CBCS SCHEME

USN | | | | | | | | | |

15EC35

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Electronic Instrumentation

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain briefly about Gross errors, Absolute error and Relative error in measurements with an example for each. **(06 Marks)**

b. Design a multirange ammeter that uses individual shunts for the ranges 0 – 100 mA, 0 – 200 mA and 0 – 500 mA, with a meter of full scale deflection current 100 μA and resistance 500 Ω. **(06 Marks)**

c. Define accuracy, precision, resolution and significant figures in measurements. **(04 Marks)**

OR

2 a. Sketch and explain the operation of a true RMS voltmeter. **(06 Marks)**

b. Design a multirange voltmeter that uses series multiplier resistor for the ranges 0 – 5 V, 0 – 50 V and 0 – 100 V with a movement of internal resistance 100 Ω and full scale deflection current 10 mA. **(06 Marks)**

c. Sketch and explain the operation of a AC voltmeter using Half Wave rectifier. **(04 Marks)**

Module-2

3 a. With sketch describe the operaton of a Dual Scope Integrator type DVM which works on the principle of voltage to time conversion. **(08 Marks)**

b. Sketch and explain the operation of staircase Ramp type DVM. **(08 Marks)**

OR

4 a. Sketch the block diagram of a digital multimeter and explain how it measures different parameters like dc and ac voltage, dc current and resistance. **(08 Marks)**

b. What is the principle used in measuring frequency of a signal digital technique, with block diagram explain the operation of a digital frequency meter. **(08 Marks)**

Module-3

5 a. With an example of sine wave input signal, explain the principle of displaying a single cycle stationary sine wave on a CRO. **(06 Marks)**

b. Give a circuit that generates the horizontal time base signal of CRO and explain its operation. **(06 Marks)**

c. Briefly explain how to generate Lissajous figures using CRO and how to measure frequency of an unknown signal. **(04 Marks)**

OR

6 a. With a block diagram, explain the operation of a function generator which generates different shape waveforms. **(08 Marks)**

b. Sketch and explain the operation of a pulse generator. What are its requirements? **(08 Marks)**

Module-4

7 a. Sketch and explain the operation of a phase sensitive detector to compare the phase of a signal with a reference signal. **(08 Marks)**

b. What is the significance of Q of a coil? Give a circuit to measure Q of a coil and explain its operation. What are the factors that affect its measurement? **(08 Marks)**

OR

8 a. Sketch a Wheatstone's Bridge that is used to measure resistance of an unknown resistor. Derive an expression that determines the unknown resistance. **(06 Marks)**

b. (i) Sketch a Maxwell's Bridge and derive an expression for determining inductance and resistance of an unknown inductor.

(ii) What is the value of unknown inductor impedance measured using a Maxwell's bridge at balance with $C_1 = 0.01\ \mu F$, $R_1 = 470\ K\Omega$, $R_2 = 5.1\ K\Omega$ and $R_3 = 100\ K\Omega$? **(10 Marks)**

Module-5

9 a. (i) What are the desired properties of a electrical transducers?

(ii) What is the piezo resistive effect in resistance strain gauges? **(04 Marks)**

b. Sketch a resistive position transducer and explain its operation to measure displacement. **(06 Marks)**

c. With a sketch, explain a method to determine strain using strain gauge in a bridge arrangement. **(06 Marks)**

OR

10 a. Sketch a variable reluctance bridge circuit and explain how it can be used to measure a displacement. **(06 Marks)**

b. Sketch the construction of a photo condutive cell and explain how it operates. Give a circuit involving it to operate a light operated relay and briefly explain its operation. **(08 Marks)**

c. Write a note on thermister. **(02 Marks)**

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