CBCS SCHEME

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15EC35

Third Semester B.E. Degree Examination, June/July 2018
Electronic Instrumentation

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Briefly explain Gross Errors, Absolute error and relative error with examples. **(05 Marks)**

b. Draw the block diagram of a true RMS voltmeter and explain its operation. **(05 Marks)**

c. Design a multirange ammeter using Aryton Shunt for the ranges 0 – 10 mA, 100 mA and 1 A, using a D'Arsonval movement having internal resistance of 1 KΩ and a full scale current of 100 μA. **(06 Marks)**

OR

2 a. Sketch and explain the operation of a multirange ammeter using Aryton shunt. **(05 Marks)**

b. A resistor of 1 KΩ with an accuracy of ±5%, carries a current of 10 mA. The current is measured with an ammeter of 30 mA full scale with an accuracy of ±2% at full scale. Calculate the power dissipiation in the resistor and the accuracy of the power measurement. **(05 Marks)**

c. What is the loading effect of a voltmeter of low sensitivity? A voltage of 100 V dc is applied across a series combination of two resistors R1 and R2 each of 10 KΩ. A voltmeter of sensitivity 1 KΩ/V is used to measure the voltage across R2 in the range of 50 V. Calculate the voltmeter reading and percentage error of reading. **(06 Marks)**

Module-2

3 a. Describe with diagram the operation of a Ramp type DVM. What are its limitations? **(08 Marks)**

b. (i) With the help of a block diagram, explain the operation of a digital time period measurement instrument.

(ii) The lowest range of a $4\frac{1}{2}$ digit DVM is 10 mV full scale. Determine its sensitivity. **(08 Marks)**

OR

4 a. Describe with diagram, the operation of a successive approximation type DVM. **(08 Marks)**

b. (i) With the help of a block diagram, explain the operation of a digital capacitance meter.

(ii) What are the outstanding characteristics of a DVM? **(08 Marks)**

Module-3

5 a. Draw the block diagram of a simple CRO and state the functions of each block. What is the advantage of using –ve HV supply in CRO? **(08 Marks)**

b. Explain with the help of a block diagram of a function generator, how it generates the different waveforms. **(08 Marks)**

OR

6 a. (i) Describe the operation of a digital storage oscilloscope with the help of a block diagran
(ii) The number of vertical and horizontal tangencies of a Lissajous figure are 2 and respectively. What is the frequency of the signal connected to vertical plates, horizontal plate signal frequency is 1 kHz. **(08 Mark**

b. Sketch the block diagram of a square and pulse generator and describe how it generates th square waveform and pulses. **(08 Mark**

Module-4

7 a. (i) Explain with diagram the working of a phase sensitive detector.
(ii) What is the principle of working of a stroboscope? **(08 Mark**

b. Draw the circuit of a Wheatstone's bridge and explain how it can be used to measure an unknown resistance. **(05 Mark**

c. If the two arms of a Wheatstone's Bridge are R_1 = 1 KΩ and R_2 = 10 KΩ. Find the range of the third arm resistance R_3 to be used to measure unknown resistance R4 of the range 1 K to 100 KΩ, in the fourth arm. **(03 Mark**

OR

8 a. Define Q factor. With diagram, explain the operation of a Q meter to measure Q and inductance of a coil. **(08 Mark**

b. Draw the diagram of a Maxwell's Bridge and obtain the equations to measure R_x, L_x and **(05 Mark**

c. A Maxwell's Bridge has components values at balance as C_1 = 0.01 μF, R_1 = 470 K R_2 = 5.1 KΩ, R_3 = 100 KΩ. Find the value of the inductive impedance connected in the fourth arm (Rx and Lx). **(03 Mark**

Module-5

9 a. Explain the operation of a resistive position transducer. **(05 Mark**

b. Describe with diagram the operation of a piezo electric transducer. **(05 Mark**

c. With circuit diagram, explain the operation of a LVDT the method of measuring displacement. **(06 Mark**

OR

10 a. (i) Explain with diagram the construction of a Bonded Resistance wire gauge. How does it senses strain/stress?
(ii) How it is used in a bridge arrangement with a dummy gauge and what is the advantages of such an arrangement? **(08 Mark**

b. Briefly explain the construction and operation of a photoconductive cell and a photo transistor. **(04 Mark**

c. With a circuit explain how a photo transistor can be used to operate a street light relay. **(04 Mark**

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