

R18

Code No: 155CB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, July/August - 2023

MEASUREMENTS AND INSTRUMENTATION

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) Compare gravity control and spring control mechanisms. [2]
- b) What is the basic principle of Moving Coil instruments and mention its main advantage. [3]
- c) Outline the applications of Crompton's Potentiometers. [2]
- d) What is the need of Potential Transformers? [3]
- e) How can you extend range of wattmeters? [2]
- f) Explain the basic principle of working of LPF wattmeter. [3]
- g) Demonstrate various AC bridges? [2]
- h) How can you measure high resistance using loss of charge method? [3]
- i) Define Gauge sensitivity? [2]
- j) Explain briefly about clamp on meters. [3]

PART – B

(50 Marks)

- 2.a) The pointer of a moving coil instrument gives full scale deflection of 20mA. The potential difference across the meter when carrying 20mA is 400mV. Determine: i) the shunt resistance required to design 0-200A range ammeter.
ii) the series resistance required to design 0-1000V range voltmeter.
- b) Explain the principle of working of Quadrant electrometer type Electrostatic voltmeter and list its applications. [4+6]

OR

- 3.a) Explain the working principle of repulsion type MI instrument.
- b) How can you extend the range of Electro static Voltmeters? Elaborate. [5+5]
- 4.a) Explain the principle and working of polar type AC potentiometer with a neat sketch.
- b) Compare Current and Potential Transformers. [6+4]

OR

- 5.a) Explain the applications of AC potentiometers.
- b) Categorize the errors occurred in instrument transformers. [5+5]

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- 6.a) Prove that for electro-dynamometer type wattmeter
True power = $\{\cos \Phi / [\cos \Phi \cos (\Phi - \beta)]\}$ x actual wattmeter reading
Where $\cos \Phi$ = power factor of the circuit

$\beta = \tan^{-1} (\omega L/R)$ where L and R are the inductance and resistance of the pressure coil of the circuit.

- b) Explain the construction and operation of Merz price maximum demand meters. [5+5]

OR

- 7.a) How could you measure three phase energy using Tri-vector meter?
b) Explain the construction and working of three element dynamometer wattmeter. [5+5]

- 8.a) How can you measure resistance using Wheatstone's bridge? Elaborate.
b) Construct the Hays bridge circuit and develop relation for unknown Inductance. [5+5]

OR

- 9.a) How can you measure frequency using Wein's bridge? Discuss with the help of diagram.
b) Construct the circuit of De Sauty bridge and develop relation for unknown capacitance. [5+5]

- 10.a) Explain the principle of LVDT. And conclude its advantages and applications.
b) How can you measure temperature using any one passive transducer? [5+5]

OR

- 11.a) Explain the principle of capacitive transducers.
b) Discuss principle of operation of Photo voltaic cell and Photo conductive cells. [5+5]

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