

GUJARAT TECHNOLOGICAL UNIVERSITY**Diploma Engineering - SEMESTER-III • EXAMINATION – WINTER • 2014****Subject Code: 3331703****Date: 29-11-2014****Subject Name: Digital Techniques****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. English version is considered to be Authentic.

Q.1

Answer any seven out of ten.

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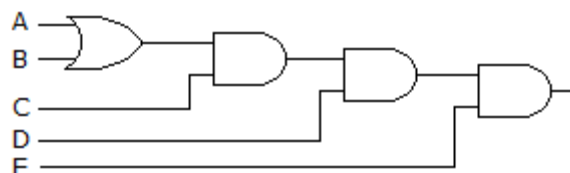
1. The output of an OR gate with three inputs, A, B, and C, is LOW when _____.
 A. $A = 0, B = 0, C = 0$
 B. $A = 0, B = 0, C = 1$
 C. $A = 0, B = 1, C = 1$
 D. all of the above
2. Determine the values of A, B, C, and D that make the sum term $\bar{A} + B + \bar{C} + D$ equal to zero.
 A. $A = 1, B = 0, C = 0, D = 0$
 B. $A = 1, B = 0, C = 1, D = 0$
 C. $A = 0, B = 1, C = 0, D = 0$
 D. $A = 1, B = 0, C = 1, D = 1$
3. Which of the following expressions is in the sum-of-products (SOP) form?
 A. $(A + B)(C + D)$
 B. $(A)B(CD)$
 C. $AB(CD)$
 D. $AB + CD$
4. How many flip-flops are required to produce a divide-by-128 device?
 A. 1
 B. 4
 C. 6
 D. 7
5. The commutative law of Boolean addition states that $A + B = A \times B$.
 A. True
 B. False
6. The systematic reduction of logic circuits is accomplished by:
 A. using Boolean algebra
 B. symbolic reduction
 C. TTL logic
 D. using a truth table
7. The output of an exclusive-NOR gate is 1. Which input combination is correct?
 A. $A = 1, B = 0$
 B. $A = 0, B = 1$
 C. $A = 0, B = 0$
 D. none of the above
8. Convert $(10011011)_2$ into (_____)₁₆
9. Convert $(67)_8$ into (_____)₁₀
10. Applying DeMorgan's theorem to the expression $\overline{ABC}$, we get _____.
 A. $\overline{A + B + C}$
 B. $\overline{A + B + C}$
 C. $A + \bar{B} + C\bar{C}$
 D. $A(B + C)$

Q.2

- (a) How many gates would be required and draw a circuit to implement the following Boolean expression without simplification? $XY + X(X + Z) + Y(X + Z)$ **03**

OR

- (a) Derive the Boolean expression for the logic circuit shown below: **03**



- (b) Prove $X + X'Y = X + Y$ 03

OR

- (b) Prove $X + X' = 1$ 03

- (c) From the truth table below, determine the standard SOP expression. 04

Inputs			Output
A	B	C	X
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

OR

- (c) Implement the expression $AB + CD$ using NAND logic (NAND as a universal gate) 04

- (d) Perform subtraction using 2's-complement method
1100-1001 04

OR

- (d) Perform subtraction using 1's-complement method
1101-1000 04

- Q.3** (a) Multiply the following binary number: 11101 X 101 03

OR

- (a) Divide the following binary number: 1111101 / 11 03

- (b) Implement Half Adder circuit. 03

OR

- (b) Implement Half Subtractor circuit. 03

- (c) Explain working of level loop for level switch configuration HL. 04

OR

- (c) Draw a circuit diagram of 4 to 1 line Multiplexer 04

- (d) Draw any logic components for temperature loop for temperature switch configuration LL. 04

OR

- (d) Implement Odd-Parity Generator circuit. 04

- Q.4** (a) How is a J-K flip-flop can be used as toggle flip-flop 03

OR

- (a) How is a J-K flip-flop can be used as D- flip-flop 03

- (b) Implement Binary to Gray Code Converter using Ex-OR gates. 04

OR

- (b) Draw any logic components for level loop for level switch configuration HL. 04

- (c) Implement a Decade counter using J-K flip-flop. 07

- Q.5** (a) Implement Gray to Binary Code Converter using Ex-OR gates. 04

- (b) Draw a circuit diagram of 3 X 8 Decoder 04

- (c) Draw any logic components for pressure loop for pressure switch configuration HH. 03

- (d) Explain S-R flip-flop using NOR gates. 03
