Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2019

EE3CO03 / EX3CO03 Electrical Measurement and Instrumentation

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Spiral springs are used in instruments to? **1**

(a) Provide damping toque
(b) Provide linear deflection
(c) Lead current to moving coil and provide controlling torque
(d) None of these

ii. Which one of the following materials is used in fabrication of swamping resistance in PMMC instrument? **1**

(a) Copper (b) Aluminium (c) Manganin (d) Tungsten

iii. Induction type single phase energy meters measure electric energy in? **1**

(a) KWh (b) KW (c) Ohms (d) None of these

iv. In a 3-phase power measurement by two wattmeter method, both the watt meters has identical readings. The power factor of the load is? **1**

(a) Unity (b) 0.707 lead (c) 0.707 lag (d) None of these

v. In a Wheatstone bridge method, the bridge is said to be balanced, when the current through the galvanometer is? **1**

(a) 1 A (b) 5 A (c) 0 A (d) 10 A

vi. To measure a very high resistance, which of following is suitable? **1**

(a) Kelvin double bridge (b) Megger
(c) Wheatstone bridge (d) All of these

vii. The Q meter works on the principle of? **1**

(a) Series resonance (b) Parallel resonance
(c) Both (a) and (b) (d) None of these

P.T.O.

viii. The A.C bridge used for the measurement of inductance? **1**
(a) Anderson bridge (b) Schering bridge
(c) De-Sauty bridge (d) All of these

ix. CRO stand for? **1**
(a) Cathode ray oscilloscope
(b) Capacitance resistance oscilloscope
(c) Current Resistance oscillator
(d) None of these

x. Which of the following materials can be used as photoconductive transducer? **1**
(a) Nickel (b) Cobalt (c) Selenium (d) Iron

Q.2 i. Differentiate between accuracy and precision. **2**
ii. Discuss construction and principle of operation of galvanometer. **3**
iii. Explain loading effects due to series & shunt connected instruments. **5**
OR iv. Describe the various types of errors in measurement system. **5**

Q.3 i. Describe the construction details of an electrodynamometer type wattmeter with diagram. **4**
ii. Sketch circuit diagram for power measurement in a 3-phase circuit star connected load using two wattmeter's and derive equation for power measurement with phasor diagram. **6**
OR iii. Discuss construction and theory of operation for single phase energy meter. **6**

Q.4 i. Discuss classification of resistance in brief. **3**
ii. Explain working of Kelvin's double bridge method for measurement of low resistance with circuit diagram and derive its mathematical equation. **7**
OR iii. What are the factors affecting earth resistance? Discuss following methods for measurement of earth resistance: **7**
(a) Fall of potential method (b) Earth tester

Q.5 i. Explain Wein-bridge for measurement of unknown frequency with necessary mathematical equations. **4**

ii. Explain Schering bridge for measurement of capacitance and derive expression for the unknown capacitance with necessary phasor diagram. **6**
OR iii. Explain Maxwell's inductance-capacitance bridge for measurement of unknown inductance by deriving necessary mathematical equations. Mention advantage and dis-advantage for the same. **6**

Q.6 Attempt any two:
i. Write short note on: **5**
(a) Piezo-electric transducer (b) Hall-effect transducer
ii. What is LVDT? Explain its working with necessary diagram and applications of LVDT. **5**
iii. Explain with neat diagram various parts and working of CRO. **5**

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Marking Scheme

EE3CO03 / EX3CO03 Electrical Measurement and Instrumentation

Q.1	i.	Spiral springs are used in instruments to? (c) Lead current to moving coil and provide controlling torque	**1**
	ii.	Which one of the following materials is used in fabrication of swamping resistance in PMMC instrument? (c) Manganin	**1**
	iii.	Induction type single phase energy meters measure electric energy in? (a) KWh	**1**
	iv.	In a 3-phase power measurement by two wattmeter method, both the watt meters has identical readings. The power factor of the load is? (a) Unity	**1**
	v.	In a Wheatstone bridge method, the bridge is said to be balanced, when the current through the galvanometer is? (c) 0 A	**1**
	vi.	To measure a very high resistance, which of following is suitable? (b) Megger	**1**
	vii.	The Q meter works on the principle of? (a) Series resonance	**1**
	viii.	The A.C bridge used for the measurement of inductance? (a) Anderson bridge	**1**
	ix.	CRO stand for? (a) Cathode ray oscilloscope	**1**
	x.	Which of the following materials can be used as photoconductive transducer? (c) Selenium	**1**

Q.2	i.	Differentiate between		**2**
		Accuracy	1 mark	
		Precision.	1 mark	
	ii.	Operation of galvanometer		**3**
		Construction	2 marks	
		Principle	1 mark	
	iii.	Loading effects due to		**5**
		Series instruments	2.5 marks	
		Shunt connected instruments.	2.5 marks	
OR	iv.	Types of errors in measurement system.		**5**
		Gross error	1 mark	
		Random error	2 marks	
		Systematic	2 marks	

Q.3	i.	Construction of an electrodynamometer type wattmeter with diagram.		**4**
	ii.	Circuit diagram	1 mark	**6**
		Phasor diagram	2 marks	
		Derivation	3 marks	
OR	iii.	Operation for single phase energy meter		**6**
		Construction	3 marks	
		Theory	3 marks	

Q.4	i.	Classification of resistance		**3**
	ii.	Kelvin's double bridge method for measurement of low resistance		**7**
		Working	2 marks	
		Circuit diagram	2 marks	
		Derivation	3 marks	
OR	iii.	Factors affecting earth resistance	2 marks	**7**
		(a) Fall of potential method	2.5 marks	
		(b) Earth tester	2.5 marks	

Q.5	i.	Wein-bridge explanation	2 marks	**4**
		Mathematical equations.	2 marks	
	ii.	Schering bridge for measurement of capacitance		**6**
		Phasor diagram	2 marks	
		Derivation for the unknown capacitance	3 marks	
		Schering bridge circuit diagram.	1 mark	
OR	iii.	Maxwell's inductance-capacitance bridge theory + diagram		**6**
			2 marks	
		Derivation	2 marks	
		Advantage and dis-advantage	2 marks	

Q.6		Attempt any two:		
	i.	Write short note on:		**5**
		(a) Piezo-electric transducer	2.5 marks	
		(b) Hall-effect transducer	2.5 marks	

ii.	LVDT working + diagram	3 marks	**5**
	Applications of LVDT	2 marks	
iii.	Various parts and working of CRO.		**5**
	Diagram	2 marks	
	Working + various parts	3 marks	

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