

Code No: 135AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May/June - 2019

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(Electrical and Electronics Engineering)

Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) What is damping torque ? What is its role in measuring instruments? [2]
- b) Write various methods for extension of range in measuring instruments. [3]
- c) Write the significance of standardization in potentiometers. [2]
- d) Write the applications of PTs and CTs. [3]
- e) What are various errors observed in energy meters? [2]
- f) Explain the working and applications of tri-vector meter. [3]
- g) Name two bridges for measurement of low resistance and high resistance. [2]
- h) Explain working of Hay's bridge and write its applications. [3]
- i) What is the function of photo diodes? [2]
- j) Explain the working of an LVDT and its applications. [3]

PART - B**(50 Marks)**

- 2.a) Explain the principle, construction and working of moving iron type meters with neat sketch and derive the expressions for its deflecting torque and controlling torque.
- b) Explain various errors and their compensation used in ammeters and voltmeters. [5+5]

OR

- 3.a) Explain any one method with neat diagram for the extension of range of ES volt meters.
- b) Describe the working of electrometer type electrostatic volt meter. [5+5]

- 4.a) Explain with a neat sketch the principle and working of coordinate type AC potentiometer.
- b) Explain the construction and working of a current transformer with neat sketch and derive the expressions for its ratio and phase angle errors. [5+5]

OR

5. Explain the working of a D.C. Potentiometer and illustrate the measurement of resistance, current and voltage with neat diagrams using DC Crompton's potentiometer. [10]

6.a) Explain the measurement of active and reactive powers in balanced and unbalanced systems.

b) Draw the neat diagram of a single phase energy meter and explain its working and also discuss the methods for its range extension. [5+5]

OR

7.a) Explain the principle and working of three phase induction type energy meter with a neat sketch and derive the expressions for braking and driving torques.

b) Illustrate the operation of maximum demand meters. [5+5]

8.a) With a suitable bridge determine the self inductance of a coil in terms of standard fixed capacitance.

b) A Schering's bridge has the following constants: Capacitor of $0.5\mu\text{F}$ in parallel with $1\text{k}\Omega$ resistance in arm AB, resistance of $2\text{k}\Omega$ in arm AD, capacitor of $0.5\mu\text{F}$ in arm BC and unknown capacitor C_x and R_x in series. Assume frequency 1 kHz . Determine the unknown capacitance and dissipation factor. [5+5]

OR

9.a) Discuss the principle and working of Cary Foster's bridge for measurement of low resistance with a sketch and mention the necessary conditions for balancing the bridge.

b) Explain the working of Desauty's bridge for measurement of unknown capacitance and loss angle with a neat diagram and derive the expressions. [5+5]

10.a) Describe principle and working of Bourdon tube, Bellows gauges for measurement of Pressure with neat sketches.

b) Describe the methods for measurement of acceleration using piezoelectric transducers with neat sketch. [5+5]

OR

11.a) Explain the principle, and working of differential capacitive transducer for displacement measurement and derive the expression for its output voltage.

b) A resistance strain gauge with gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 1×10^{-6} . If the original resistance value of the gauge is $130\ \Omega$, calculate the change in resistance. [5+5]

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