B.E.E. 2ND YEAR 2ND SEMESTER SUPPLE EXAMINATION, 2017

SUBJECT: - ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Time: Three hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

		PART-I	Marks
		Answer any **FIVE** questions.	10×5
1.		Prove that in Wheatstone Bridge based resistance measurement, the bridge sensitivity becomes maximum when the bridge arms carry equal resistances. Explain the purpose of 2nd ratio arm in Kelvin Double Bridge for measurement of low resistance.	10
2.		A series type ohmmeter has a moving system with 60 Ω internal resistance (R_m). If the full-scale deflection current is 1.2 mA, internal supply battery voltage is 3 V and the desired scale marking for half-scale deflection is 1500 Ω, determine (i) Series resistance (R_{se}) and shunt resistance (R_{sh}) (ii) maximum value of R_{sh} to compensate for 10% drop in battery voltage (iii) error at the half scale mark when R_{sh} is set at a value obtained in (ii).	10
3.		Describe with the help of neat diagram, the loss of charge method to determine the insulation resistance of a short length of cable and derive an expression for determination of insulation resistance.	10
4.		Explain the term 'Standardization' of a dc potentiometer. How can you make a dual range dc potentiometer (namely X1, X0.1) by connecting two resistances parallel to the total dial resistance? Derive necessary relations.	10
5.		Describe the Llyod-Fisher square for measurement of iron losses in a specimen of laminations. How the corrections for resistance of wattmeter pressure coil and resistance of secondary winding are applied?	5+5
6.		The four arms of an AC bridge at balance are: arm AB an unknown inductance L_1 having an inherent resistance R_1; arm BC a non-inductive resistance of 100Ω; arm CD a capacitance of 0.5µF in parallel with a resistance 100Ω; arm DA a resistance of 1000Ω. The source is connected to A and C and the detector is connected between B and D. Derive the equations for balance and find the values of R_1 and L_1.	10
7.		How does the ambient temperature variation affect the measurement accuracy in strain gauges? Under what condition is a dummy gauge used? Derive bridge sensitivity in such a condition for Wheatstone bridge method based strain measuring system using one active and one dummy gauges.	3+2+5

BACHELOR OF ELECTRICAL ENGINEERING 2ND YR 1ST SEMESTER) EXAMINATION, 2017

(1st / 2nd-Semester/~~Repeat~~/Supplementary/~~Annual/Bi-Annual~~)

SUBJECT: - ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT

Full Marks 100
(50 marks for each part)

Time: ~~Two hours~~/Three hours/ ~~Four hours~~/ ~~Six hours~~

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	Answer Question:ONE and any TWO from the rest:	
1.	**Answer any four :**	
	a) Why the damping in a D'Arsonval galvanometer can be controlled by changing the value of CDRX?	
	b) Why the parameter logarithm decrement is important in ballistic galvanometer ?	
	c) Why pressure coil of electrodynamic type instrument should be resistive as much as high	
	d) Why braking torque is necessary for induction type instrument?	
	e) What happens if non sinusoidal voltage and current are applied to coils of electrodynameter type wattmeter ?	4X5=20
2.	a) A moving iron voltmeter has the resistance and inductance of the coil as 200 ohm and 1H, respectively. The series resistance is 2000 ohm, The instrument reads correctly for DC voltage of 230V Find the reading when 230V at 50Hz is applied.	
	b) Derive the expression of eddy current damping torque generated in metallic disc attached to the moving part of indicating instrument.	
	c) Distinguish between attraction and repulsion type moving iron type instruments	5+5+5
	a) A wattmeter with resistance of the two coils as 0.01 ohm and	

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3.	1000 ohm respectively is used to measure the power supplied to a resistive load. The load current and voltage may be taken as 20A and 30V, respectively. Show the two ways in which the voltage coil can be connected and find the error in the reading in each case.	
	b) .Why the wattmeter should be calibrated with Phantom loading circuit ?	
	c) What is the purpose of compensating coil used in electrodynamometer type wattmeter?	6+4+5
4	a) A 230V single phase energy meter has a constant load of 4A passing through it for 6 hours at unity power factor., If the meter disc makes 2208 revolutions during this period , what is the meter constant in revolutions per KWhr ? Calculate the power factor of the load if the number of revolutions made by the disc is 1472 when operating at 230V and 5A for 4 hours.	
	b) Draw the equivalent circuit of a C.T. using standard notations and the phasor diagram.	8+7
5.	Writ short notes on any three : a) Normal shunts and Universal shunts b) Lag adjustment in single phase energy meter c) Turns compensation in C.T. d) Vibration galvanometer	3 X 5

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