4E1320

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4E1320

B. Tech. IV - Sem. (Main / Back) Exam., - 2025

Electrical & Electronics Engineering

4EX3-04 Electronic Measurement & Instrumentation

EE, EX

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

[10×2=20]

PART – A

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Explain the loading effect in measuring instruments.

Q.2 What is the essential difference between moving coil and moving iron instruments?

Q.3 List two sources of error in bridge measurements and explain precautions.

Q.4 Define ratio error in instrument transformers.

Q.5 Describe the role of a volt ratio box in potentiometer measurements.

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Q.6 How is earth resistance typically measured?

Q.7 State one advantage of using Hay's bridge for inductance measurement.

Q.8 Define phase angle error in potential transformers.

Q.9 State Blondel's Theorem for an n-phase, p-wire system.

Q.10 What is the main application of an AC potentiometer? [5×4=2

PART – B

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Explain the errors encountered in wattmeters and their compensation methods.

Q.2 Derive the expression for torque equation for a moving iron instrument and comment upon the nature of scale.

Q.3 Illustrate the construction and operation of a current transformer (CT).

Q.4 Compare the ammeter-voltmeter method and the Wheatstone bridge method for measuring medium resistances.

Q.5 Discuss the applications of De-Sauty's Bridge in capacitance measurement.

Q.6 Explain the standardization process of a Crompton potentiometer.

Q.7 Explain the procedure for calibrating a single-phase energy meter using phantom loading.

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PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Show that the Wien's bridge will be balanced at frequency given by .

$$f = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}}.$$

Q.2 (a) The meter constant of a 230 V, 10 A watt-hour meter is 1800 revolutions per kWh. The meter is tested at half load and rated voltage and unity power factor. The meter is found to make 80 revolutions in 138 s. Determine the meter error at half load.

(b) The inductance of a 25A electrodynamic ammeter changes uniformly at the rate of 0.0035 μH/degree. The spring constant is 10^{-6} Nm/degree. Determine the angular deflection at full scale.

Q.3 Describe the various methods for measuring low resistances. Compare their advantages and disadvantages.

Q.4 Derive the expression for the ratio and phase angle errors in current transformers. Suggest methods to minimize these errors.

Q.5 Describe the construction and working principle of a three-phase induction type energy meter. Discuss its advantages over single-phase energy meters.

[1560]

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