Third Semester B.E. Degree Examination, June/July 2019
Electronic Instrumentation

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1 a. Define the following terms as applied to the electronic instruments i) Accuracy ii) Precession iii) Resolution. **(06 Marks)**

   b. Explain the working of a true rms voltmeter with the help of suitable block diagram. **(08 Marks)**

   c. Determine the value of the multiplier resistance on the 0–50V range of a DC voltmeter, that uses a 250μA meter movement with an internal resistance of 100Ω. **(06 Marks)**

2 a. Discuss the advantages of a digital voltmeter over an analog voltmeter. **(04 Marks)**

   b. Explain the block diagram of successive approximation type DVM (Digital voltmeter). **(10 Marks)**

   c. A $4\frac{1}{2}$ digit voltmeter is used for voltage measurements i) Find its resolution ii) How would be 13.87V be displayed on a 10V range? iii) How would the 0.7572V be displayed on 1V and 10V ranges. **(06 Marks)**

3 a. Draw the basic block diagram of an oscilloscope and explain the function of each. **(08 Marks)**

   b. Describe the following modes of operation available is dual trace oscilloscope i) ALTERNATE ii) CHOP. **(06 Marks)**

   c. Draw and explain the circuit diagram of an electronic switch. **(06 Marks)**

4 a. With a relevant block diagrams and wave forms explain the working of sampling oscilloscope. **(10 Marks)**

   b. With a block diagram explain construction and working of digital storage oscilloscope. **(10 Marks)**

PART – B

5 a. Explain with the help of block diagram, the operation of the conventional standard signal generator. **(05 Marks)**

   b. What is sweep frequency generator? Explain with neat block diagram. **(07 Marks)**

   c. Explain the working of square wave and pulse generator with the neat block diagram. **(08 Marks)**

6 a. Define the sensitivity of a Wheatstone bridge. Derive an equation for galvanometer current of wheat stone bridge under balanced condition. **(08 Marks)**

   b. The four arms of the Wheatstone bridge have the following resistances arm AB = 900Ω, BC = 900Ω, CD = 100Ω, DA = 100Ω. The bridge is used for strain measurement and supplied from 5V ideal battery. The galvanometer has sensitivity of 1mm/μA, with internal resistance of 250Ω. Determine the deflection of the galvanometer if arm DA increase to 101Ω and arm CD decreases to 99Ω. **(04 Marks)**

   c. Derive an equation for unknown frequency Wein's bridge, and find the equivalent parallel resistance and capacitance that causes a Wein's bridge to null with the following component values. $R_1 = 4k\Omega$, $C_1 = 6\mu F$, $R_2 = 30K\Omega$, $f = 2KHz$, $R_4 = 120K\Omega$. **(08 Marks)**

7   a.   What is transducer? Describe the operation of resistance pressure transducer.   **(06 Marks)**
   b.   Derive an expression for gauge factor of bonded resistance wire strain gauge.   **(10 Marks)**
   c.   A resistance strain gauge with a gauge factor of 3 is cemented to steel member, which is subjected to strain of 2×10^{-6}. If the original resistance value of the gauge is 150Ω. Calculate the change is resistance.   **(04 Marks)**

8   Explain the following with appropriate block diagrams.
   a.   Piezo – Electric transducer
   b.   Led and LCD display devices
   c.   Signal conditioning circuits
   d.   Bolometer.   **(20 Marks)**

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