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

**Enrollment No.....**

Faculty of Engineering

End Sem Examination May-2023

EE3CO33 / 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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. An ammeter of 0-25 A range has a guaranteed accuracy of 1% of full-scale reading. The current measured is 5 A. The limiting error is- **1**

(a) 2% (b) 2.5% (c) 4% (d) 5%

ii. A moving coil instrument has a resistance of 0.6 Ω and full-scale deflection at 0.1 A. To convert it into an ammeter of 0-15 A range, the resistance of shunt should be- **1**

(a) 0.6 Ω (b) 0.06 Ω (c) 0.1 Ω (d) 0.004 Ω

iii. In 3 phase power measurement by two wattmeter method, the reading of one wattmeter is zero. The power factor of load is- **1**

(a) 1 (b) 0.5 (c) 0 (d) 0.8

iv. Induction type single phase energy meter measures energy in- **1**

(a) kW (b) kWh (c) Wh (d) Var

v. What is the use of current transformer? **1**

(a) Stepping up AC current

(b) Stepping down AC current

(c) Protection and Measurement

(d) Both (b) and (c)

vi. Kelvin's double bridge is used to measure low resistance because- **1**

(a) It has high sensitivity

(b) There is no thermoelectric emf

(c) Resistance variation due to temperature

(d) Effect of contact and lead resistances eliminated.

P.T.O.

vii. Anderson bridge is used to measure- **1**
(a) L (b) R (c) V (d) I

viii. The frequency can be measured by- **1**
(a) Wein's bridge (b) De-Sauty's Bridge
(c) Schering's bridge (d) Anderson's bridge

ix. Strain gauge, LVDT and thermocouple are example of- **1**
(a) Active transducer (b) Passive transducer
(c) Analog transducer (d) Primary transducer.

x. Which of the following can be measured with Piezo electric crystal? **1**
(a) Force (b) Velocity (c) Sound (d) Pressure

Q.2 i. Explain the methods of measurement. **2**

ii. A meter reads 127.50 V and the true value of the voltage is 127.37 V. Determine the static error and the static correction for this instrument. **3**

iii. Explain the principle and construction of Galvanometer. **5**

OR iv. Explain the method by which the measuring range of voltmeter is extended. **5**

Q.3 i. Draw the circuit diagram of measurement of power by 3-wattmeter method. **2**

ii. Explain the two-wattmeter method for measuring 3-phase power. Derive the necessary equation of power and power factor. **8**

OR iii. Define energy. Draw and explain the well-labelled circuit diagram of measuring energy by single phase energy meter. **8**

Q.4 i. Explain the CT saturation characteristic. **3**

ii. Explain the working principle and construction of Megger. How the insulation resistance of 3-phase transformer is measured by Megger? **7**

OR iii. Explain the Wheatstone Bridge method for measurement of resistance with necessary vector diagram. **7**

Q.5 i. Define Q-factor. Draw the circuit diagram of De-Sauty's bridge. **4**

ii. Explain the Maxwell inductance capacitance bridge. **6**

OR iii. Explain the Anderson's bridge with necessary vector diagram. **6**



Q.6 Attempt any two:

i. What is the function of transducer? Explain the transducer used for measurement of temperature. **5**

ii. Explain hall effect. Explain the photo voltaic transducer. **5**

iii. Explain the working principle and construction of LVDT. **5**

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# SCHEME

End Sem Examination May-23

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Electrical Measurement & Instrumentation

Programm :- B.tech. Branch :- EE/EX

Q.1

(i) (d) 5 %

(ii) (d) 0.004 Ω

(iii) (b) 0.5

(iv) (b) kWh

(v) (d) ~~Protection & Measurement~~ Both (b) and (c) Rep

(vi) (d) Effect of contact and lead resistance eliminated

(vii) (a) L

(viii) (a) Wein's bridge

(ix) (c) Analog Transducer

(x) (d) ~~force~~. Pressure.

Q.2

(i) Atleast 2 Method in short each 1 marks 2.

(ii) Static error ~~+/-~~ 2 Marks
Static correction 1 Marks 3

(iii) Principle - 2 Marks
construction 3 Marks 5

Q.3

(i) Clear Ckt diagram 2 marks 2

(ii) Ckt diagram - 2 marks

Q.3 (iii) Define - 1 marks
Diagram - 4 marks
Explanation - 3 marks — 8

Q.4 (i) Characteristics 1.5 marks
Explanation 1.5 marks — 3

(ii) Construction 3 marks
Principle 2 mark
How explanation 1 mark — 7

(iii) Ckt diagram - 3 marks
Vector diagram - 1 mark
Explanation with - 2 marks
derivation — 7

Q.5 (i) define - 2 marks
Descuty bridge :- 2 mark — 4

(ii) Ckt diagram - 3 marks
Explanation with - 3 marks
Derivation — 6

(iii) Ckt diagram - 2 marks
Vector dig - 2 marks
Explanation with - 2 marks
Derivation — 6

Q.6 (i) function of transducer - 2 marks
Explanation - 3 marks — 5

(ii) Hall effect explanation - 2.5 marks
Photo voltaic transducer - 2.5 marks — 5

(iii) Construction - 2.5 marks

Principle - 2.5 Marks