

**B.E.E. 2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER SUPPLEMENTARY EXAMINATION, 2023****SUBJECT: - ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS**

Time: Three hours

Full Marks 100  
(50 marks for each part)

Use a separate Answer-Script for each part

<b>PART-I</b>		<b>Marks</b>
Answer any 3, 2 marks for well-organized answers (16 X 3 + 2 = 50)		
<b>1. Justify and/or correct the following statements (any four):</b>		<b>(4×4=16)</b>
a) In High voltage Schering bridge the source and the detector can be interchanged to obtain high sensitivity in balancing the bridge.		
b) It is impossible to distinguish between series and shunt type ohmmeters viewing from outside.		
c) Due to piezoelectric property, semiconductor strain gauges are better than metal resistance gauges.		
d) It is better to have both <i>Gauge Factor</i> and <i>Transverse sensitivity</i> of a strain gauge as high as possible.		
e) Low resistances have four terminals.		
2. a) Is it possible to obtain the B-H loop of a specimen of magnetic material using a ballistic galvanometer in the measuring circuit? Explain with necessary diagrams and calculations.		10
b) In magnetic loss test of a specimen of magnetic material of total weight 10 kg, the measured values of iron loss at a given peak flux density were 36 watt at 40 Hz and 78 watt at 60 Hz. Estimate hysteresis and eddy current losses in Watt/kg at 50 Hz for the same peak flux.		6
3. a) Calculate the bridge sensitivity for Wheatstone bridge based strain measurement using two active resistance strain gauges.		8
b) A series type ohmmeter has a moving coil system with full-scale current of 10 mA and resistance of 100 Ω. The current limiting series resistance is 1 kΩ. Find the minimum and maximum value of shunt resistance for proper zero adjustment when the battery varies between 31 V and 21 V.		8
4. a) Describe the method for measuring self inductance of a coil using Anderson's bridge.		8
b) The arms of a Maxwell's inductance-capacitance bridge in the balanced condition are as follows: AB is a non-reactive resistor of 1500 Ω in parallel with a condenser of 0.1 μF; BC is a non-reactive resistor of 600 Ω; CD is an unknown inductive resistor and DA is a non-reactive resistor of 400 ohms. Find the magnitudes of inductance (L) and resistance of the inductive resistor. Derive the relations used for calculations.		8

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Ref No: Ex/EE/PC/B/T/214/2023(S)

**B.E.E. 2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER SUPPLEMENTARY EXAMINATION, 2023**

**SUBJECT: - ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS**

**Time: Three hours**

**Full Marks 100  
(50 marks for each part)**

**Use a separate Answer-Script for each part**

5. **Write short notes on *any two*** 2×8=16
- a) Cold junction compensation for thermocouple circuits
  - b) Megger insulation tester
  - c) Price's Guard wire method for measurement of insulation resistance
  - d) Separation of iron loss using Lloyd Fisher Square

**B.E. ELECTRICAL ENGINEERING 2<sup>ND</sup> YR 1<sup>ST</sup> SEMESTER SUPPLEMENTARY**  
**EXAMINATION, 2023**

**SUBJECT: - ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT**

Full Marks 100

Time: Three hours

(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	<p>Answer Question-1 and any TWO from the rest:</p> <p>1. Justify with reasons <b>any four</b> of the following:</p> <p>a) PMMC-Rectifier instruments can measure rms value for an applied waveform of any shape.</p> <p>b) The moving coil of the electrodynamic type instrument serves as the current coil.</p> <p>c) The damping of D'Arsonval galvanometer is extremely small.</p> <p>d) Mutual inductance in a moving iron instrument varies with time.</p> <p>e) The secondary of C.T. should never be opened when its primary remains energized.</p> <p>f) Universal shunt is used to control damping.</p> <p>2. a) Show that the electromagnetic damping of an indicating instrument is inversely proportional to its coil circuit resistance.</p> <p>b) Define current multiplying factor and voltage multiplying factor for an ammeter and a voltmeter.</p> <p>3. a) Show that the first swing of oscillation for a Ballistic galvanometer is the measure of short time charge already passed through its coil.</p> <p>b) What do you mean by logarithmic decrement?</p>	<p>4x5=20</p> <p>10</p> <p>5</p> <p>10</p> <p>5</p>

4.	Write short notes on <b>any two</b> of the following:  a) Errors in wattmeter  OR  Temperature compensation of instruments  b) Measuring scales of indicating instruments  OR  Ratio error and phase error of current transformer	8+7 =15
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