

**B.E.T.C.E 2<sup>ND</sup> YEAR 2ND SEMESTER EXAMINATION, 2018****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
<b>Answer all questions; 2 marks for well organized answers</b>		
1.	Derive the expression for measurement sensitivity of a Wheatstone bridge method based strain measurement with one active and one dummy gauges. Draw necessary circuit diagram to show the placement of the gauges.	12
OR	OR	
1.	Derive the expression for measurement sensitivity of a Wheatstone bridge method based strain measurement with four active gauges. How can you achieve the zero/offset adjustment in this case?	12
2. a)	How do you standardize a laboratory type DC Potentiometer?	6
b)	A Crompton potentiometer has 16 step coarse dial where each step represents 0.1 V and each step resistance is 10 ohms. The fine dial is total 10 ohms with 150 divisions. Find the working current, minimum and maximum voltages that can be measured using the potentiometer.	6
OR	OR	
2. a)	How can you convert Crompton potentiometer into a dual range potentiometer with provision for two scales namely, X1 and X0.1?	6
b)	Explain how "Phantom Loading" saves power loss during calibration of wattmeter by dc potentiometer.	6
3. a)	"Series type and Shunt type ohmmeters can be distinguished from their scales"- Explain.	6
b)	Derive the condition for maximum sensitivity of Wheatstone bridge based resistance measurement.	6
OR		
3. a)	What are the importances of Interbridge transformers in AC bridges?	5
b)	Explain the measurement of loss angle of a capacitor using Schering bridge.	7
4.	Write Short notes on <i>any two</i>	6+6
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 frequency using Wien Bridge	

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**B.E. ELECTRONICS AND TELECOMMUNICATION ENGINEERING 2<sup>ND</sup> YEAR 2<sup>ND</sup>**  
**SEMESTER EXAMINATION, 2018**

**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 in favour of your comments. (Any TWO only).</p> <p>(a) "The pole-face of the permanent magnet of a PMMC instrument is made flat."</p> <p>(b) "Secondary of a current transformer should never be open-circuited."</p> <p>(c) "The purpose of using spring is to offer control torque only."</p>	2x5=10
2.	<p>A moving iron voltmeter of resistance <math>5k\Omega</math> and inductance <math>10mH</math> is used to measure <math>150V</math> full scale at <math>50Hz</math>. A resistance <math>R</math> is added in series with its coil to use the meter in measurement of <math>600V</math> full scale at <math>60Hz</math>.</p> <p>(a) Determine the value of resistance <math>R</math>.</p> <p>(b) Find the error in the reading of the instrument when it is used to measure <math>600V</math> dc with the external resistance <math>R</math> connected.</p>	10
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 reading of the ammeters?</p>	10

4.	<p>An ammeter of internal impedance <math>(0.1+j0.4) \Omega</math> is connected to the secondary of a 1000/5A current transformer (CT). The CT with secondary impedance of <math>(0.2+j0.5)\Omega</math> has 2-turn primary and 398 turns in its secondary, with 10AT and 14AT 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 notes on any <i>One</i>:</p> <p>a) Torques in indicating instruments</p> <p>b) Measurement of frequency by vibration galvanometer</p>	10
6.	<p>Derive an expression of deflecting torque of a moving iron instrument. Hence, show that reading of this instrument is not affected by change in waveform of input current.</p>	10
7.	<p>“When the range of a moving coil instrument is altered by varying its shunt resistance, the damping of the instrument changes.” – State clearly whether the statement is true or false and justify in favour of or against the statement.</p>	10