Code No: RT31021 **R13** SET - 1

III B. Tech I Semester Supplementary Examinations, October/November -2018

ELECTRICAL MEASUREMENTS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	List out the errors in Ammeters and Voltmeters. Write the importance of swamping resistance.	[4M]
	b)	List out the parts of the operating mechanism of single phase induction type energy meter.	[3M]
	c)	List out the applications of AC potentiometers.	[3M]
	d)	List out the advantages and disadvantages of Maxwell's bridge	[4M]
	e)	What are the components of power loss that occur in ferromagnetic materials when subjected to alternating magnetic fields?	[4M]
	f)	What are the advantages of a Digital voltmeter?	[4M]

PART -B

2	a)	Derive the necessary torque equation of PMMC instruments and explain in brief the effect of temperature changes in Ammeters.	[5M]
	b)	Enumerate the advantages of MI instruments.	[5M]
	c)	A potential transformer, ratio 1000/100 volt, has the following constants: primary resistance = 94.5Ω, secondary resistance = 0.86Ω, primary reactance = 66.2Ω, total equivalent reactance = 110Ω, no-load current = 0.02A at 0.4 power factor. Calculate i) phase angle error at no load. ii) burden in VA at unity power factor at which the phase angle will be zero.	[6M]
3	a)	Explain the theory and shape of scale of electrodynamometer wattmeters.	[6M]
	b)	A dynamometer type of wattmeter is rated 10 A and 100 V with a full scale reading of 1000 W. The inductance of the voltage circuit is 5 mH and its resistance is 3000 Ω. If the voltage drop across the current coil of the wattmeter is negligible, what is the error in the wattmeter at the rated VA rating with zero power factor? Assume frequency is 50 Hz.	[5M]
	c)	Write the working principle of Weston type synchroscope.	[5M]
4	a)	Explain the term standardization and describe the procedure of standardization for a DC potentiometer.	[8M]
	b)	A coordinate type potentiometer is used for the determination of a coil and the results obtained are: Voltage across a 1.0Ω resistor in series with the coil is +0.238V on in-phase dial and -0.085V on quadratic dial. Voltage across a 10:1 potential divider used with the coil is +0.3375V on in-phase dial and +0.232V on quadratic dial. Calculate the resistance and reactance of the coil.	[8M]
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5 a) Describe the working of hay's bridge for measurement of inductance. Derive the equations for balance condition [8M]

b) What are the difficulties encountered in the measurement of High resistances [3M]

c) The four arms of a bridge are: [5M]
arm ab: an imperfect capacitor C_1 with an equivalent series resistor of r_1.
arm bc: a non-inductive resistance R_3.
arm cd: a non-inductive resistance R_4.
arm da: an imperfect capacitor C_2 with an equivalent series resistance of r2 series with a resistance R_2.
A supply of 450 Hz is given between terminals a and c and the detector is connected between b and d. At balance: R_2=4.8Ω, R_3=2000Ω, R_4=2850Ω and C_2=0.5μF and r_2=0.4Ω. Calculate the value of C_1 and r_1 and also the dissipating factor for this capacitor.

6 a) Explain the procedure to measure leakage factor using flux meter with necessary sketches. [8M]

b) Explain the operation of Ballistic Galvanometer with a neat diagram. [8M]

7 Explain about the following [16M]
i) Measurement of frequency
ii) Digital Multimeter.

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