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17EC32

## Third Semester B.E. Degree Examination, Feb./Mar. 2022 Electronic Instrumentation

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define types of static errors, Explain each one in brief. (08 Marks)
- b. Convert a basic D'Arsonval movement into a DC-Voltmeter and derive the resistance equation. (04 Marks)
- c. State different types of thermocouple used for RF current measurement and explain each one of them in brief. (08 Marks)

OR

- 2 a. What is loading effect? (03 Marks)
- b. Design a multirange ammeter with range of 0-1A, 5A, and 10A employing individual shunt in each A D'Arsonval movement with an internal resistance of  $500\Omega$  and a full scale deflection of 10mA is available. (06 Marks)
- c. Explain working of true RMS voltmeter with a neat diagram. (06 Marks)
- d. Calculate the value of multiplier resistance on the 50V range of a dc voltmeter that uses a  $200\mu\text{A}$  meter movement with an internal resistance of  $100\Omega$ . (05 Marks)

### Module-2

- 3 a. Describe with a neat diagram, the operation of a voltmeter to time conversion type (DVM) Digital Volt Meter. (08 Marks)
- b. Explain with a diagram, the working of digital pH meter. (08 Marks)
- c. A  $4\frac{1}{2}$  digit voltmeter is used for voltage measurements:
  - i) Find its resolution
  - ii) How would 12.98V be displayed on a 10V range?
  - iii) How would 0.6973 be displayed on 1V and 10V range? (04 Marks)

OR

- 4 a. Explain the working of successive approximation DVM with the help of block diagram. (10 Marks)
- b. Describe with the help of a diagram the operation of universal counter. (10 Marks)

### Module-3

- 5 a. Describe with the help of neat block diagram the operation of conventional standard signal generator. (08 Marks)
- b. What are the common requirements for the signal generator? (02 Marks)
- c. Discuss the important features of Cathode Ray Tube (CRT). (10 Marks)

OR

- 6 a. Draw the basic block diagram of an oscilloscope and explain the function of each block. (10 Marks)
- b. Sketch the block diagram and explain the AF sine wave and square wave generator. List the various controls on the front panel of AF sine and square wave generation. (10 Marks)

**Module-4**

- 7 a. Define use of Maxwell's bridge, with a circuit diagram derive and explain Maxwell's bridge equation. (08 Marks)
- b. A Wein bridge circuit consists of the following components  $R_1 = 4.7K\Omega$ ,  $C_1 = 5nf$ ,  $R_2 = 20K\Omega$ ,  $C_3 = 10nf$ ,  $R_3 = 10K\Omega$ ,  $R_4 = 100K\Omega$ . Determine the frequencies of the circuit. (03 Marks)
- c. With a circuit diagram, explain Q-meter and its purpose. (09 Marks)

OR

- 8 a. Explain Basic Megger circuit. (08 Marks)
- b. Explain the Wheatstone's bridge, using Thevinin's theorem, determine the amount of deflection due to unbalanced Wheatstone's bridge. (08 Marks)
- c. An inductance comparison bridge is used to measure inductive impedance at a frequency of 5kHz. The bridge constants at balance are  $L_3 = 10mH$ ,  $R_1 = 10K\Omega$ ,  $R_2 = 40K\Omega$ ,  $R_3 = 100K\Omega$ , find the equivalent series circuit of the unknown impedance. (04 Marks)

**Module-5**

- 9 a. Explain the construction, principle of operation of LVDT, show characteristic curve. (10 Marks)
- b. What are the factors to be considered for the selection of better transducer? (04 Marks)
- c. Explain Piezoelectric transducer. (06 Marks)

OR

- 10 a. Derive an expression for gauge factor for Bonded Resistance strain gauge. (08 Marks)
- b. Mention advantages and limitations of thermistor. (06 Marks)
- c. Explain principle of operation of semiconductor photo diode. (06 Marks)

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