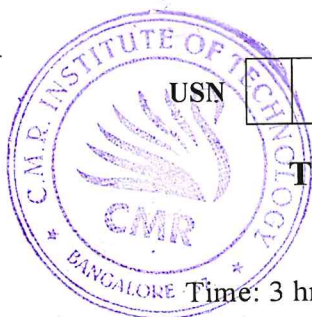


CBCS SCHEME



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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 μ A 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 operation 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 $C_1 = 0.01 \mu\text{F}$, $R_1 = 470 \text{ K}\Omega$, $R_2 = 5.1 \text{ K}\Omega$ and $R_3 = 100 \text{ K}\Omega$? (10 Marks)

Module-5

- 9 a. (i) What are the desired properties of a electrical transducers? (04 Marks)
- (ii) What is the piezo resistive effect in resistance strain gauges? (06 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 conductive 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)

FEB 4 2020