SE328

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S.E. (Electrical & Electronics) (Sem-III) (Revised Course 2016-2017)
EXAMINATION MAY/JUNE 2019
Electrical Measurements and Measuring Instruments

[Duration : 3 Hours] **[Total Marks : 100]**

Instructions :
1. Answer the questions as per the format.
2. Assume suitable data if necessary.

PART- A

Q. 1 Answer **any two** questions from **Part – A**

a) Describe the construction and working of a vibration type galvanometer. **08**

b) Differentiate between spring control and Gravity control methods used to produce controlling torque. **08**

c) Define the following terms as applied to an instrument. **04**

i) Accuracy and Precision
ii) Gross error
iii) Systematic error
iv) Random error

Q. 2 a) A 50V range spring controlled, electrodynamics voltmeter having a square law scale response takes 0. 05A on DC, for full scale deflection of 90°. The control constant is $0.5 \times 10^{-}6\ N-m/$ degree and initial mutual inductance of the instrument is 0.25 H. Find the true potential difference across the instrument when it reads 50V at 50Hz. **06**

b) With the help of a neat phasor diagram explain the working of Anderson's Bridge. Derive an expression to measure unknown quantity. **08**

c) With the help of a neat diagram, explain in brief working of Crompton's potentiometer. **06**

Q. 3 a) What are the difficulties associated with measurement of low resistance? Describe how low resistance is measured accurately by Kelvin's Double Bridge. **08**

b) Describe the construction and working of a flux meter with the help of neat diagram. **07**

c) What is the use of potentiometer in the field of electrical measurement? **05**

PART- B

Answer **any two** questions from **Part – B**

Q. 4	a)	With the help of a neat sketch, explain the construction and working of electrodynamometer type wattmeter.	**08**
	b)	Explain the different methods used for testing of A.C Energy meters.	**06**
	c)	A current transformer rated as 1000/5A, 25 VA has a turns ratio of 1:200. The core loss and magnetizing components of the primary current are 5A and 8 A under rated conditions. Determine the ratio and phase angle errors for the rated burden and rated secondary current at 0.8 p.f lagging and 0.8 p.f leading. Neglect the resistance and leakage reactance of secondary winding.	**06**
Q. 5	a)	What is a transducer? What are its requirements? Mention the advantages of electrical transducers.	**07**
	b)	Explain in brief constructional features of vibration reed type frequency meter.	**07**
	c)	Write a short note on rotary voltage differential transformer.	**06**
Q. 6	a)	Draw the equivalent circuit diagram and phasor diagram of current transformer. Also state the expression for phase error and indicate clearly each term used in expression.	**08**
	b)	Discuss the procedure for the determination of flux density in a specimen and explain the types of magnetic tests performed.	**08**
	c)	Explain the applications of synchroscope.	**04**

PART-C

Answer **any one** questions from **Part – C**

Q. 7	a)	Describe the construction and working of PMMC type of instrument. Derive expression for torque.	**09**
	b)	Two wattmeters are used to measure power input to a synchronous motor. Each of them indicates 60KW. If the power factor to be changed to 0.866 leading, determine the reading of the two wattmeters , the total power remaining the same.	**06**
	c)	Discuss classification of measuring instruments.	**05**

Q. 8 a) Explain voltmeter- ammeter method for resistance measurement. **05**

b) Explain LVDT and define application in displacement measurement. **08**

c) An Owen's bridge is used to measure impedance of a coil at 1KHz. The bridge configuration is as follows. **07**
Arm AB : coil under test
Arm BC: standard resistance of 80Ω
Arm CD: Capacitance of $0.13\mu F$
Arm DA: Resistance of $814\ \Omega$ is series with capacitance of $0.122\ \mu F$
Calculate the values of the unknown parameters of the coil under test.
Also draw phasor diagram.