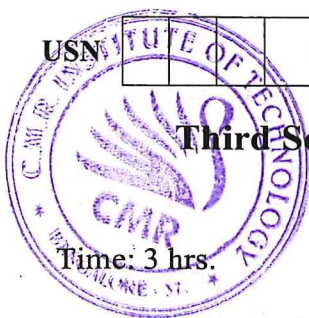


CBCS SCHEME

15EC35



Third Semester B.E. Degree Examination, July/August 2021 Electronic Instrumentation

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Define the following terms with respect to electronic instrument:
(i) Significant figure (ii) Accuracy (iii) Absolute error (06 Marks)
- b. The output voltage from a precision 12V power supply, monitored at intervals over a period of time produced. The following readings:
 $V_1 = 12.001V$, $V_2 = 11.999V$, $V_3 = 11.998V$, $V_4 = 12.003V$, $V_5 = 12.002V$, $V_6 = 11.997V$,
 $V_7 = 12.002V$, $V_8 = 12.003V$, $V_9 = 11.998V$ and $V_{10} = 11.997V$. Calculate:
(i) The average voltage level
(ii) Mean deviation
(iii) Standard deviation (06 Marks)
- c. With neat diagram, explain the working of universal shunt. (04 Marks)
- 2 a. With relevant diagram, convert a basic meter can be used as DC ammeter. (04 Marks)
- b. A Permanent Magnet Moving Coil instrument (PMMC) with Full Scale Deflection (FSD) of 100 μA and coil resistance of 1 $K\Omega$ is to be connected into a voltmeter. Determine the required multiplier resistance if the voltmeter is to be measure 50 V at full scale. Also calculate the applied voltage when the instrument indicates 0.8, 0.5 and 0.2 of FSD. (04 Marks)
- c. Explain the principle and operation of a true rms voltmeter using thermocouple. (08 Marks)
- 3 a. Mention any four general specifications of DVM. (04 Marks)
- b. With neat diagram, explain the working of capacitance meter. (06 Marks)
- c. With neat diagram, explain the working of frequency meter using gate control flipflop. (06 Marks)
- 4 a. Explain the working of successive approximation type digital voltmeter. Draw the table of comparison with $V_{in} = 1V$ and $V_{out} = 5V$. Using 8 bit DAC. (08 Marks)
- b. Explain the working of dual slope integrating type DVM for voltage to frequency conversion. (05 Marks)
- c. A $3\frac{1}{2}$ digit voltmeter is used for measuring voltage; find:
(i) The resolution of the instrument.
(ii) How would be a reading 15.53 be displayed on 100V range? (03 Marks)
- 5 a. Explain any two features of CRT. (04 Marks)
- b. With neat diagram, explain the working oscilloscope. (08 Marks)
- c. In the CRO, the horizontal signal has frequency of f_h and the vertical signal has a frequency of f_v . Draw the Lissajous figures for :
(i) $f_v = f_h$ (ii) $f_v = 2f_h$ (iii) $f_v = 0.5f_h$ (iv) $f_v = 0.25 f_h$ (04 Marks)
- 6 a. With neat diagram, explain standard signal generator. Mention the advantages, disadvantages and applications of it. (06 Marks)
- b. With neat diagram, explain digital storage oscilloscope. (06 Marks)
- c. Explain sweep or time base generator circuit for a continuous sweep CRO. (04 Marks)

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- 7 a. Define Q factor. Explain the working of Q-meter. (08 Marks)
b. Draw a circuit diagram of Wheatstone's bridge and derive an expression for unknown element at balance. (08 Marks)
- 8 a. Find the equivalent parallel resistance and capacitance that causes the Wein bridge to null with the following component values:
 $R_1 = 3.1 \text{ K}\Omega$, $C_1 = 5.2 \text{ }\mu\text{F}$, $R_2 = 25 \text{ K}\Omega$, $f = 2.5 \text{ kHz}$ and $R_4 = 100 \text{ K}\Omega$. (04 Marks)
b. Explain the working of a measuring instrument phase sensitive detector with neat diagram. (06 Marks)
c. Explain the working of Wein's bridge for the measurement of frequency. (06 Marks)
- 9 a. What are thermistors? Explain brush type thermistor with neat diagram. Mention the advantages and disadvantages of it. (08 Marks)
b. Explain the construction and working of LVDT with neat diagram. Mention the advantages and disadvantages of it. (08 Marks)
- 10 a. Explain the following strain gauges:
(i) Bonded resistance wire strain gauges
(ii) Semiconductor strain gauge (10 Marks)
b. A resistance strain gauge with a gauge factor of 2 is cemented to a steel member which is applied to a strain of 1×10^{-6} . If the original resistance value of gauge is $130 \text{ }\Omega$. Calculate the change in resistance. (06 Marks)
