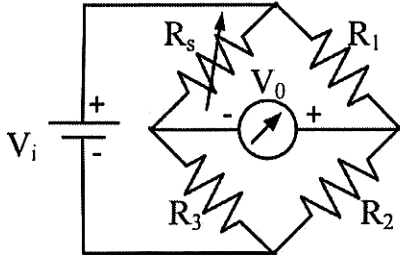


B.E.T.C.E 2ND YEAR 2ND SEMESTER EXAMINATION, 2019**SUBJECT: - ELECTRICAL MEASUREMENTS**

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
Answer any two (2X25=50)		
1.	Justify and correct (if required) the following statements :	(5X5=25)
a)	“Phantom Loading” saves power loss in wattmeter during calibration of the wattmeter by dc potentiometer.	
b)	Interbridge transformers are used for electrical isolation only in AC bridges.	
c)	Wien bridge measures frequency of an AC supply.	
d)	Low resistances are made with four terminals.	
e)	Series type and Shunt type ohmmeters can be distinguished from their scales.	
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.	3+3
c)	Derive the expression for measurement sensitivity of a Wheatstone bridge method based strain measurement with two active gauges.	9
d)	A strain gauge forms one arm of the bridge shown in the figure below and has a nominal resistance without any load as $R_s = 300 \Omega$. Other bridge resistances are $R_1 = R_2 = R_3 = 300 \Omega$. The maximum permissible current through the strain gauge is 10 mA. During certain measurement when the bridge is excited by maximum permissible voltage and the strain gauge resistance increases by 1% over the nominal value, find the output voltage V_0 . Derive the relevant expression.	8
		
3. a)	How do you standardize a laboratory type DC Potentiometer?	5
b)	A Crompton potentiometer has 16 step coarse dial where each step represents 0.1 V and each step resistance is 10 ohm. The fine dial is total 15 ohm with 150 divisions. Find the working current, minimum and maximum voltage that can be measured using the potentiometer.	5
c)	How can you convert this potentiometer into a dual range potentiometer with provision for two scales namely, X1 and X0.1	6

[Turn over

Ref No: Ex/ET/EE/T/225/2019**B.E.T.C.E 2ND YEAR 2ND SEMESTER EXAMINATION, 2019****SUBJECT: - ELECTRICAL MEASUREMENTS****Time: Three hours****Full Marks 100
(50 marks for each part)****Use a separate Answer-Script for each part**

d)	Explain the use of Kelvin-Varley slide.	9
4.	Write notes on <i>any two</i>	$2 \times 12 \frac{1}{2} = 25$
a)	Ratio Bridge and Product bridge topologies for Alternating Current Bridges	
b)	Kelvin's Double bridge method for measurement of low resistance	
c)	Measurement of capacitance using Schering Bridge	

B.E. ELECTRONICS AND TELECOMMUNICATION ENGINEERING 2ND YEAR 2ND
SEMESTER EXAMINATION, 2019

SUBJECT: - ELECTRICAL MEASUREMENTS

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 align="center"><i>Answer any Five.</i></p>	
1.	<p>State whether the following statements are true or false and justify your comments. (Any TWO only).</p> <p>(a) "Generally the moving iron instruments need no shunt."</p> <p>(b) "Electrodynamometer type wattmeter can measure power contributed by fundamental components of voltage and current only."</p> <p>(c) "Ballistic galvanometer can be used to measure charge flowing steadily through its coil."</p>	2x5=10
2.	<p>(a) A moving iron voltmeter of resistance 10kΩ and inductance 20mH is used to measure 300V full scale at 50Hz. How do you use the voltmeter to measure a voltage of full scale value of 450V? What will be the error in reading a dc voltage of 450V?</p> <p>(b) "The scale of a moving iron instrument is mostly linear with its lower region cramped." – State clearly whether the statement is true or false and give reasons in favour of your argument.</p>	5 5
3.	<p>An electro-dynamometer type ammeter, a moving iron ammeter, a PMMC ammeter and a PMMC-rectifier (full wave) ammeter are connected in series. The entire combination is used to measure a current whose waveform is given by</p> <div style="text-align: center;"> </div> <p>What will be the readings of the ammeters?</p>	10

4.	<p>An ammeter of internal impedance $(0.3+j0.8) \Omega$ is connected to the secondary of a 2000/5A current transformer (CT). The CT with secondary impedance of $(0.4+j0.7)\Omega$ has 2-turn primary and 396 turns in its secondary, with 40AT and 80AT as its loss component and magnetizing component of ampere turns, respectively. Determine the ratio error and phase error of the CT.</p> <p>Draw the corresponding phasor diagram.</p>	10
5.	<p>Write short note on any <i>One</i>:</p> <p>a) Temperature compensation of PMMC instruments</p> <p>b) Extension of range for voltmeters and ammeters.</p>	10
6.	<p>Derive an expression of actual current transformation ratio of a current transformer. Explain with neat drawing of phasor diagram.</p>	10
7.	<p>Show that the electromagnetic damping of a PMMC instrument is inversely proportional to its coil circuit resistance. Hence define CDRX.</p>	10