

**B.E. ELECTRICAL ENGINEERING SECOND YEAR FIRST SEMESTER**  
**SUPPLEMENTARY EXAM 2024**

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

**Time: Three hours**

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

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

No. of Questions	PART-I	Marks
<b>Answer any two (25X2=50)</b>		
1.	<b>Justify and correct (if required) the following statements (any five):</b>	(5X5=25)
a)	"Phantom Loading" saves power loss by wattmeter during calibration of the wattmeter by dc potentiometer.	
b)	Interbridge transformers are used only for electrical isolation in AC bridges.	
c)	Scale of the Megger is cramped towards the higher values of resistance.	
d)	High Voltage Schering bridge requires some safety measures for operating personnel.	
e)	A thick metal link in Kelvin's Double bridge reduces measurement error.	
f)	Low resistances are made with four terminals.	
2. a)	Define <i>gauge factor</i> and <i>transverse sensitivity</i> of a strain gauge.	2
b)	What are the properties of good strain gauge material? Comment on relative merits and demerits of semiconductor strain gauges over metal strain gauges.	2+2
c)	Derive the expression of measurement sensitivity for a Wheatstone bridge method based strain measurement with one active and one dummy gauges.	10
d)	What is the use of <i>dummy gauges</i> ?	4
e)	Explain <i>Ratio Bridge</i> and <i>Product bridge</i> topologies for Alternating Current bridges.	5
3. a)	How can you separate iron loss components of a specimen of magnetic material using Lloyd Fisher Square?	8
b)	In magnetic loss test of a specimen 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.	5
c)	How is the loss factor and capacitance of a capacitor measured by Schering bridge?	7

[ Turn over

Ref No: Ex/EE/PC/B/T/214/2024(S)

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d)	The arms of a Maxwell's inductance-capacitance bridge in the balanced condition are as follows: AB is a non-reactive resistor of 1500 ohms in parallel with a condenser of 0.1 $\mu$ F; BC is a non-reactive resistor of 600 ohms; CD is an unknown inductive resistor and DA is a non-reactive resistor of 400 ohms. Find the magnitudes of the self-inductance (L) and resistance (R) of the inductive resistor.	5
4.	<b>Write notes on <i>any two</i></b>	$2 \times 12 \frac{1}{2} = 25$
a)	Cold junction compensation for thermocouple circuits	
b)	Standardization of laboratory type DC potentiometer	
c)	Price's Guard wire method for measurement of insulation resistance	
d)	Operation of <i>Megger</i> insulation tester	
e)	Determination of B-H loop of a specimen of magnetic material using a ballistic galvanometer in the measuring circuit	

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

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

Time: **Three hours**

Full Marks 100  
(50 marks for each part)

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

No. of Questions	PART- II	Marks
	<p><i>Answer any THREE..</i>  <i>Two marks reserved for neat and well organized answers.</i></p>	
1.	(a) Derive an expression of the response of a PMMC instrument when it is excited by a unit step current. The instrument is under damped. Introduce all the symbols used in the expression.	8
	(b) What is the purpose of using universal shunt? Explain its working principle with necessary diagram.	8
2.	(a) Show that the error in reading of an electrodynamicometer type wattmeter is due to the coil nearest to the load connected.	8
	(b) Describe the operating principle of electrodynamicometer type instruments. How do you use it as wattmeter?	8
3.	Write short notes on any TWO: (a) Ballistic Galvanometer (b) Current Transformer (c) Moving iron instruments	8 + 8
4.	(a) How do you compensate an ammeter and a voltmeter against temperature variation?	8
	(b) Can the PMMC be used in AC application? Comment with justification.	8
5.	(a) Obtain an expression of logarithmic damping.	8
	(b) How do you modify a normal PMMC meter to develop a D'Arsonval galvanometer?	8