

類組：電機類 科目：數位邏輯(300H)

共11頁 第1頁

※請在答案卷內作答

※本試卷共 15 題選擇題，每一題都是**單選題**，請選出正確答案並將答案寫在答案卷內，答案卷內只寫答案，請勿附加計算過程。

※答案寫在本試題內不予計分。

※答對第 1 題得 2 分，答錯第 1 題倒扣 1 分。

※第 2 題到第 15 題每題 7 分，答對 1 題得 7 分，答錯一題倒扣 3 分。

※**沒有**合適答案的題目，請在答案卷寫出題號並註明“**沒有答案**”，得該題的分數。

※**有**合適答案的題目，沒有作答，該題不給分也不倒扣分數。

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Question 1 [2 points] Convert $.375_{10}$ to binary. Which of the following is the answer.

- (A) $.011_2$ (B) $.11_2$ (C) $.011\ 011\ 011\ \dots_2$ (D) $.110\ 110\ 110\ \dots_2$

Question 2 [7 points] Which of the following is not true.

- (A) $(X+Y)(X+Y')=X$ (B) $X+YZ=(X+Y)(X+Z)$ (C) $XY'+Y=X+Y$ (D) $(X+Y')Y=X'Y$

Question 3 [7 points] Which of the following is not true.

- (A) $(X+Y)(X'+Z)=XZ+X'Y$ (B) $XY+X'Z+YZ=XY+YZ$ (C) $1\oplus 1=0$ (D) $X\oplus X'=1$

Question 4 [7 points] Work on Truth Table 1 and find the simplest expression for F. Which of the following is the simplest expression for F. (Note: X indicates "don't care".)

Truth Table 1			
X	Y	Z	F
0	0	0	1
0	0	1	X
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	X
1	1	0	1
1	1	1	1

- (A) $F=X'Y'Z'+XYZ'+XYZ$ (B) $F=XY+X'Y'Z'$ (C) $F=XY+X'Y'$ (D) $F=Y'Z$

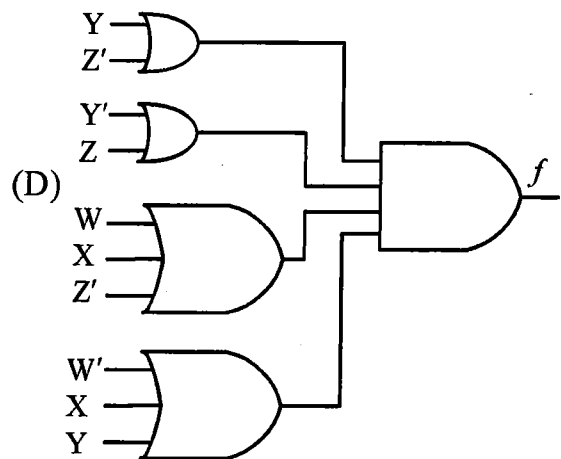
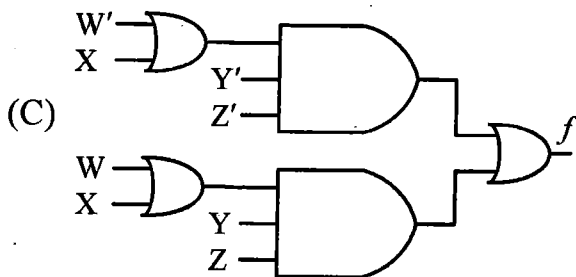
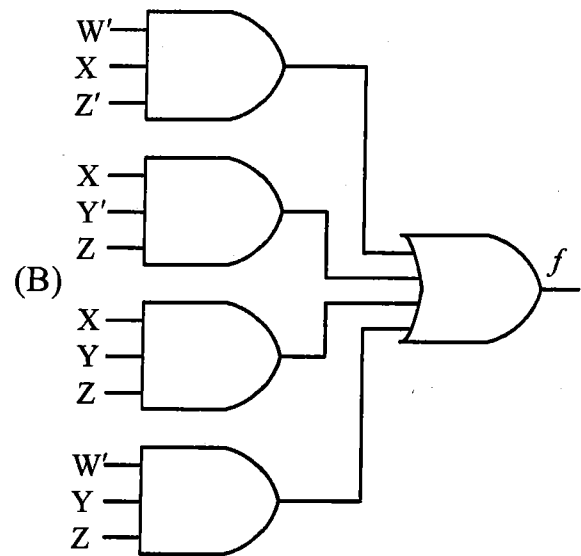
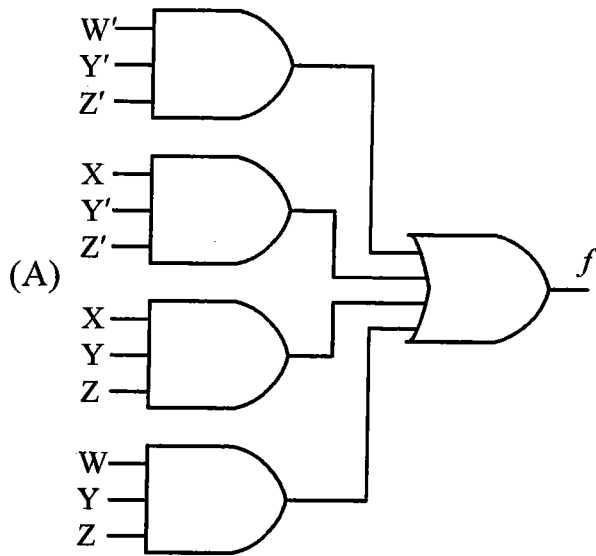
Question 5 [7 points] Which of the following is the minimum sum of products for the function of $f(W,X,Y,Z)=\Pi M(0, 1, 6, 8, 11, 12)\cdot\Pi D(3, 7, 14, 15)$

- (A) $f = WY'Z+X'YZ'$ (B) $f = W'X'Y'+WY'Z$ (C) $f = W'XY'+WY'Z$ (D) $f = W'XY'+WY'Z+X'YZ'$

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Question 6 [7 points] Which of the following is not the circuit to realize

$$f(W,X,Y,Z) = \sum m(0, 4, 7, 11, 12, 15)$$



Question 7 [7 points] Which of the following is the timing diagram for the circuit shown in Fig. 1. Assume that all gates have a propagation delay of 1 ns.

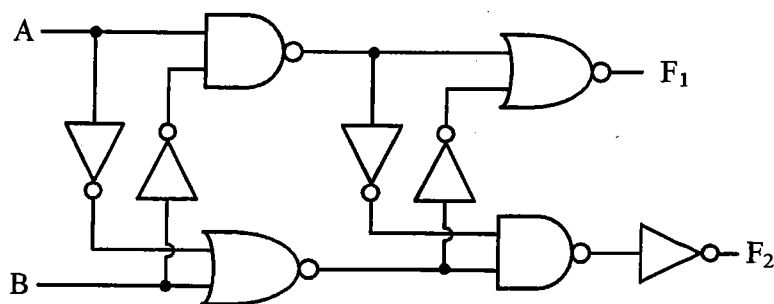
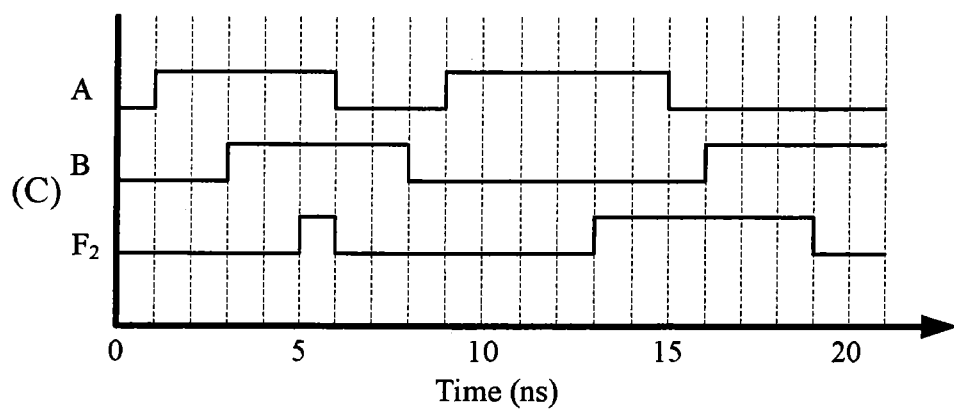
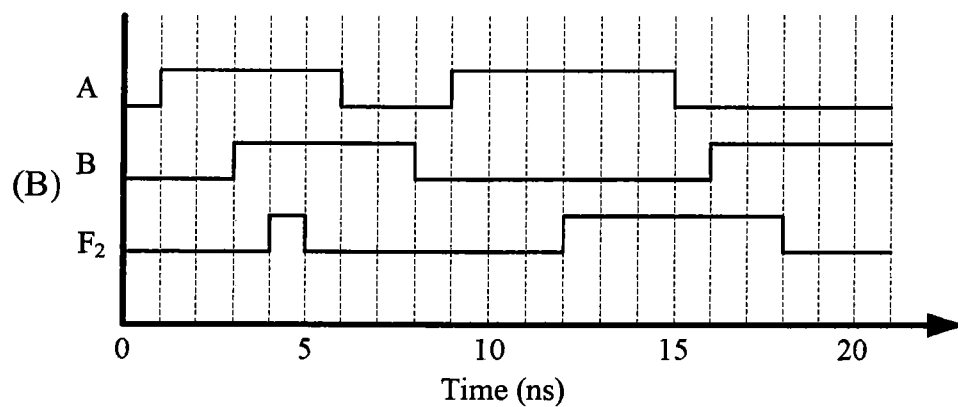
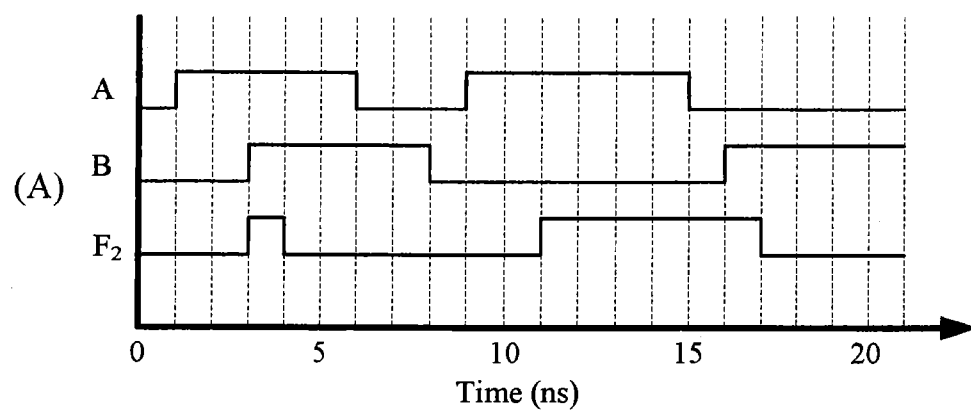
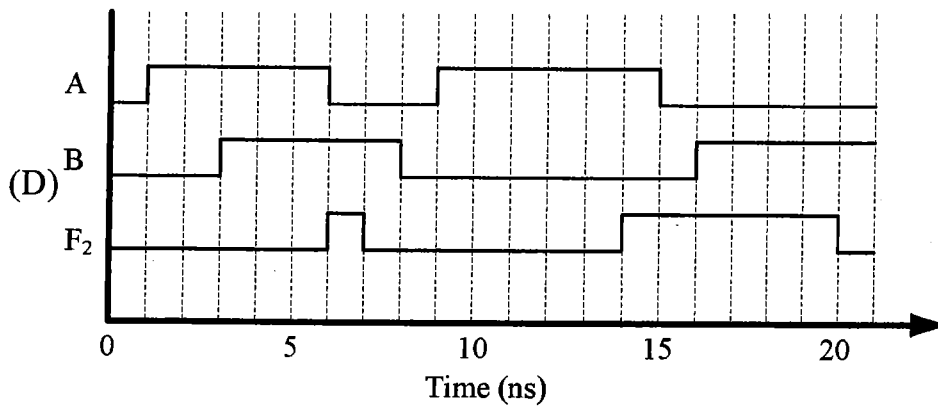


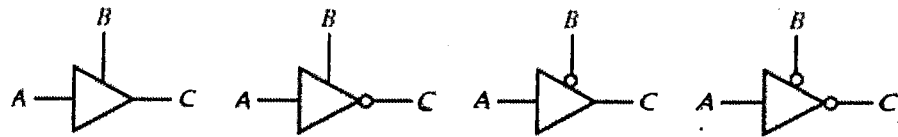
Fig. 1

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Question 8 [7 points] Fig. 2(a) and 2(b) show four kinds of three-state buffers and a symbol of 2-to-1 MUX, respectively. Which of the following schematic is a 2-to-1 MUX.



B	A	C	B	A	C	B	A	C	B	A	C
0	0	Z	0	0	Z	0	0	0	0	0	1
0	1	Z	0	1	Z	0	1	1	0	1	0
1	0	0	1	0	1	1	0	Z	1	0	Z
1	1	1	1	1	0	1	1	Z	1	1	Z

Fig. 2(a)

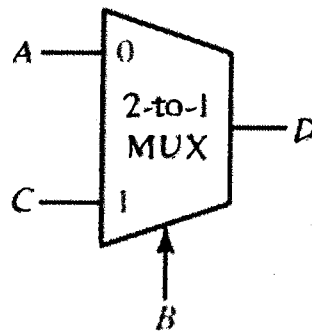
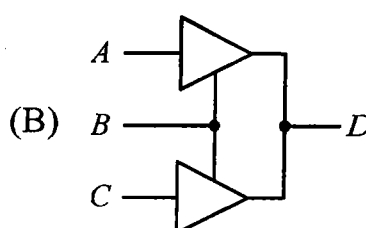
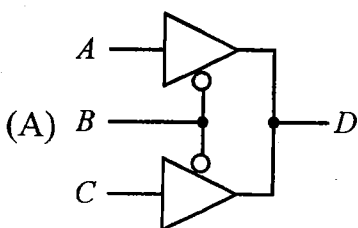
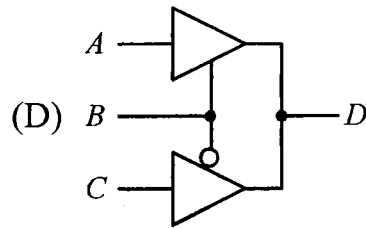
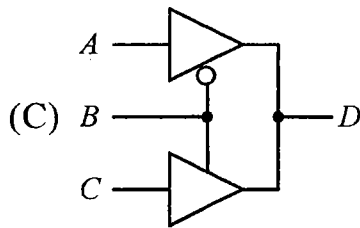


Fig. 2(b)





Question 9 [7 points] Table 2 shows a truth table for a 4-to-10 line decoder. Fig. 3 shows a circuit using the 4-to-10 line decoder and a NAND gate. Find the Boolean function of the output "F".

- (A) $F = ABCD \cdot ABC\bar{D} \cdot \bar{A}BC\bar{D} \cdot \bar{A}BCD$ (B) $F = ABCD + ABC\bar{D} + \bar{A}BC\bar{D} + \bar{A}BCD$
 (C) $F = \bar{A}BCD \cdot \bar{A}BC\bar{D} \cdot \bar{A}BCD \cdot \bar{A}BC\bar{D}$ (D) $F = \bar{A}BCD + \bar{A}BC\bar{D} + \bar{A}BCD + \bar{A}BC\bar{D}$

Table 2

Input ABCD	Output 0 1 2 3 4 5 6 7 8 9
0000	0 1 1 1 1 1 1 1 1 1
0001	1 0 1 1 1 1 1 1 1 1
0010	1 1 0 1 1 1 1 1 1 1
0011	1 1 1 0 1 1 1 1 1 1
0100	1 1 1 1 0 1 1 1 1 1
0101	1 1 1 1 1 0 1 1 1 1
0110	1 1 1 1 1 1 0 1 1 1
0111	1 1 1 1 1 1 1 0 1 1
1000	1 1 1 1 1 1 1 1 0 1
1001	1 1 1 1 1 1 1 1 1 0
1010	1 1 1 1 1 1 1 1 1 1
1011	1 1 1 1 1 1 1 1 1 1
1100	1 1 1 1 1 1 1 1 1 1
1101	1 1 1 1 1 1 1 1 1 1
1110	1 1 1 1 1 1 1 1 1 1
1111	1 1 1 1 1 1 1 1 1 1

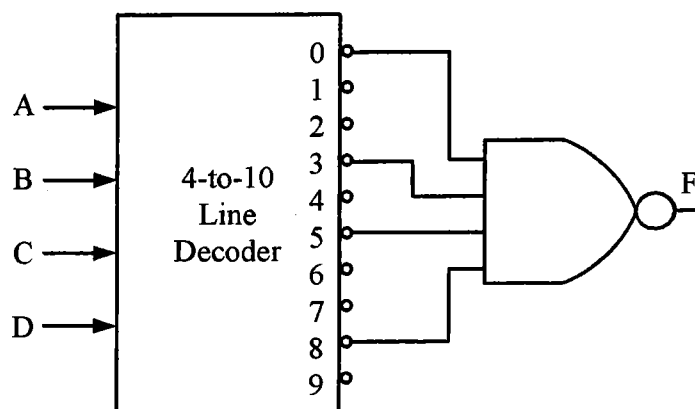


Fig. 3

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Question 10 [7 points] Fig. 4 shows a circuit where "D" and "G" are two input signals, and "Q" is the output signal. Which of the following is the correct timing diagram.

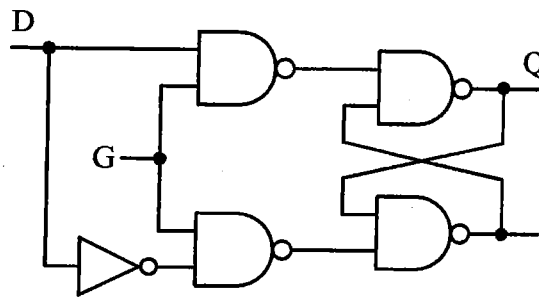
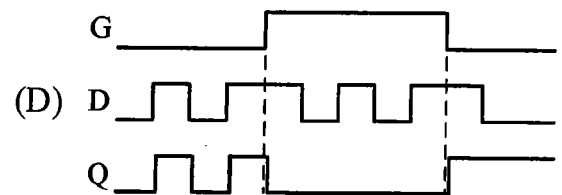
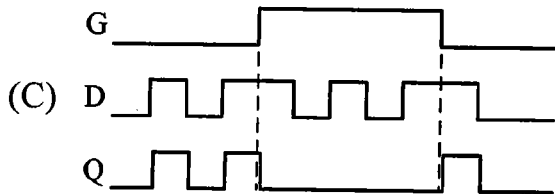
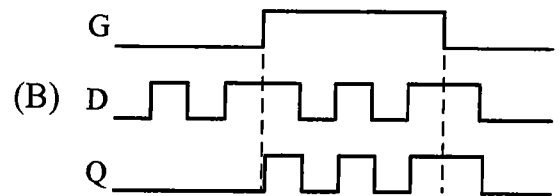
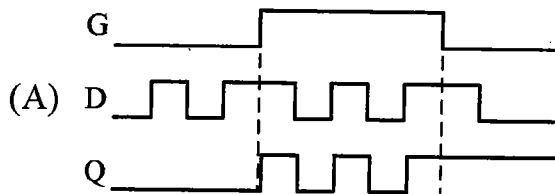


Fig. 4



Question 11 [7 points] Fig. 5 shows a shift register consists of four D flip-flops. Which of the following is the correct timing diagram.

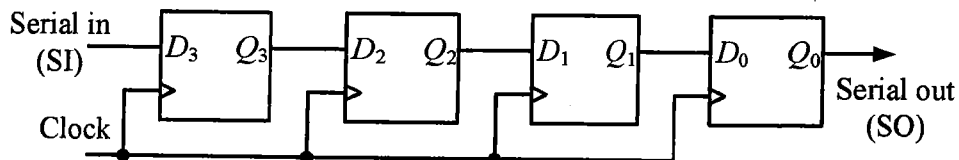
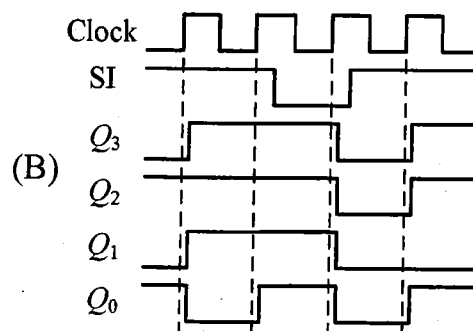
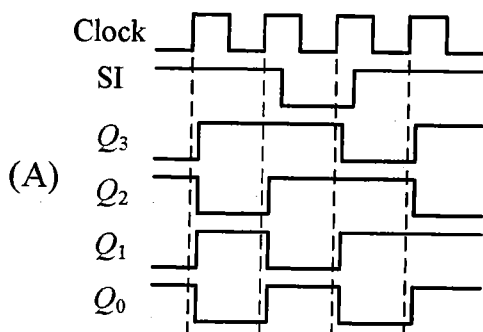
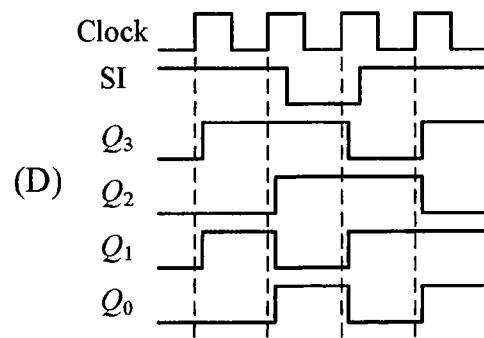
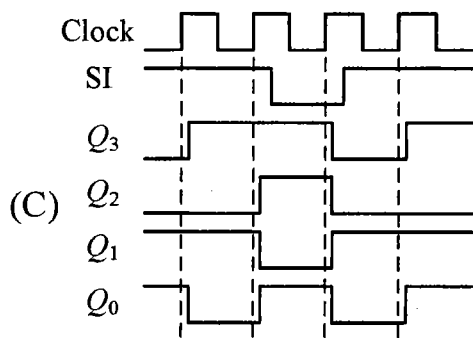


Fig. 5



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Question 12 [7 points] Fig. 6 shows a circuit consists of three T flip-flops and a NAND gate. This circuit is synchronized by a common clock pulse (Clock). If the present state of CBA is 100, what is the next state of CBA.

- (A) 001 (B) 010 (C) 100 (D) 110

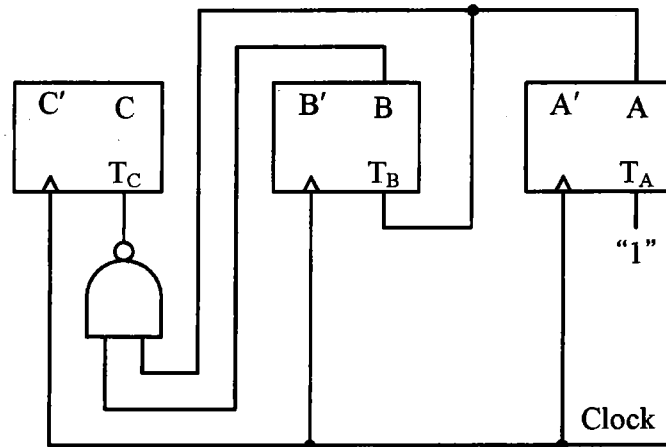


Fig. 6

Question 13 [7 points] Fig. 7 shows a Moore sequential circuit consisting of two D flip-flops and three logic gates. "X" is the input signal, and "Z" is the output signal. Which of the following is its Moore state graph.

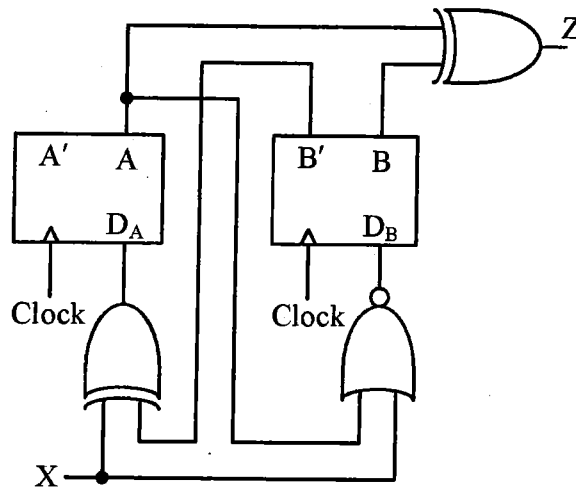
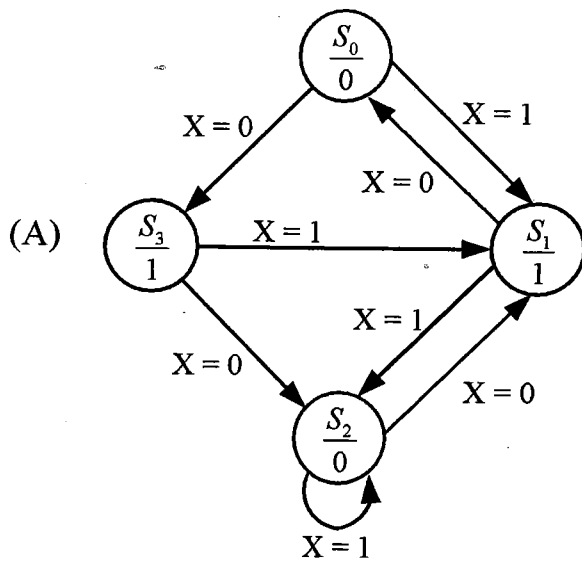
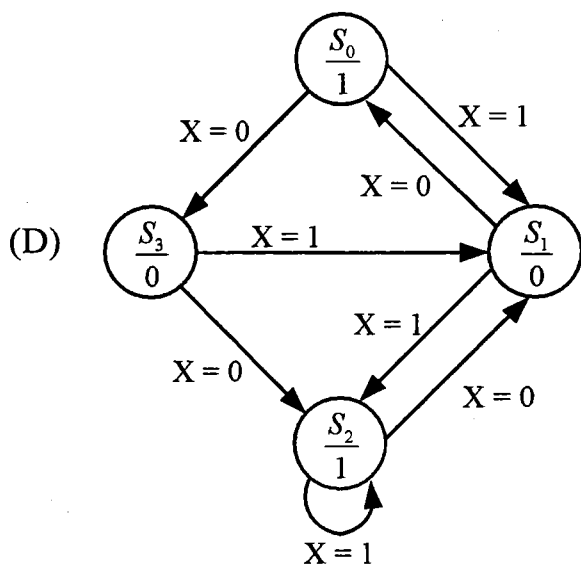
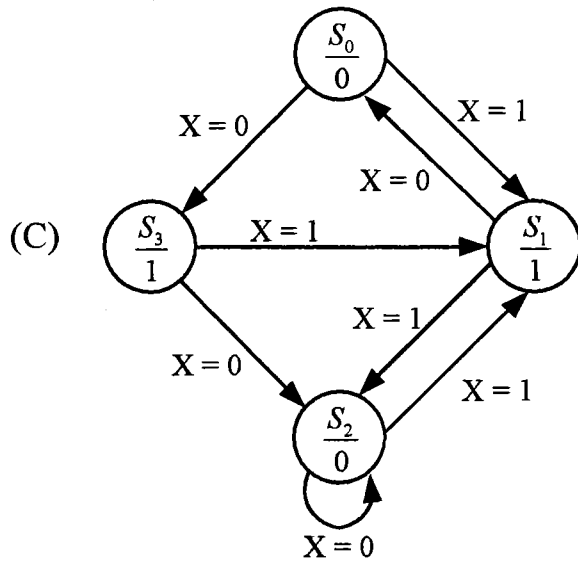
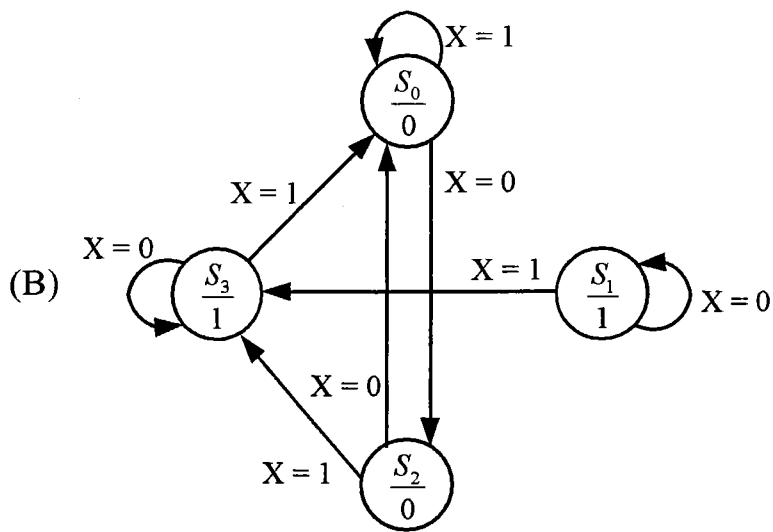


Fig. 7





Question 14 [7 points] Fig. 8 shows a serial adder. Which of the following is the state graph for the serial adder.

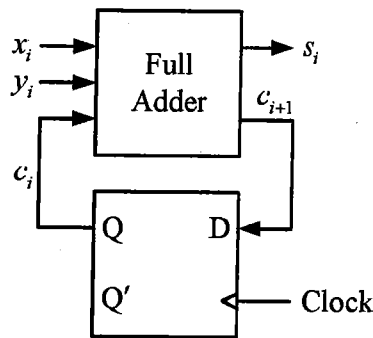
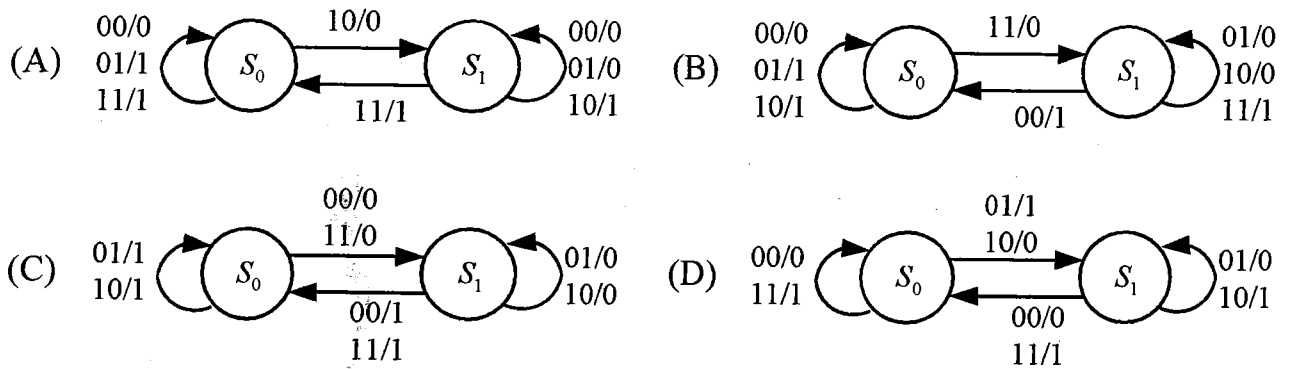


Fig. 8

Question 15 [7 points] Table 3 shows a transition table with the outputs missing. The output should be $Z = (X \oplus B)'$. Which of the following is the state graph.

Table 3

ABC	$A^+B^+C^+$	
	X=0	X=1
000	011	010
001	000	100
010	100	100
011	010	000
100	100	001

