Registration No:

Total Number of Pages: 02

3rd Semester Regular Examination 2016-17
ELECTRICAL AND ELECTRONICS MEASUREMENT
BRANCH: EE
Time: 3 Hours
Max Marks: 100
Q.CODE:Y581
Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1   **Answer the following questions:***multiple type or dash fill up type*   **(2 x 10)**

a) An ammeter of 0-25 A range has a guaranteed accuracy of 1% of full scale reading. The current measured is 5 A. The limiting error is -------

b) In 3 phase power measurement by two wattmeter method, the reading of one wattmeter is zero. The power factor of load is ---------

c) A single phase energy meter has the rating 1200 resolutions/ kWh. If a 500 W electric gadget is used for 4 hours, the energy meter will make --------

d) In which of the transformer is the secondary nearly short circuited under normal operating conditions?
A.CT   B. PT   C. Distribution transformer   D. Power transformer

e) A moving coil instrument has a resistance of 0.6 Ω and full scale deflection at 0.1 A. To convert it into an ammeter of 0-15 A range, the resistance of shunt should be --------

f) In a ballistic galvanometer, a charge of 100 μC gives a first swing of 25°. The charge required to cause first swing of 50° is ---------

g) Two resistors R1 = 36 Ω ± 5% and R2 = 75 Ω ± 5% are connected in series. The total resistance is ---------

h) A digital voltmeter has a read out range from 0 to 999 counts. If the full scale reading is 9.999 V, the resolution is -------

i) The coil of a moving coil meter has 100 turns, is 40 mm long and 30 mm wide. The control torque is 240 x 10-6N-m on full scale. If B = 1 Wb/m2, range of meter is ---------

j) A standard cell of 1.0185 V is used with a slide wire potentiometer. The balance was obtained at 60 cm. When an unknown emf was connected, the balance was obtained at 82 cm. The magnitude of unknown emf is -------

Q2   **Answer the following questions:** *Short answer type*   **(2 x 10)**

a) Explain felici's method for measurement of mutual inductance.

b) Define different types of standards of measurement.

c) Define constants of galvanometer.

d) Discuss the causes of errors in single phase energy meter.

e) What is loss of charge method.

f) Write galvanometer motion equation and state conditions for different types of damping behavior.

g) Define phantom loading.

h) Discuss the effect of secondary current on potential transformer ratio.

i) Electrodynamometer instruments are called transfer instruments, Explain.

j) Draw the block diagram of a digital storage oscilloscope.

Part – B (Answer any four questions)

Q3 **a)** What are the different problems associated with measurement of low resistances and how these are eliminated using Kelvin' Double Bridge? Draw the circuit of a Kelvin' Double Bridge and derive the condition for balance. **(10)**

b) The four arms of a wheatstone bridge are as follows: AB=100Ω ; BC=1000Ω , CD=4000Ω , DA=400Ω. The galvanometer has a resistance of 100Ω and, a sensitivity of 100mm/μA and is connected across AC. A source of 4 V d.c. is connected across BD. Calculate the current through the galvanometer and its deflection if the resistance of arm DA is changed from 400Ω to 401Ω. **(5)**

Q4 **a)** Derive the equations for balance in case of Maxwell's inductance capacitance bridge (for unknown inductance) and De Sauty'sbridge(for unknown capacitance). Draw the phasor diagrams for balance conditions. **(10)**

b) Explain the function and working of Wagner Earth Devices. **(5)**

Q5 **a)** Derive expression of the deflecting torque of a moving iron instrument. The inductance of a moving iron instrument is given by:
$L = (0.01 + A\Theta)^2$ mH, where Θ is the deflection from zero position in degree. The angular deflections of the instrument corresponding to 1.5 and 2 A are respectively 90° and 120°. Find the value of A. **(10)**

b) Derive the expression for external resistance required for critical damping of a galvanometer. **(5)**

Q6 **a)** Describe the working principle for induction type energy meter and derive the torque expression. A 230 V, single phase, watt hour meter has a constant load of 4 A 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 kWh? Calculate the power factor of the load if the number of revolutions made by the meter are 1472 when operating at 230 V and 5 A for 4 hours. **(10)**

b) Derive the torque equation for a dynamometer type wattmeter. Comment upon the shape of scale if spring control is used. **(5)**

Q7 **a)** Describe the construction and working of a polar type potentiometer. **(10)**

b) Write short notes on flux meter. **(5)**

Q8 **a)** Derive the expressions for ratio and phase angle errors for current transformer and discuss the effect of secondary burden on it. **(10)**

b) Write short notes on ramp type DVM. **(5)**

Q9 **a)** Draw block diagram of an oscilloscope and explain its operation. Explain the methods of measurement of frequency, phase angle and time delay using oscilloscope. **(10)**

b) Write short notes on rectifier type AC voltmeters **(5)**