# 第一次期中考解答

# 第一題

A.

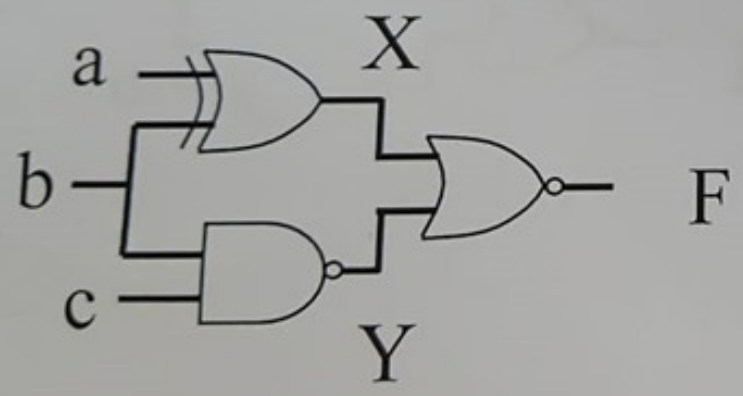
B.

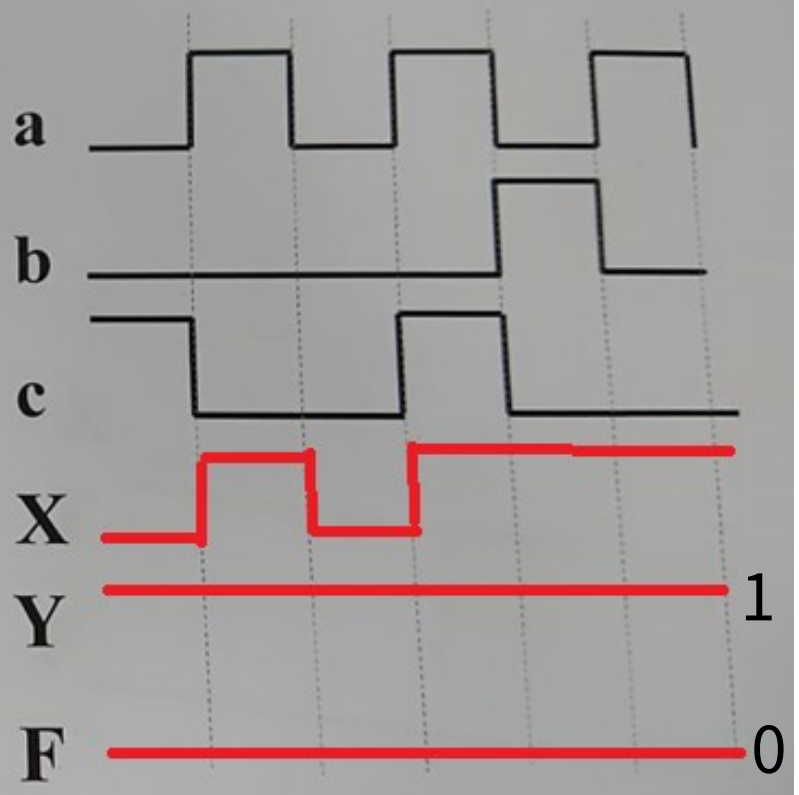
C.

D.

# 第二題

2. Please draw the time diagram to show the responses (X, Y, F) of the three gates. (9%)



# 第三題

ease prove ( x + y + z )’ = x’ ・ y’ ・ z’ and x ・ (y + z) = ( x ・ y ) + ( x ・ z )

| x | y | z | ( x + y + z )’ | x’ ・ y’ ・ z’ | x ・ (y + z) | ( x ・ y ) + ( x ・ z ) |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 |

# 第四題

選項 E 沒有兩個都寫會扣分

A.Power dissipation : 功率消耗，元件上會耗散能量造成輸出與輸入之功率有差額

B.Fan-out 一個 logic gate : 可驅動同類 logic gate 的數量

C.Gate propagation delay : 訊號從輸入穩定到可接收穩定輸出的時間

D.Gray code vs. binary : code gray code 一次只翻轉 1bit ，較 binary code 省電

E.Advantages of 2’s complement representation :

1 、沒有正負 0

2 、加減法皆只需使用加法器，電路設計上較簡單

F.A/D converter : 將類比訊號轉換至數位訊號的儀器

# 第五題

沒化簡扣部分分數

5. The truth table for functions F is listed as:

(a) Simply F with K-map and implement it with product of sums **(5%)**

(b) Simply F with K-map and implement it with sum-of-products **(5%)**

| a | b | c | d | F |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

(A)

| ab \ cd | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 0 | 0 | 1 |
| 01 | 1 | 0 | 0 | 1 |
| 11 | 0 | 0 | 1 | 1 |
| 10 | 0 | 0 | 0 | 1 |

F = (b+d’ )
(a+d’ )(a’ +c)

# 第五題

沒化簡扣部分分數

5. The truth table for functions F is listed as:

(a) Simply F with K-map and implement it with product of sums **(5%)**

(b) Simply F with K-map and implement it with sum-of-products **(5%)**

| a | b | c | d | F |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

(B)

| ab \ cd | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 0 | 0 | 1 |
| 01 | 1 | 0 | 0 | 1 |
| 11 | 0 | 0 | 1 | 1 |
| 10 | 0 | 0 | 0 | 1 |

F =
cd’ +a’ d’ +abc

# 第六題

6. Simply function F with K-map and draw the NOR logic diagram of it. **(10%)**

**F(A,B,C,D)=A'BC'+ABC'+CD+A'B'CD'**

| AB \ CD | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 0 | 0 | 1 | 對F (F'1)' |
| 01 | 1 | 1 | 1 | 0 |
| 11 | 1 | 1 | 1 | 0 |
| 10 | 0 | 0 | 1 | 0 |

沒化簡扣部分分數， Kmap 錯全錯

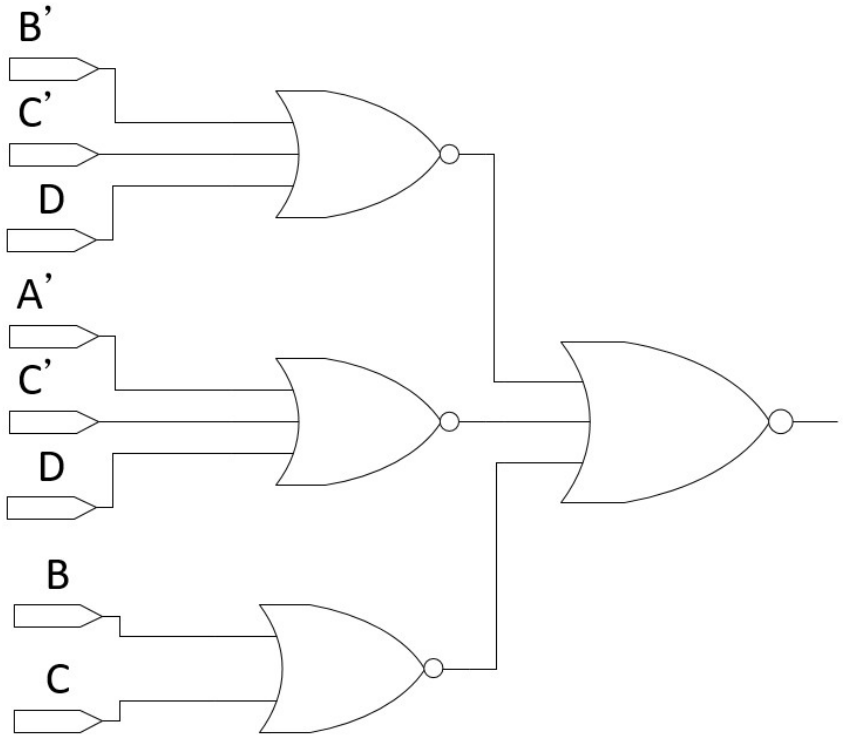
做 Kmap( 答案不只一種 )

= ((B' + C' + D)' + (A' + C' + D)' + (B + C)'

# 第六題

6. *Simply* function F with K-map and draw the NOR logic diagram of it. **(10%)**

**F(A,B,C,D)=A'BC'+ABC'+CD+A'B'CD'**



# 第七題

7. Simply function F with K-map and draw the NAND logic diagram of it. **(10%)**

**F(A,B,C,D)=A'B'D'+ABD'+AC'D+BCD'**

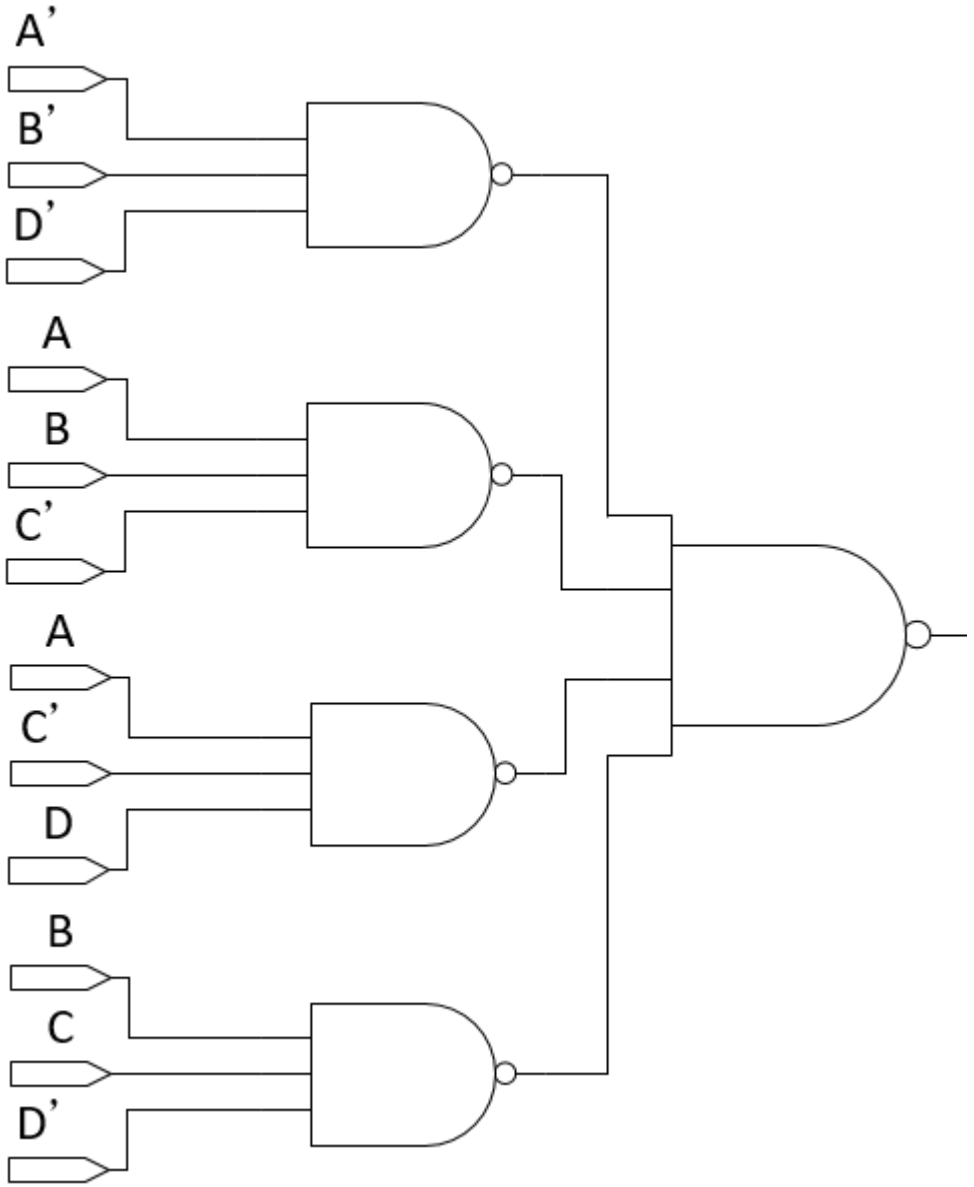
| AB \ CD | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 0 | 0 | 1 |
| 01 | 0 | 0 | 0 | 1 |
| 11 | 1 | 1 | 0 | 1 |
| 10 | 0 | 1 | 0 | 0 |

沒化簡扣部分分數， Kmap 錯全錯

改 Kmap ( 答案不只一種 )

(F) = ((A' B' D')' (ABC')' (AC' D)' (BCD')' )'

# 第七題



# 第八題

8. Simply the following function with K-map and implement it with sum-of-products (8%) and product-of-sums (8%).

**F(A,B,C,D)=Σ(0,6,7,8,14,15) with don't care condition *d*(A,B,C,D)=Σ(2,4,10)**

Sum-of-products

| AB \ CD | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 0 | 0 | X |
| 01 | X | 0 | 1 | 1 |
| 11 | 0 | 0 | 1 | 1 |
| 10 | 1 | 0 | 0 | X |

沒化簡扣部分分數

$F = BC + B'D'$

# 第八題

8. Simply the following function with K-map and implement it with sum-of-products (8%) and product-of-sums (8%).

**F(A,B,C,D)=Σ(0,6,7,8,14,15) with don't care condition *d*(A,B,C,D)=Σ(2,4,10)**

Product-of-sum

| AB \ CD | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 0 | 0 | X |
| 01 | X | 0 | 1 | 1 |
| 11 | 0 | 0 | 1 | 1 |
| 10 | 1 | 0 | 0 | X |

沒化簡扣部分分數

$F = (B' + C)(B + D')$