Code No: R1622021 **R16** SET - 1

II B. Tech II Semester Regular Examinations, April - 2018
ELECTRICAL MESUREMENTS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

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PART –A

1. a) State the reasons why current transformer must never be operated on open circuit. (3M)
   b) What will be the power factors in two wattmeter reading when: (2M)
   i) When readings of the two wattmeters are equal
   ii) When the readings of two wattmeters are equal and opposite.
   c) Explain why standardization of the potentiometer is required. (3M)
   d) What are the advantages and disadvantages of a Maxwell bridge? (2M)
   e) List the principle requirements needed in magnetic measurements (2M)
   f) List the different characteristics features of Digital voltmeters (2M)

PART -B

2. a) Explain the importance of damping mechanism in an instrument and how are they classified (7M)
   b) Derive an expression for the force of attraction between the plates in a parallel plate electrostatic voltmeter. (7M)

3. a) Explain the principle of operation of the moving iron power factor meter with a neat connection diagram (7M)
   b) A 50 A, 230 V meter on full load test makes 61 revolutions in 37 seconds. If the normal disc speed is 520 revolutions per KWh, find the percentage error. (7M)

4. a) Explain how measurement of Resistance and power can be done using a dc Potentiometer (7M)
   b) Explain the working of Drysdale Polar Potentiometer with a neat circuit diagram (7M)

5. a) Explain Wien bridge for measurement of frequency and derive the necessary relation (7M)
   b) Calculate the insulation resistance of a length of cable in which voltage falls from 120 to 80 Volts in 20 seconds, the capacity being 0.0004 μF. (7M)

6. a) Explain the procedure for measurement of Flux/flux density in a ring specimen with a neat connection diagram (7M)
   b) The measured values of iron loss of a magnetic specimen of weight 15 kg are 19.8 W and 30 W at 40 Hz and 60 Hz respectively at a constant peak value flux density. Determine the values of hysteresis and eddy current losses in W/Kg at 50 Hz for the same value of flux density (7M)

7. a) Explain in detail about the following characteristics of Digital meters: (7M)
   i)Resolution ii) Sensitivity iii) Accuracy
   b) Explain the working of Ramp type Digital voltmeter with a neat block diagram (7M)
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Code No: R1622021 **R16** SET - 2

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ELECTRICAL MESUREMENTS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Discuss briefly the essential features of indicating instruments (2M)
   b) List and explain briefly the various errors in dynamometer wattmeters (3M)
   c) List the precautions that need to be taken during potentiometers in use (2M)
   d) What are the sources of measurement errors in a Wheatstone bridge? (2M)
   e) Explain the function of a shunted flux meter (2M)
   f) A digital frequency counter which has a 3 – digit display, gated period of 10 milliseconds, is selected to measure an unknown frequency. The reading is 098. What is the frequency of the system? (3M)

PART -B

2. a) Explain the construction and working principle of the electrostatic voltmeters. (7M)
   b) A 15 V moving iron voltmeter has a resistance of 500 ohms and inductance of 0.14 H. Assuming that the instrument reads correctly on D.C. What will be its reading on A.C. at 15 V when the frequency is i) 25 Hz and ii) 100 Hz. (7M)

3. a) What is phantom loading? Explain with an example how it is more advantageous than testing with direct loading (7M)
   b) A meter, whose constant is 600 revolutions per KWh, makes 5 revolutions in 20 seconds. Calculate the load in KW. (7M)

4. a) Explain the working of DC Crompton potentiometer with a neat circuit diagram (7M)
   b) List the advantages and disadvantages of A.C potentiometers (7M)

5. The four arms of an A.C. bridge network are as follows: (14M)
   Arm AB: an unknown capacitance; Arm BC: a standard capacitor C_3 of 1000 pF; Arm CD: a non inductive resistor R_4 of 100 Ω in parallel with a capacitor C_4 of 0.01μF; Arm DA: a non – inductive resistor R_2 of 1000 Ω. The A.C. supply is connected across terminals B, D and the supply frequency is 50 Hz. If the bridge is balanced with the above values, determine the components of the unknown impedance, while deriving the balanced conditions.

6. a) Distinguish between a Flux meter and ballistic galvanometer (7M)
   b) Explain how hysteresis loop is determined by method of reversals with a neat connection diagram (7M)

7. Write short notes on the Following: (14M)
   i) Digital Multimeter
   ii) Maxwell Bridge for iron loss measurement

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Code No: R1622021 **R16** SET - 3

II B. Tech II Semester Regular Examinations, April - 2018
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(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What is the purpose of an instrument? And how are they classified (2M)
   b) Discuss how the friction compensation and creep prevention is done in an energy meter. (3M)
   c) List the significant /advantages of potentiometers (2M)
   d) List and discuss the common sources of errors in A.C bridges and how are they eliminated (3M)
   e) Explain the need for A.C. magnetic testing (2M)
   f) List the advantages of Digital Voltmeters (2M)

PART -B

2. a) Explain with the help of a neat sketch the construction and operation of a D'Arsonval galvanometer (7M)
   b) The Ayston universal shunt has a total resistance of 6000 ohms and galvanometer has a resistance of 2000 ohms. Determine the multiplying power of shunt for 1000 ohms, 2000 ohms and 3000 ohms tapping (7M)

3. a) Explain the working of a three phase energy meter with a neat connection diagram (7M)
   b) A three phase motor draws a line current of 50 A from 220V source while starting. The power factor is 0.4. Find the readings of two wattmeters connected to measure power (7M)

4. a) Explain the procedure for standardizing the Potentiometer (7M)
   b) A simple dc potentiometer has: 18 step dial switch- each represent 0.1V; the dial resistors are 10Ω; the slide wire of the potentiometer is circular; and has 11 turns and a resistance of 11Ω each; the slide wire has 100 divisions and interpolation can be done to one fourth of a division. The working battery has a voltage of 6 V and negligible internal resistance. Calculate: i) Measuring range of instrument ii) Resolution of instrument iii) Working current. iv) Setting of Rheostat. (7M)

5. a) Explain the construction and working of a megger (7M)
   b) What is the main aim of having Wagner earthing device and explain its working (7M)
6. Explain the construction and working of Ballistic galvanometer and also prove that the "charge is proportional to first swing of the moving coil" (14M)
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7. a) Explain the working of Successive - approximation type Digital voltmeter with a neat block diagram (7M)
   b) What is the resolution of a four and half digital display? How would 17.65 V be displayed on a 10 V range and 0.0356 V on a 1 V and 10 V range (7M)

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What is a galvanometer? And list the various types of Galvanometers (2M)
   b) Explain how you measure the total power in a three phase circuit with the help of two wattmeters only (3M)
   c) List the applications/uses of potentiometers (2M)
   d) How are detectors classified in measurement of parameters (2M)
   e) Explain the factors affecting permeability and Hysteresis loss. (3M)
   f) List the advantages of digital systems/techniques (2M)

PART -B

2. a) Derive the expression for torque equation of a moving iron instrument and comment up on the nature of the scale. (7M)
   b) An absolute electrometer uses a movable circular plate 70 mm in diameter. During a voltage measurement, the distance between the plates is 3.2 mm and the force of attraction is 0.003N. The medium is air. $\varepsilon_0 = 8.854 \times 10^{-12}$ F/m. Find the Voltage. (7M)

3. a) Discuss the various types of errors and their methods of compensation in the dynamometer type wattmeters. (7M)
   b) Explain how the following adjustments are made in a single – phase induction type energy meter: (7M)
   i)Lag adjustment ii)Overload compensation iii)temperature compensation

4. a) Explain the working of a Simple D.C. Potentiometer with a neat connection diagram (7M)
   b) Using a Weston cadmium cell of 1.0562 V and a standard resistance of 0.1 ohm a potentiometer was adjusted so that 1.0562 m was equivalent to the emf of the cell; when a certain direct current was flowing through the standard resistance, the voltage across the corresponding length is 150 cm. what was the value of the current? (7M)

5. a) Explain the procedure for measuring a low resistance with the help of kelvin's double bridge. Derive the relation for finding the unknown resistance. (10M)
   b) State the applications of a wein bridge (4M)
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6. a) Explain the measurement of iron losses by Wattmeter method in detail (7M)

   b) Calculate the percentage change in the hysteresis and eddy current losses of a choke coil if other factors remain constant: i) The form factor of the applied voltage decreases by 15%; ii) The frequency of the applied voltage increases by 15%. Neglect resistance of the choke coil. (7M)

7. Write short notes on the Following: (14M)
   i)Digital Tachometer
   ii) Measurement of phase difference and frequency using CRO