

[56]

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Instrumentation and Digital Electronics
US03CELE 02

Thursday, 07-01-2021
10:00 am to 12:00 noon
Marks 70

Q 1 : Multiple Choice Questions:

(10)

- (1) Sensitivity is the ratio of out signal or response of the instrument to a change of
- (i) Input signal
 - (ii) Output signal
 - (iii) Intermediate signal
 - (iv) None of the above.
- (2) The full form of CRO is
- (i) Cathode Ray Oscillator
 - (ii) Cathode Ray Oscilloscope
 - (iii) Cathode ray Tube
 - (iv) Cathode ray transistor
- (3) The path of an electron travelling through an electric field of constant intensity and entering the field at right angle to the lines of flux is -----in XY plane.
- (i) Circular
 - (ii) Elliptical
 - (iii) Parabolic
 - (iv) Linear
- (4) $93_{16} + DE_{16} =$
- (i) 271_{16}
 - (ii) 161_{16}
 - (iii) 171_{16}
 - (iv) 181_{16}
- (5) Octal number system has ----- unique symbols.
- (i) 8
 - (ii) 16
 - (iii) 2
 - (iv) 4
- (6) The code which is used to reduce errors in binary airthemetic is
- (i) XS3 Code
 - (ii) Gray Code
 - (iii) 8421 code
 - (iv) 5211 code
- (7) 5211 is
- (i) Sequential code
 - (ii) Non weighted code
 - (iii) Reflective Code.
 - (iv) Both (i) & (ii)
- (8) By forming doublet we can reduce -----variables in Karnaugh mapping

[1]

[P.T.O.]

- (i) 1 variable
- (ii) 2 variables
- (iii) 3 variables
- (iv) 4 variables

(9) The fundamental operators of Boolean Algebra are

- (i) AND, OR, NOT
- (ii) XOR, XNOR
- (iii) NAND, NOR
- (iv) None of the above

(10) According to Boolean algebra, $1+1=$

- (i) 2
- (ii) 0
- (iii) 1
- (iv) 10

Q2: Fill in the blanks.

(04)

1. The full form of CRT is -----.
2. The binary equivalent number of $ABC0_{16}$ is -----.
3. The code in which each succeeding code is one binary bit greater than preceding code is -----.
4. The universal building blocks are -----.

Q2: True or False.

(04)

1. The delay time for CRO is 100 ns.
2. The Hexadecimal number system has got radix =4.
3. 2421 code is non-weighted binary code.
4. The fundamental building blocks are NAND and OR.

Q.3 Answer any ten questions briefly.

(20)

1. Define accuracy and precision.
2. Name some systematic error. List two ways in which they could be minimized.
3. Draw block diagram of CRO.
4. Convert the following decimal numbers to binary:
 - (i) 121
 - (ii) 161
5. Convert the following Hexadecimal to Binary
 - (i) 7AB4
 - (ii) 9BC8
6. Convert octal 5674_8 to decimal.
7. Define Weighted Binary Code and Non weighted Binary Code.
8. Define Sequential code giving examples.
9. Define Reflective code giving examples.
10. Construct AND, OR and NOT gate using NOR gate.
11. State utility of De Morgan's theorem.
12. Draw circuit of two input OR gate using transistor.

Q.4 Long Answer question. (Answer any 4 out of 8)

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- 1a. Give short note on Gross error **OR** Systematic error (4)
- 1b. The following value were obtained from the measurement of the value of resistor:
 $147.2\Omega, 147.4\Omega, 147.9\Omega, 148.1\Omega, 147.1\Omega, 147.5\Omega, 147.6\Omega, 147.4\Omega, 147.6\Omega$ and
 147.5Ω . Calculate (4)
- The arithmetic mean,
 - The average deviation
 - the standard deviation
 - Probable error of the average of the ten readings.
2. Explain electrostatic focusing system of CRO. (8)
- 3(a) Multiply the given Hexadecimal numbers $6A \times 2DD5$. (3)
- 3(b) Add given decimal numbers using eight-bit two's complement system: $28 + (-154)$. (3)
- 3(c) Convert $38AC_{16}$ to Octal. (2)
- 4(a) Multiply $1110_2 \times 10_2$ using computer method. (3) (3)
- 4(b) Multiply the given Hexadecimal numbers $94EC \times A5$. (3)
- 4(c) Convert the following Binary number to Hexadecimal: (2)
- 101011011011100
 - 1011011101101111
- 5(a) Add 6748 to 5972 in BCD (8421) code. (3)
- 5(b) Add 347.2 to 87.5 in XS3 code. (2)
- 5(c) Subtract 168.2 from 705.3 in XS3 code. (2)
- 6(a) Add 5085 to 9322 in BCD (8421) code. (3)
- 6(b) Add 37 to 28 in XS3 code. (2)
- 6(c) Subtract 27.8 from 57.6 in XS3 code. (2)
- 7(a) Reduce the given Boolean expression using Boolean laws i) $\overline{ABC + \overline{A}B + BC}$ (4)
- 7(b) Reduce by mapping & implement in SOP NAND logic $F = \sum m(0, 2, 3, 6, 7, 8, 10, 11, 12, 15)$ (4)
- 8(a) Draw circuit of AND gate using transistor and discuss its working for different input conditions. (4)
- 8(b) Reduce POS form and implement in NOR logic. $F = \sum m(2, 3, 5, 7, 8, 9, 11, 12, 13, 14, 15)$. (4)

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