



**P.E.S. College of Engineering, Mandya - 571 401**  
(An Autonomous Institution affiliated to VTU, Belagavi)  
**Third Semester, B.E. - Electrical and Electronics Engineering**  
**Semester End Examination; March - 2021**  
**Measurement and Instrumentation**

Time: 3 hrs

Max. Marks: 100

**Course Outcomes**

The Students will be able to:

CO1: Understand various units and dimensions associated with Electrical Quantities.

CO2: Apply fundamental knowledge of instruments/bridges characteristics for solving engineering problems.

CO3: Understand different types of standards; methods of calibration used in measurements and statistical and regression analysis.

CO4: Understand the principle of operation and working of different electronic instruments.

CO5: Apply the knowledge of different oscilloscopes like CRO, DSO for various applications.

**Note: I) PART - A** is compulsory. **Two** marks for each question.**II) PART - B:** Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs COs POs
<b>I : PART - A</b>		<b>10</b>	
I a.	List the sources of errors in energy meters.	2	
b.	What range of resistance can be measured by Kelvin's double bridge to determine the unknown?	2	
c.	Why the secondary of CT should not be the open circuited?	2	
d.	Mention the two major advantages of digital multimeter.	2	
e.	Write the principle of LED display.	2	
<b>II : PART - B</b>		<b>90</b>	
<b>UNIT - I</b>		<b>18</b>	
1 a.	Write a note on classification of Ammeters and Voltmeters. Derive an expression for deflecting torque ( $T_d$ ) of permanent magnet moving coil instrument.	9	
b.	What are the different adjustments in energy meter? Explain experimental procedure for the adjustment.	9	
c.	Mention the errors in Dynameters type wattmeter. The voltage coil of a dynamometer wattmeter has on inductive reactance which is 0.5% of its resistance at normal frequency. Find the correction factor when the load pf is;	9	
	i) 0.8 lagging		
	ii) 0.5 lagging		

Contd... 2

**UNIT - II****18**

- 2 a. What are the limitations of Wheatstone bridge? The four arms of the Wheatstone bridge have the following resistance:

$AB = 1000 \Omega$ ,  $BC = 1000 \Omega$ ,  $CD = 120 \Omega$ ,  $DA = 120 \Omega$ . The bridge is used for strain measurement and supplied from 5 V ideal battery. The galvanometer has a sensitivity of 1 mm/ $\mu$ A with internal resistance of 200  $\Omega$ . Determine the deflection of the galvanometer, if arm  $DA$  increases to 121  $\Omega$  and arm  $CD$  decreases to 119  $\Omega$ . 9

- b. How shering bridge is used for the measurement of unknown capacitor? Derives its balance equation. 9
- c. Write a short note on source and detectors for AC bridges. 9

**UNIT - III****18**

- 3 a. Describe the general requirements of shunts and multipliers. Derive the expression to calculate shunt resistance and multiplier resistance. 9
- b. A 100/5 current transformer of its rates load of 25 VA has an iron loss of 0.2 W and a magnetising current of 1.5 A. Calculate its ratio error phase angle when supplying rated output to a meter having a ratio of resistance to reactance of 5. 9
- c. Explain the contraction of current transfer and potential transformer. 9

**UNIT - IV****18**

- 4 a. Explain the working of Digital multimeter with relevant diagrams. 9
- b. What is an LVDT? Where it is used? Explain its operating principle. 9
- c. What are different most important strain gauges? Explain them briefly. 9

**UNIT - V****18**

- 5 a. Explain the front panel details of a typical dual trace oscilloscope. 9
- b. With a neat diagram, explain the working of digital storage oscilloscope. 9
- c. Write short notes on the following:
- i) X-Y recorders 9
- ii) Use of Lissajous patterns

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