



KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

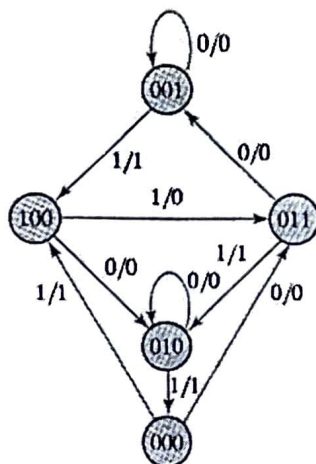
(10 X 10 = 100 Marks)

1. The outputs X and Y, from two combinational logic circuits, are tabulated below. Use Karnaugh maps to minimize these functions.

A	B	C	D	E	X	Y
0	0	0	0	0	0	1
0	0	0	0	1	1	1
0	0	0	1	0	1	1
0	0	0	1	1	0	1
0	0	1	0	0	0	1
0	0	1	0	1	1	0
0	0	1	1	0	0	0
0	0	1	1	1	0	0
0	1	0	0	0	1	1
0	1	0	0	1	1	0
0	1	0	1	0	1	1
0	1	0	1	1	0	1
0	1	1	0	0	1	1
0	1	1	0	1	1	1
0	1	1	1	0	0	0
0	1	1	1	1	0	0

A	B	C	D	E	X	Y
1	0	0	0	0	1	1
1	0	0	0	1	0	1
1	0	0	1	0	1	1
1	0	0	1	1	0	1
1	0	1	0	0	0	0
1	0	1	0	1	0	0
1	0	1	1	0	0	0
1	0	1	1	1	0	1
1	1	0	0	0	1	0
1	1	0	0	1	1	0
1	1	0	1	0	0	1
1	1	0	1	1	1	1
1	1	1	0	0	1	0
1	1	1	0	1	1	1
1	1	1	1	0	1	0
1	1	1	1	1	0	1

2. a) Implement the Boolean function $F(A, B, C, D) = \prod M(3, 8, 12)$ using 8x1 multiplexer. [5]
- b) An 8x1 multiplexer has inputs A, B, and C connected to the selection inputs S_2, S_1 , and S_0 respectively. The data inputs I_0 to I_7 are as follows. [5]
 $I_1=I_2=I_7=0$; $I_3=I_5=1$; $I_0=I_4=D$; and $I_6=D'$. Determine the Boolean function that the multiplexer implements.
3. Design a BCD to Excess -3 code converter and implement the circuit using only NAND gate.
4. A sequential circuit has three flip-flops A, B, and C, and has one input x and one output y. The state diagram is shown below. The circuit is to be designed by treating the unused states as don't care conditions. Analyze the circuit obtained from the design to determine the effect of the unused states. Use JK flip-flops in the design.



5. A sequential circuit with two D flip-flops A and B, two inputs x and y, and one output z is specified by the following next-state and output equations.

$$A(t + 1) = x'y + xB$$

$$B(t + 1) = x'A + xB$$

$$z = A$$

- i) Draw the logic diagram of the circuit.
 - ii) List the state table for the sequential circuit.
 - iii) Draw the corresponding state diagram.
6. Design a mod-6 synchronous binary up-counter using JK-type flip-flops.
7. Explain the different types of flags in 8086 Microprocessor. Specify the content of the registers and indicate the status of the flag registers after the execution of the following instructions.
- ```
MOV AX, 2345H
MOV BX, 1234H
ADD AX, BX
SUB AX, BX
HLT
```
8. Two 8-bit numbers X and Y are stored in memory. Write a 8086 assembly language program to calculate Z based on the following equation and store it in memory as a 16-bit number. Discard the remainder in the division operation.
- $$Z = (X^2 + Y^2) / (X^2 - Y^2)$$
9. Develop a 8086 assembly language program to compare two arrays of 10 elements each. If all the elements in both the arrays are the same, store 1 in the memory location 2200H otherwise store 0.
10. How many modes of operation are there in the programmable peripheral interface? Discuss the various modes of operation with respect to 8086 processor.

