values of an inductance and resistance of an inductor.	9
b.	A Wheatstone bridge each of the resistance of various arms are P = 1000 Ω, Q = 100 Ω, R = 2005 Ω and S = 200 Ω. The battery has an emf of 5 V and negligible internal resistance. The galvanometer has a current sensitivity of 10 mm/μA and an internal resistance of 100 Ω. Compute the deflection of galvanometer and the sensitivity of the bridge in terms of deflection per unit change in resistance.	9
c.	Mention the methods used for the measurement of low resistance. Discuss in details the measurement of unknown value of low resistance using Kelvin's double bridge with necessary connection diagram.	9

Contd…2

UNIT - III **18**

3 a. What are shunts and multipliers? Derive an expression for both with reference to the extension of the meters used in electrical circuits. Also name the resistive materials used for shunts and multipliers. 9

b. A current transformer has a bar primary and 200 secondary winding turns. The secondary winding burden is an ammeter of resistance 1.2 Ω and reactance of 0.5 Ω, the secondary winding has a resistance of 0.02 Ω and reactance of 0.3 Ω. The core requires the equivalent of an mmf of 100 A for magnetization and 50 A for a core losses. Compute; 9

i) The primary winding current and ratio error when the ammeter in the secondary winding circuit indicates 5 A.

ii) How many turns could be reduced in the secondary winding in order that the ratio error be zero for this condition?

c. Draw an equivalent circuit and phasor diagram of potential transformer. Also write an expression for transformation ratio and phase angle. 9

UNIT - IV **18**

4 a. Explain in briefly the Digital-Meter with a schematic diagram. Also mention the advantages of digital meters over the analog meter. 9

b. Explain the working of LVDT with a neat sketch. Also mention the advantages of the same. 9

c. Write briefly on: 9

i) Electronic energy meter

ii) True RMS responding voltmeter

UNIT - V **18**

5 a. Draw and label the different parts of a general purpose oscilloscope. Also state the functions of any five parts. 9

b. Draw the Lissajous pattern for the following: 9

i) With equal frequency voltages and zero phase shift

ii) With equal voltages of equal frequency and phase shift of 90°

iii) With two equal voltages of same frequency and phase shift of Φ

c. Explain the working of X-Y recorder with a neat sketch. And also name any two applications of the same. 9

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