Reg. No. :

Question Paper Code: 31064

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2015.

Third Semester

Instrumentation and Control Engineering

01UIC304 – MEASUREMENTS AND INSTRUMENTATION

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Why are Galvanometers intentionally under damped?

2. Define sensitivity in voltmeters.

3. Why is an electrodynamometer a transfer instrument?

4. How can we prevent creeping in energy meter?

5. List the applications of DC potentiometer.

6. Define the Nominal ratio for current transformer.

7. Classify the resistances based on various range of measurements.

8. List the factors that influence the value of earth resistance.

9. Define Q factor of coil.

10. Name the bridge used for the measurement of unknown mutual inductance.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Describe the construction and working of a D'Arsonval galvanometer. (10)

(ii) Explain the difference in constructional details of a ballistic galvanometer and D'Arsonval galvanometer. (6)

Or

(b) The coil of a 150V moving iron voltmeter has a resistance of 400Ω and an inductance of 0.75H. The coil is made of copper which has a resistance temperature coefficient of 0.004/^oC. The current consumed by the instrument when placed on a 150V DC supply is 0.05A. The series resistance of the voltmeter is of manganin with a resistance temperature coefficient 0.00015/^oC. Calculate (16)

(i) The temperature coefficient of the instrument.

(ii) The alteration of the reading between direct current and alternating current at 100Hz.

(iii) The capacitance of the capacitor necessary to eliminate the frequency error.

12. (a) (i) Explain in detail about working principle of a dynamometer wattmeter with a neat diagram. (10)

(ii) Discuss the errors in electrodynamometer type wattmeter. (6)

Or

(b) (i) Describe the construction and theory of operation of a single phase induction type energy meter. (10)

(ii) Two watt meters are connected to measure the input to a balanced 3 phase circuit indicate 2000W and 500W respectively. Calculate the power factor of the circuit when both the readings are positive. (6)

13. (a) (i) Explain the constructional details and operating principle of current transformer and draw its characteristics. (10)

(ii) Mention the various types of errors in current transformer and also explain how to reduce the errors. (6)

Or

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(b) (i) List the different types of AC potentiometers. (2)

(ii) With a neat sketch explain in detail about drysdale polar potentiometer. (14)

14. (a) (i) Draw the circuit diagram of a wheatstone bridge and drive an expression for achieving balance condition of bridge circuit. (10)

(ii) Design a series type ohmmeter. The movement to be used requires $0.5mA$ for full scale deflection and has an internal resistance of 50Ω. The internal battery has a voltage of $3V$. The desire value of half scale resistance is 3000Ω. Calculate the values of series and parallel resistances R_1 and R_2. (6)

Or

(b) (i) Explain the construction and working principle of Megger. (8)

(ii) Explain in detail about fall of potential method for measurement of earth resistance. (8)

15. (a) (i) Derive an expression to determine unknown inductance in Anderson's Bridge and also draw its vector diagram. (12)

(ii) What are the advantages and disadvantages of Schering Bridge. (4)

Or

(b) What are the different sources of errors in AC bridges? Explain the precautions to be taken to eliminate errors. (16)

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