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BIEE-039

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DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

Term-End Examination

June, 2013

BIEE-039 : ELECTRICAL MEASUREMENTS AND INSTRUMENTS

Time : 2 hours *Maximum Marks : 70*

Note : (i) Attempt five questions in all.

*(ii) Q.No, **1** is **compulsory**.*

1. Select the correct answer of the following multiple choice questions. **7x2=14**

(a) Purely Mechanical Instrument cannot be used for dynamic measurements because they have :

(i) high inertia

(ii) large time constant

(iii) higher response time

(iv) All above

(b) The input resistance of a CRO is of the order of :

(i) Tens of ohm (ii) Mega ohm

(iii) Kilo ohm (iv) Fraction of ohm

(c) Electrostatic type instruments are primarily used as :

(i) Ammeter (ii) Wattmeter

(iii) Voltmeter (iv) Ohmmeter

(d) A moving iron instrument can be used for current and voltage measurements :

(i) in AC circuit only

(ii) DC circuit only

(iii) both AC and DC (for any value of frequency)

(iv) both AC and DC circuits for frequency upto about 125 Hz.

(e) Quartz and Rochette Salt belong to :

(i) natural group of Piezo - electric materials.

(ii) they are basically made of barium titanate

(iii) they do not have piezo electric properties in their original state but these properties are produced by special polarizing treatment

(iv) All above

(f) A Tachometer Encoder has :

(i) one output (ii) two outputs

(iii) three outputs (iv) All above

(g) A vertical amplifier for a CRO can be designed for :

(i) only a high gain

(ii) only a broad bandwidth

(iii) constant gain time bandwidth product

(iv) All above

2. (a) Describe the construction and working of PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. **7x2=14**

(b) A moving coil voltmeter with a resistance of 20 Ω gives a full scale deflection of 120° when a potential difference of 100 mV is applied across it. The moving coil has dimensions of 30 mm × 25 mm and is wound with 100 turns. The control spring constant is 0.375×10^{-6} N.m/deg. Find the flux density in the air gap, also find the diameter of copper wire of coil winding if 30% of instrument resistance is due to coil winding. The specific resistance for copper = 1.7×10^{-8} Ω. m.

3. (a) The following data refers to a moving coil voltmeter, **7x2=14**

resistance = 10000 Ω

dimension of coil = 30 mm × 30 mm no.of turns = 100,

flux density in gap = 0.08 Wb/m^2

spring constant = 3×10^{-6} Nm/deg.

Find the deflection produced by a voltage of 200 V.

(b) Describe the constructional detail of an attraction type moving iron instrument with the help of neat diagram. Derive the equation for deflection if spring controlled is used.

4. (a) Draw the block diagram of a general purpose CRO and explain the function of each block. 7x2=14

(b) Describe with the help of diagram how the following measurements can be made with the use of CRO.

(i) Frequency (ii) Phase angle

5. Describe the difference between deflection and null type of instruments, giving suitable examples. Discuss about their accuracy, sensitivity and suitability for dynamic measurement. 7+2+5=14

6. Write a short note of **any two** of the following : 7x2=14

(a) Meggar

(b) Earth tester

(c) Current transformer

(d) Potential Transformer

7. Describe the following methods of reactive power measurement in three phase circuits. 14

(a) using two autotransformers.

(b) using a single electrodynamometer type instruments.