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SARDAR PATEL UNIVERISTY

Bachelor of Science (Semester III) Examination - 2022

US03CELE22: INSTRUMENTAION AND DIGITAL ELECTRONICS

Date: 16/11/2022 (Wednesday)

Time: 10:00 A.M. to 01:00 P.M.

Total: 70 Marks

NOTE:
1. Figure to the right indicate full marks of the questions.

Q-1 Multiple Choice Questions **[10]**

1. The full form of CRT is
   (A) Cathode Ray Oscillator
   (B) Cathode Ray Oscilloscope
   (C) Cathode ray Tube
   (D) None of these
2. The probable error 'r' is given by
   (A) $\pm 0.674\ \sigma$
   (B) $\pm 0.6725\ \sigma$
   (C) $\pm 0.6775\ \sigma$
   (D) $\pm 0.6745\ \sigma$
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.
   (A) Circular
   (B) Elliptical
   (C) Parabolic
   (D) Linear
4. Radix or base of Octal number system is
   (A) 2
   (B) 4
   (C) 8
   (D) 16
5. The expression for -20 in 2's complement system is
   (A) 1111 1100
   (B) 1011 1100
   (C) 1110 1100
   (D) 1100 1001
6. 8421 is
   (A) weighted binary code
   (B) XS3 code
   (C) Non-weighted binary code
   (D) Gray code
7. We express 6 in XS3 code as
   (A) 1011
   (B) 1100
   (C) 1001
   (D) 1111
8. The universal building blocks of Boolean Algebra are
   (A) NAND and NOR
   (B) XOR, NAND and NOR
   (C) AND, OR and NOT
   (D) None of the above
9. By forming doublet we can reduce_____ variables in Karnaugh mapping.
   (A) 2 variables
   (B) 3 variables
   (C) 1 variable
   (D) 8 variables
10. According to Boolean Algebra $\bar{A} + AB =$
    (A) $\bar{A} + B$
    (B) $A + B$
    (C) $A + \overline{B}$
    (D) $\overline{A} + \overline{B}$

Q-2 Short Answer Question (Attempt TEN out of TWELVE) **[20]**

1. Define Accuracy.
2. Name some systematic errors.
3. Draw block diagram of CRO.

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(P.T.O.)

4. Convert the following decimal Numbers to binary
(i)121 (ii)161
5. Convert the following Binary number to Hexadecimal
(i) 1010110110111 (ii) 10110111011011
6. Convert decimal 89657 to Octal
7. Define Weighted Binary Code
8. Define Reflective Code
9. Define XS3Code
10. Define OR logic.
11. State utilities of De Morgan's theorem.
12. Construct AND, OR and NOT using NOR gate.

Q.3(A) The following value were obtained from the measurement of the value of resister: 147.2 Ω, 147.4 Ω, 147.9 Ω, 148.1 Ω, 147.1 Ω, 147.5 Ω, 147.6 Ω, 147.4 Ω, 147.6 Ω and 147.5 Ω Calculate **[05]**
a. The arithmetic mean,
b. The average deviation
c. the standard deviation
d. Probable error of the average of the ten readings.

Q.3(B) Name types of errors and write short note on Gross error. **[05]**

OR

Q.3(A) Draw the block diagram of Oscilloscope and give function of each block. **[08]**

Q.3(B) Define Error. **[02]**

Q.4(A) Multiply the following Hexadecimal numbers 94EC x A5 **[03]**

Q.4(B) Multiply following binary numbers using computer method 1110 x 10 **[03]**

Q.4(C) Convert the following Hexadecimal 9BC8 to binary **[02]**

Q.4(D) Convert the decimal number 3619 to Hexadecimal. **[02]**

OR

Q.4(A) Multiply binary numbers 1001 x 110 using computer method **[03]**

Q.4(B) Multiply the following Hexadecimal numbers 89BC x AA **[03]**

Q.4(C) Add the following decimal numbers using eight - bit two's complement arithmetic: 103 – 110 **[03]**

Q.4(D) Convert Binary 1101100001 to Octal **[01]**

Q.5(A) Add 157.83 to 688.93 in BCD (8421) code **[03]**

Q.5(B) Add 265 to 369 in XS3 code **[03]**

Q.5(C) Subtract 98 from 587 in XS3 code. **[03]**

Q.5(D) Convert Binary 110001010 to Gray code **[01]**

OR

Q.5(A) Add 5085 to 9322 in BCD (8421) code **[03]**

Q.5(B) Add 54.95 to 36.12 in XS3 code. **[03]**

Q.5(C) Subtract 198.6 from 457.8 in XS3 code **[03]**

Q.5(D) Convert Gray 110001010 to Binary code **[01]**

Q.6(A) Reduce given Boolean expression $AB + \overline{AC} + A\overline{B}C(AB + C)$ using Boolean Laws **[05]**

Q.6(B) Find the POS and SOP form of $Y = \sum m\ (1,2,3,5,6,10,13,14,15)$. Which is cheaper? **[05]**

OR

Q.6(A) Reduce given Boolean expression $\overline{(A+\overline{BC})}(A\bar{B}+\overline{ABC})$ using Boolean Laws. [05]

Q.6(B) Reduce SOP form and implement in NAND logic. [05]

$$Y = \sum m\,(0,2,3,6,7,8,10,11,12,14,15)$$