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

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EE3CO03 / EX3CO03

Electrical Measurement & 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. Moving Iron instruments can be used on **1**

(a) AC and DC both (b) AC only

(c) DC only (d) None of these

ii. ……. devices is/are used for extending the range of the instruments. **1**

(a) Multipliers (b) Current transformers

(c) Potential transformer (d) All of these

iii. In a Dynamometer type wattmeter, the fixed coil is split into **1**

(a) 4 (b) 3 (c) 2 (d) 1

iv. The induction type single - phase watt - hour meters uses **1**

(a) Control spring

(b) Pointer

(c) Brake magnet and spindle

(d) All of these

v. The resistances of potential transformer winding is minimized by **1**

(a) Thick conductors and small length of turns

(b) Thin conductors and small length of turns

(c) Thin conductors and large length of turns

(d) Thick conductors and large length of turns

vi. What is the significance of measuring low resistances? **1**

(a) Voltage drop across the circuit is high

(b) Contact and lead resistances are appreciable

(c) There is no power loss

(d) No current flows through the bridge circuit

P.T.O.

vii. The suitable bridge for measurements of high voltage capacitors, is **1**
(a) Wein bridge (b) Modified De Santy's bridge
(c) Schering bridge (d) None of these

viii. For the measurement of unknown inductance in terms of known capacitance, the suitable ac bridges are **1**
(a) Maxwell and Schering bridge
(b) Maxwell and Hay's bridge
(c) Maxwell and Wien's bridge
(d) Hay's and Wien's bridge

ix. LVDT works on the principal of **1**
(a) Linear inductance (b) Non – linear inductance
(c) Mutual inductance (d) Linear capacitance

x. Which of the following quantities cannot be measured by capacitive transducers? **1**
(a) Displacement (b) Speed
(c) Moisture (d) None of these

Q.2 i. Classify different types of analog instruments. **3**
ii. Discuss working, construction, advantages & disadvantages of PMMC instrument. **7**
OR iii. Explain D' Arsonval galvanometer in details. **7**

Q.3 i. What is phantom loading? How it is more advantageous than testing with direct loading? **3**
ii. Explain the different causes of errors in electrodynamometer type of wattmeter. How can they be rectified? **7**
OR iii. Discuss construction and theory of operation for single phase power factor meter. **7**

Q.4 i. Explain the different advantages of Instrument transformer. **3**
ii. How the resistances are classified as low, medium and high. Which method is suitable for measurement of high resistance? Explain. **7**
OR iii. Explain with circuit diagram the Lloyd Fischer square for measurement of iron loss in an iron specimen. **7**

Q.5 i. What is a Q meter? How does it work. **3**
ii. How Hay's bridge is used to overcome the problems of Maxwell bridge? Explain in detail. How it is used to measure Q of a coil? **7**
OR iii. Discuss Owen's bridge. How do we measure inductances in terms of capacitance? **7**

Q.6 Attempt any two:
i. Short note on strain gauge proving that its gauge factor is 1 + 2P. **5**
ii. Temperature measurement using Thermistor. **5**
iii. Short note on Opto- electronic transducers. **5**

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Marking Scheme

EE3CO03 / EX3CO03 Electrical Measurement & Instrumentation

Q.1 i. Moving Iron instruments can be used on **1**
(a) AC and DC both

ii. ……. devices is/are used for extending the range of the instruments. **1**
(d) All of these

iii. In a Dynamometer type wattmeter, the fixed coil is split into **1**
(c) 2

iv. The induction type single - phase watt - hour meters uses **1**
(c) Brake magnet and spindle

v. The resistances of potential transformer winding is minimized by **1**
(a) Thick conductors and small length of turns

vi. What is the significance of measuring low resistances? **1**
(b) Contact and lead resistances are appreciable

vii. The suitable bridge for measurements of high voltage capacitors, is **1**
(b) Modified De Santy's bridge

viii. For the measurement of unknown inductance in terms of known capacitance, the suitable ac bridges are **1**
(c) Maxwell and Wien's bridge

ix. LVDT works on the principal of **1**
(c) Mutual inductance

x. Which of the following quantities cannot be measured by capacitive transducers? **1**
(d) None of these

Q.2 i. Classify different types of analog instruments. **3**
1.5 marks for each (1.5 marks * 2)

ii. PMMC instrument. **7**
Working 2.5 marks
Construction 2.5 marks
Advantages & disadvantages 2 marks

OR iii. D' Arsonval galvanometer **7**
Diagram 2 marks
Details 5 marks

Q.3 i. Phantom loading 1 mark **3**
More advantageous than testing with direct loading 2 marks

ii. Causes of errors in electrodynamometer type of wattmeter **7**
4 marks
They rectified 3 marks

OR iii. Construction of operation 3 marks **7**
Theory of operation 4 marks

Q.4 i. Different advantages of Instrument transformer. **3**
1 mark for each (1 mark *3)

ii. Classified as low, medium and high 2 marks **7**
Name of method 1 mark
Working with diagram 4 marks

OR iii. Lloyd Fischer square for measurement of iron loss in an iron specimen **7**
Circuit diagram 2 marks
Explanation 5 marks

Q.5 i. Q meter 1 mark **3**
Working 2 marks

ii. Hay's bridge is used to overcome the problems of Maxwell bridge **7**
5 marks
It is used to measure Q of a coil 2 marks

OR iii. Owen's bridge 5 marks **7**
Measure inductances in terms of capacitance 2 marks

Q.6 Attempt any two:

i. Strain gauge proving that its gauge factor is 1 + 2P. **5**
Short Note 1 mark
Proof 4 marks

ii. Temperature measurement using Thermistor. **5**

iii. Opto- electronic transducers. **5**

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