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BIEL-029

DIPLOMA – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (DECVI) / ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRONICS AND COMMUNICATION ENGINEERING (ACECVI)

Term-End Examination

00943

December, 2016

BIEL-029 : ELECTRONIC MEASUREMENT AND INSTRUMENTS

Time : 2 hours *Maximum Marks : 70*

***Note** : Attempt any **five** questions. Question no. **1** is **compulsory**. All questions carry equal marks. Missing data, if any, may be assumed.*

1. Objective Type Questions (Fill in the blanks/Choose the best option/State *true* or *false*) : *7×2=14*

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

(i) High Gain

(ii) Broad Bandwidth

(iii) Gain-Bandwidth Product

(iv) All of the above

(b) An aquadag is used in a CRO to collect secondary emission electrons. [True/False]

(c) ISWR stands for _____ .

(d) A 1 mA ammeter has a resistance of 100 Ω. It is to be converted to a 1 A ammeter. The value of shunt resistance is

(i) 0·001 Ω

(ii) 0·1001 Ω

(iii) 10^5 Ω

(iv) 100 Ω

(e) The power consumption of a PMMC instrument is typically about 0·25 mW to 2 mW. [True/False]

(f) In measurement systems, undesirable static characteristics are

(i) Sensitivity and Accuracy

(ii) Drift, Static Error and Dead Zone

(iii) Reproducibility and Non-linearity

(iv) Drift, Static Error, Dead Zone and Non-linearity

(g) Fast Response and Fidelity are the desirable dynamic characteristics of a measurement system. [True/False]

2. (a) Explain the following types of errors :
   (i) Gross Errors
   (ii) Systematic Errors
   (iii) Random Errors
   Give an example of each type of error. 7

   (b) What is the difference between accuracy and precision ? List four possible sources of errors in instruments. 3+4=7

3. Explain the operation of a series type ohmmeter, with the help of a neatly labelled circuit diagram. Also prove that the values of resistances R_1 and R_2 are respectively given as

$$R_1 = R_h - \frac{I_{fSD}\, R_m\, R_h}{E} \text{ and } R_2 = \frac{I_{fSD}\, R_m\, R_h}{E - I_{fSD}\, R_h}$$

   where :

   R_h – Half scale position resistance

   I_{fSD} – Full scale current

   R_m – Internal resistance of movement

   E – Battery voltage 7+7=14

4. (a) Give the block diagram of an integrating type Digital Voltmeter (DVM) and explain its operation as a voltage-to-frequency converter. Also prove that the output frequency is proportional to the input voltage. 3+4=7

   (b) Explain the operation of a Digital Multimeter (DMM) with the help of a neatly labelled block diagram. 7

5. Give the block diagram of a digital storage oscilloscope and explain its operation. List the desirable features of a digital storage oscilloscope. *14*

6. (a) Explain the operation of RF-type signal generators with the help of a neatly labelled block diagram. *7*

   (b) With the help of a neatly labelled block diagram, explain the operation of a Logic Analyzer. *7*

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

   (a) Calibration of instruments

   (b) Analog Multimeters

   (c) Use of CRO for frequency and phase measurement

   (d) Function Generator and Pulse Generator
