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BIEE-039

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

00636

Term-End Examination

June, 2015

BIEE-039 : ELECTRICAL MEASUREMENTS AND INSTRUMENTS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. All questions carry equal marks. Question no. **1** is **compulsory**. Use of calculator is permitted. Missing data, if any, may be suitably assumed.*

1. Choose the best option given in the following questions. *7×2=14*

(a) When measured value approaches the mean value, the reading is

(i) Accurate, but not Precise

(ii) Precise but not Accurate

(iii) Precise

(iv) Both Accurate and Precise

(b) In a measurement system, if measured quantity 'x' is across variable and 'y' is through variable, then the admittance may be given as

(i) $x \cdot y$

(ii) x/y

(iii) y/x

(iv) $x + y$

(c) In an electrodynamometer type instrument, deflection is proportional to

(i) self-inductance of the moving coil and fixed coil

(ii) derivative of the self-inductance of the fixed coil

(iii) the galvanometer constant

(iv) currents in the moving coil and fixed coil

(d) In two-wattmeter method of power measurement at 0·5 p.f.,

(i) both the wattmeters read same in magnitude and direction

(ii) both the wattmeters read same in opposite direction

(iii) one wattmeter reads zero

(iv) total power measured is slightly less than the power consumed by 50%

(e) A three-phase, three-wire energy meter generally contains

(i) three pressure coils and two current coils

(ii) two current coils and one pressure coil

(iii) one current coil and two pressure coils

(iv) two current coils and two pressure coils

(f) A Lissajous pattern of circle means that the two applied inputs are

(i) in phase and of same amplitude

(ii) out of phase by 30° and of same amplitude

(iii) out of phase by 60° and of same amplitude

(iv) out of phase by 90° and of same amplitude

(g) Which of the following is ***not*** true ?

(i) A PMMC, MI or Electrodynamometer type instrument can measure physical units in DC.

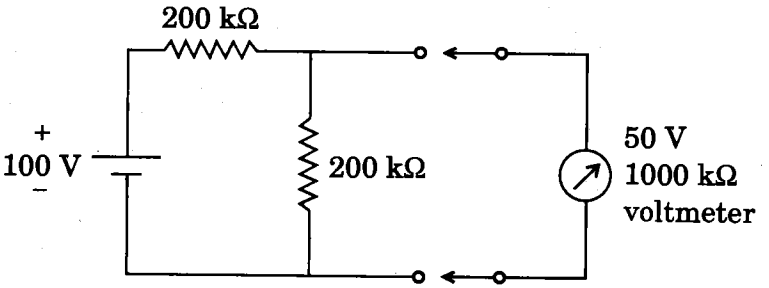
(ii) An MI, Induction type or Electrodynamometer type instrument can measure physical units in AC.

(iii) An Electrostatic type, Thermocouple type or Rectifier type instrument can measure physical units in AC and DC.

(iv) An MI, Induction type or Electrostatic type instrument can measure physical units in DC.

2. (a) Write down your understanding of loading effect due to shunt connected instruments. Draw the schematic diagram and derive the expression for measured voltage. 7

(b) Consider the following figure :



A 50 V voltmeter with internal resistance 1000 kΩ is connected across 200 kΩ resistor to measure voltage across it. Determine the following :

(i) Actual voltage across 200 kΩ resistor 3

(ii) Measured voltage across 200 kΩ 2

(iii) % Accuracy in measurement 2

3. (a) Discuss the construction and working of permanent magnet moving coil type instrument with the help of a neat sketch. 7

(b) Describe the construction and explain the principle of operation of the moving iron type instrument. 7

4. (a) Explain the construction and working of a single phase induction type energy meter. *10*

(b) What do you mean by creeping in energy meters ? How can this error be reduced ? *4*

5. The power flowing in a 3-phase 3-wire balanced load system is measured by two-wattmeter method. Reading of wattmeter 'A' is 7500 W and that of wattmeter 'B' is –1500 W. Determine the following :

(a) Power factor of the system *7*

(b) If the voltage of the circuit is 400 V, what is the value of the capacitance which must be introduced in each phase to cause the whole of the power measured to appear on wattmeter A ? Supply frequency is 50 Hz. *7*

6. (a) Explain the vertical and horizontal deflection system of a CRT. *7*

(b) Describe the construction and working principle of a megger. *7*

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Essential Torques in an Indicating Instrument

(b) Digital Multimeter

(c) Maximum Demand Indicator
