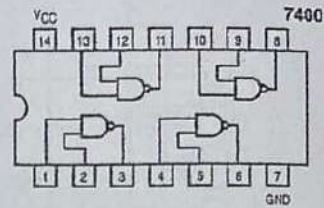


1. By using one chip 7400 (4x2 input NAND gates) you can achieve:

- \overline{AB}
- AB or $\overline{\overline{AB}}$
- $A + B$ or $\overline{\overline{A+B}}$
- $\overline{A} + \overline{B}$ and all the above
- None



2. The simplest Boolean function of the shown k-map is:

- $\overline{B}\overline{C} + DB + \overline{A}D$
- $D\overline{C} + DB + \overline{B}\overline{C}$
- $\overline{B}\overline{C} + D\overline{C} + DB + \overline{A}D$
- $\overline{B}\overline{C} + D\overline{C} + DB + \overline{A}\overline{B}D$
- None

		CD			
	AB	00	01	11	10
00		1	1	1	0
01		0	1	1	0
11		0	1	1	0
10		1	1	0	0

3. In the dual-purpose adder/subtractor circuit shown (i.e., U9), if $Y_5 = 1$, $(X_3X_2X_1X_0) = 1011$ and $(Y_3Y_2Y_1Y_0) = 0111$, then $(\Sigma_4\Sigma_3\Sigma_2\Sigma_1)$ of U9 is _____

- 1000
- 1001
- 0100
- 0010
- None

4. In the dual-purpose adder/subtractor circuit shown (i.e., U9), if $Y_5 = 1$, $(X_3X_2X_1X_0) = 0000$ and $(Y_3Y_2Y_1Y_0) = 0000$, then $(\Sigma_4\Sigma_3\Sigma_2\Sigma_1)$ of U9 is _____

- The 2's complement of $(Y_3Y_2Y_1Y_0)$
- The 1's complement of $(Y_3Y_2Y_1Y_0)$
- The 2's complement of $(X_3X_2X_1X_0)$
- The 1's complement of $(X_3X_2X_1X_0)$
- None

5. In the dual-purpose adder/subtractor circuits shown (i.e., U9 and U12), if $Y_5 = 0$, $(X_3X_2X_1X_0) = 1011$ and $(Y_3Y_2Y_1Y_0) = 0111$, then $(C_{out}\Sigma_4\Sigma_3\Sigma_2\Sigma_1)$ of U12 is _____

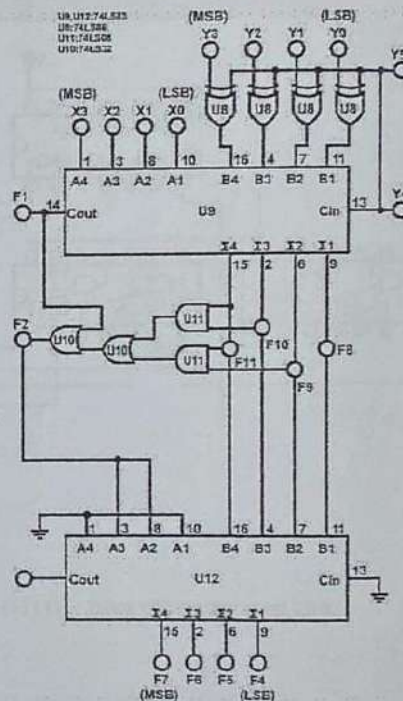
- 11001
- 10010
- 11000
- 01001
- None

6. How many inputs will a decimal-to-BCD encoder have?

- 4
- 6
- 9
- 12
- 10

7. A circuit that converts n inputs to 2^n outputs is called _____

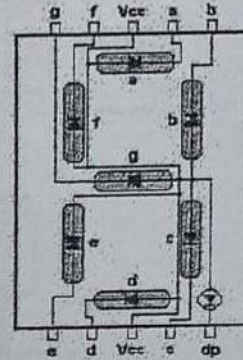
- Encoder
- Decoder
- Demultiplexer
- Multiplexer



15. For the circuit shown, the counter state (Q1Q 0) follows the sequence
- 00,01,10,11,00 ...
 - 00,01,10,00,01 ...
 - 00,01,11,00,01
 - 00,10,11,00,10

16. The seven-segment display configuration shown in the figure is referred to as:

- Configuration is not clear
- Common anode configuration
- Common cathode configuration
- This is not a seven-segment display
- None of the above



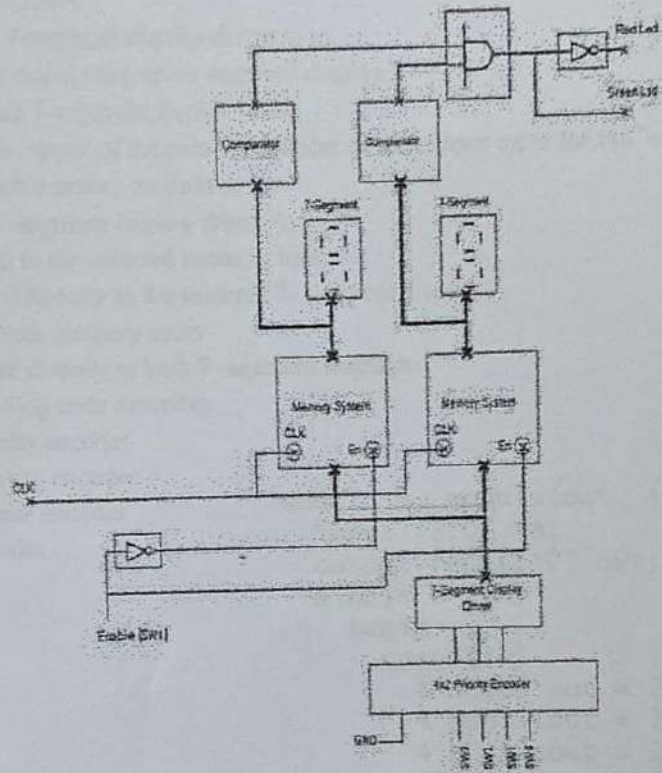
17. To turn on these LED segments:
- The inputs logic must be set high
 - The inputs logic must be hi-impedance
 - The inputs logic could be set to low or high
 - The inputs logic must be set to low
 - None
18. How many D-Flip-Flops are required to build a 2x4 memory?
- 2
 - 4
 - 8
 - 16
 - 32
19. A Flip-Flop can be used to store
- One bit only
 - 8 bits
 - 4 bits
 - 2 bits
 - Flip-Flop cannot store anything
20. A memory with 8 words requires
- One bit address
 - Two bits address
 - Three bits address
 - None
21. A memory address is a unique identifier and can be used by a device or CPU for
- Reading operations only
 - Writing operations only
 - Both reading and writing operations
 - The direction of data transfer
22. The following set of instructions represent:
- ```

MAR <= PC;
state = 1;
IR <= Memory[MAR];
PC <= PC + 1 ;

```
- The Decoding phase
  - The PC register control phase
  - The Decode and Execution phases

- d. The Fetch phase
- e. None

Consider the FPGA-based simple security system block diagram shown below, answer the following questions



23. To build such FPGA-based simple security system, we need
  - a. Four comparators
  - b. Two Priority encoders
  - c. Two clocks with different frequencies
  - d. None of the above is correct
24. In the priority encoder, if multiple input lines are active, the output code:
  - a. Is wrong
  - b. Is corresponding to the input line with the highest priority
  - c. Is corresponding to the first input line
  - d. Is corresponding to the input line with the lowest priority
25. The number of D-flip flops in each memory unit is
  - a. Seven
  - b. Depending on the number of digits used in the security system
  - c. Eight
  - d. Depending on the maximum value of the digit
26. The enable port (Sw4) determines:
  - a. Which memory system is active
  - b. Which switch to read from
  - c. Which 7-segment display to use
  - d. A+C

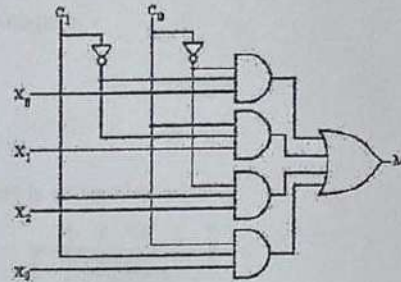
27. In the memory system, a multiplexer is associated with each D-flip flop. Which of the following sentences is correct?
- This multiplexer is a 2 x 1 mux
  - This multiplexer is controlled by the enable port
  - A+B
  - None of the above
28. The purpose of the 7-segment display driver is to:
- Enable and disable the seven segment display
  - Select which 7-segment display to use
  - Convert the output of the priority encoder to the proper input for the 7- segment displays
  - Select which memory module to use
29. The output of the 7-segment display driver is:
- First stored in the selected memory unit
  - Transferred directly to the selected 7- segment display
  - Stored in both memory units
  - Transferred directly to both 7- segment displays
30. The following Verilog code describes
- 8 x 3 priority encoder
  - 4 X 2 priority encoder
  - 4 x 2 normal encoder
  - 2 x 4 decoder
  - None

```

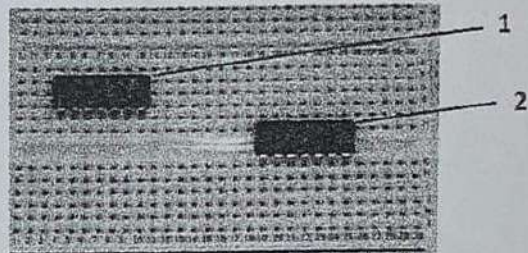
module my_module(out, in);
 input [3:0] in;
 output reg [1:0] out;
 always @ (in)
 begin
 casex(in)
 4'b0001:out = 2'b00;
 4'b001x:out = 2'b01;
 4'b01xx:out = 2'b10;
 4'b1xxx:out = 2'b11;
 default:out = 2'b00;
 endcase
 end
endmodule

```

- e. Tri-state buffer
8. In the given 4 x 1 multiplexer, if  $c_1 = 0$  and  $c_0 = 1$  then the output  $M$  is \_\_\_\_\_. Select one or more:
- X0
  - X1
  - X2
  - X3
  - None



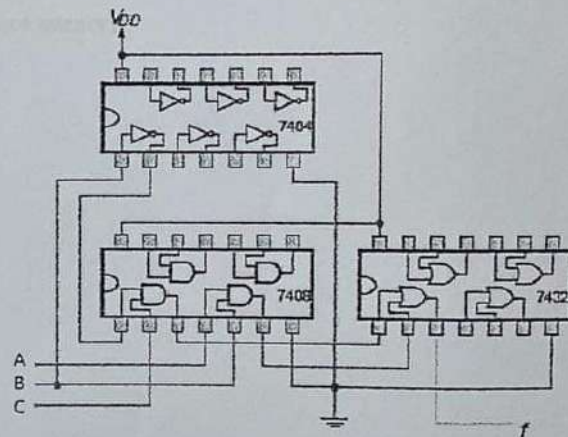
9. Select the correct positioning of the IC chip:
- 1
  - 2
  - Both are correct
  - None are correct
  - Breadboard is wrong



10. Determine the Boolean function  $f$ , in SoP form of the following circuit
- $AB + BC$
  - $A'C + AB$
  - $AB + B'C$
  - $(A+B).(B+C)$
  - $AB' + B'C$

11. To construct 3\*8 decoder using ICs, we need at least:
- Two (7408), One (7404), One (7432)
  - Four (7408), One (7404)
  - One (7408), One (7404)
  - Three (7408), one (7404)

12. Which of the following is the output 'Y3, Y2, Y1, Y0' for 2 to 4 decoder with enable pin "0" and inputs A, B is '10'?
- 0000
  - 0001
  - 0010
  - 0100
  - None



13. An 8-bit binary ripple UP counter is holding the count 01111111. What will be the count after 135 clock pulses?

- 0000 0101
  - 1111 1001
  - 0000 0110
  - 0000 0111
14. Read and write operations are used in
- MUX
  - Decoder
  - Memory
  - Encoders