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Ref No: EX/EE/5/T/211/2017(S)

**B.E.E. (EVENING) 2ND YR 1ST SEMESTER SUPPLE
EXAMINATION, 2017**

SUBJECT: - ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS

Time: Three hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

PART I

Answer any five Questions.

5×10=50

1. What modifications are made in the basic Wheatstone bridge to convert it into Kelvin's double bridge to make it suitable for low resistance measurement below the value of 0.1Ω ? Explain with the help of circuit diagram, how Kelvin bridge is used to measure low resistance. 7+3
2. What are the special problems associated with the measurement of high resistances of the order of Megohms? Describe Price's guard wire method of measuring high resistance with the help of a diagram. 4+6
3. Why is volt-ratio box arrangement employed for measurement of voltage? With necessary circuit diagram explain the method of calibration of wattmeter with the help of dc potentiometer. 2+8
4. A shunt type ohmmeter has a D'Arsonval movement of resistance 2Ω . Its full-deflection current is 10 mA and the battery voltage is 3 volts. Determine the value of current limiting resistor so that the meter indicates 0.5Ω at the midpoint of its scale. Briefly explain the operation of such an ohmmeter. 5+5
5. Define gauge factor and Poisson's ratio and establish a relation between them. 5+5
What is the importance of Cold Junction Compensation for a temperature measuring circuit using thermocouple?
6. Describe the Lyod-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? 7+3
7. Write short notes on *any two* 5×2
 - a) Phantom Loading;
 - b) Ratio and product bridge;
 - c) Crossed coil type Ohmmeter;
 - d) Loss of charge method.

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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
1.	<p>Answer Question:1 and any TWO from the rest:</p> <p>Give comparative study of any four of the following in brief between:</p> <ul style="list-style-type: none"> a) Shunt and multiplier b) Current transformer and voltage transformer c) PMMC meter and rectifier type PMMC meter. d) Low power factor wattmeter and general wattmeter e) Electromagnetic and eddy current damping 	4X5=20
2.	<ul style="list-style-type: none"> a) Derive the expression of deflection of a PMMC instrument in terms of relative damping, natural frequency of oscillation and steady state deflection , when it is under damped. b) What are the basic differences between PMMC instruments when used as meters and galvanometers? c) The coil of a moving coil galvanometer is wound on a non magnetic former whose height and width are both 20 mm. It moves in constant field of 0.20 Wb/m². The moment of inertia of its moving parts is 0.25 X 10⁻⁶ Kg-m² and the control spring constant is 30 X 10⁻⁶ Nm/rad. Calculate the resistance of the coil to produce critical damping, all damping being assumed as electromagnetic. 	5+6+4
3.	<ul style="list-style-type: none"> a) Explain the working principle of registering mechanism for reading the energy in Watt-Hour by induction type energy meter . 	

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4.	<p>b) Explain how the driving torque in induction disc type energy meter can be increased by lag adjustment method.</p> <p>c) A burden of $(0.2+j0.2)$ ohm is connected to the secondary of a 1000/5A C.T.If the C.T.. with secondary impedance of $(0.2+j0.2)$ ohm has th bar primary and 198 turns in its secondary winding with 16 AT and 8 AT as its loss component and magnetizing component, respectively. determine the ratio and phase angle error of the C.T.</p>	5+4+6
4.	<p>a) Derive the expression of driving torque of the induction disc type energy meter with the help of phasor diagram.</p> <p>b) Why the permanent magnet is used across the rotating disc for producing brake torque?</p>	10+5
5.	<p>a) Derive the expression for ratio and phase angle error of a current transformer.</p> <p>b) Explain the effect of secondary burden on the ratio and phase angle error of a current transformer.</p> <p>c) Explain briefly the factors which must be taken into account in the design of a current transformer in order that the ratio and phase angle errors may be as small as possible.</p>	5+5+5