

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 =  $94.5\Omega$ , secondary resistance =  $0.86\Omega$ , primary reactance =  $66.2\Omega$ , total equivalent reactance =  $110\Omega$ , 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 electrodynamic 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  $3000\Omega$ . 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  $1.0\Omega$  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  $r_2$  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:  $R_2=4.8\Omega$ ,  $R_3=2000\Omega$ ,  $R_4=2850\Omega$  and  $C_2=0.5\mu\text{F}$  and  $r_2=0.4\Omega$ . 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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