CS & IT Batch : Hinglish

Weekly Test - 02
Digital Logic
Minimization

Time Duration - 50 Min **Maximum Marks –** 20

Note : Negative Marking - 1/3, NAT no negative marking
{For MSQs no part marking no negative marking(from week onwards)}

Part A : 1 to 6 questions each will carry 1 marks (MCQs + NAT)

1. The Boolean function,

$f = PQ\bar{R} + \bar{P}QR + PQR + \bar{P}Q\bar{R}$

Minimal product is,

(a) $P\bar{Q}$ (b) $P + Q\bar{R}$

(c) Q (d) None of the above

2. The min term/ max term form of the given Boolean expression,

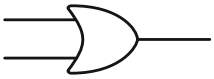
$f(A, B, C) = (AB + B\bar{C} + \bar{A}C)(A + C)$

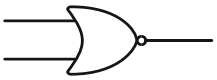
is represented by,

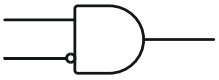
(a) $\sum m(1, 2, 6, 7)$ (b) $\prod M(0, 2, 4, 5)$

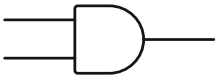
(c) $\sum m(1, 2, 3, 6)$ (d) $\prod M(0, 3, 4, 5)$

3. Which of the following is/are universal gate?

(i) 

(ii) 

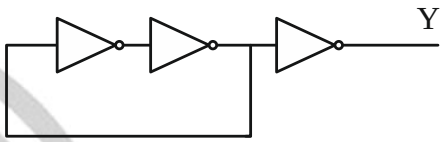
(iii) 

(iv) 

(a) Only (ii) (b) (ii) and (iv)

(c) (ii) and (iii) (d) (ii), (iii) and (iv)

4. All the inverters have propagation delay (t_d) 0.5μsec, as shown below,



At output (Y) we will get?

(a) Square waveform of $f = \frac{1}{3}$ MHz

(b) Square waveform of $f = \frac{1}{2}$ MHz

(c) Square waveform of $f = 1$ MHz

(d) None of the above

5. A Boolean function F can be represented as

$F(A, B, C) = \overline{\bar{A} + \left[\overline{B + \bar{C}\left(\overline{AB + A\bar{C}}\right)}\right]}$

Then the minimum number of 2 input NOR gates can be required to implement the above function is equal to_____?

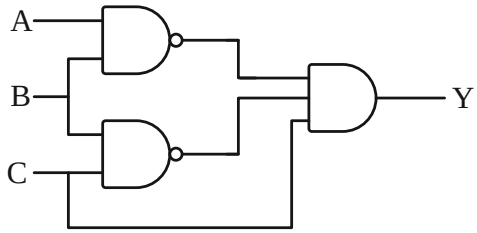
6. A Boolean function of two variables X and Y is defined as follows:

F (0, 0) = 1 = F (1, 1) and F (0, 1) = F (1, 0) = 0

Assuming complement of X and Y are not available a minimum cost solution for realizing F using 2-input NAND gates (each having unit cost) would have total cost of _____ unit.

Part B: 7 to 13 questions each will carry 2 marks (MCQs + NAT)

7. Which of the following is not correct?



(a) Y is dependent of B
(b) Y is independent of A
(c) Y is dependent of B and C
(d) Y is independent of C

8. We have two binary numbers A and B of 4-bit each, then the number of times, comparator output will be 1 that generates output 1 if A < B _____.

9. A K-map is given below-

Y	$\bar{A}$	A
$\bar{B}$	X	1
B	0	C

X-don't care

The minimized solution of above K-map will be

(a) $A\bar{B}+AC$ (b) $\bar{B}\bar{C}+A\cdot C$
(c) $AB+AC$ (d) $\bar{B}\cdot\bar{A}+A\cdot C$

10.

Y	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	1	X	
$\bar{A}B$		1	X	
AB		1	1	
$A\bar{B}$			1	

X-don't care

Minimized solution of above K-map will be

(a) $BD+CD+\bar{A}D+\bar{A}\bar{B}\bar{C}$
(b) $BD+CD+\bar{A}\bar{B}\bar{C}$
(c) $BD+\bar{A}\bar{B}+\bar{C}\bar{D}$
(d) $BD+CD+\bar{A}\bar{C}D+\bar{A}\bar{B}\bar{C}$

11. Which of the following K-map represents the borrow output of full subtractor (A-B) with C as borrow given to previous bit

(a)

B	$\bar{C}$	C
$\bar{B}$		$\bar{A}$
B	$\bar{A}$	1

(b)

B	$\bar{C}$	C
$\bar{B}$		$\bar{A}$
B	(A+C)	1

(c)

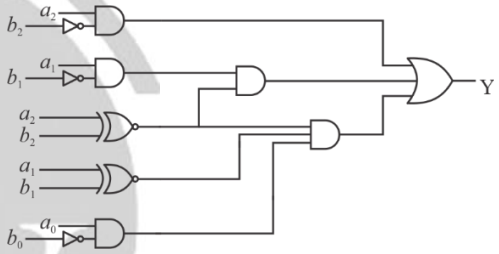
B	$\bar{C}$	C
$\bar{B}$		A
B	$\bar{A}+\bar{C}$	1

(d)

B	$\bar{C}$	C
$\bar{B}$		$\bar{A}$
B	1	A

12. A comparator circuit is designed to compare two modes A and B.

$A=a_2\,a_1\,a_0 \qquad B=b_2\,b_1\,b_0$



Then which of the following is true ?

(a) This circuit compares A and B and output Y is '1' when A = B.
(b) This circuit compares A and B and output Y is '1' when A > B.
(c) This circuit compares A and B and output Y is '1' when B > A.
(d) This circuit gives the final carry output of (A+B) addition.

13. Function $f=\bar{A}BD+\bar{A}CD+\bar{A}C\bar{D}+AB\bar{C}D+ABCD$ minimum number of NAND gates required to implement the function?

Answer Key

1. (c)
2. (b)
3. (c)
4. (d)
5. (3 to 3)
6. (5 to 5)
7. (d)
8. (120 to 120)
9. (b)
10. (b)
11. (a)
12. (b)
13. (4)