CBCS SCHEME

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15EC35

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

Time: 3 hrs. 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 (FDS) of 100 μA and coil resistance of 1 KΩ 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 3½ 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)**

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:
$R_1 = 3.1$ KΩ, $C_1 = 5.2$ μF, $R_2 = 25$ KΩ, f = 2.5 kHz and $R_4 = 100$ KΩ. **(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 Ω. Calculate the change in resistance. **(06 Marks)**

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