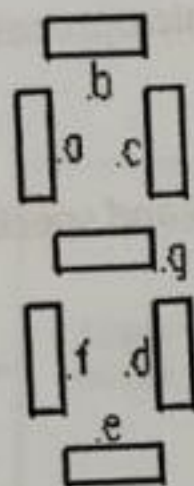




KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions
(10 X 10 = 100 Marks)

1. a) Simplify the following Boolean Expression using K-Map. [5]
 $F(a, b, c, d) = \sum (2, 4, 9, 12, 15) + d(3, 5, 6, 13)$
b) Draw the logic circuit for the derived expression and find the NAND equivalent [5] for the same.
2. There is an integrated circuit called a BCD - seven segment decode that takes 4 inputs and has seven output. The inputs represent a number between 0 and 9, and each of the seven outputs corresponds to one of seven LED's in a seven-segment display. A typical seven segment display is shown below.



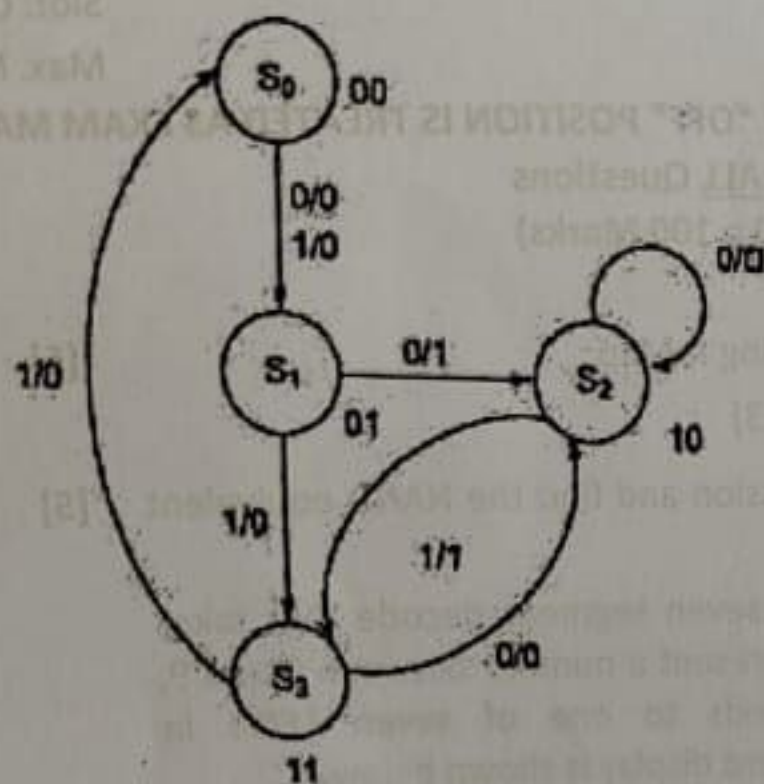
For example the number zero would be represented by lighting segments a, b, c, d, e and f, as shown below.



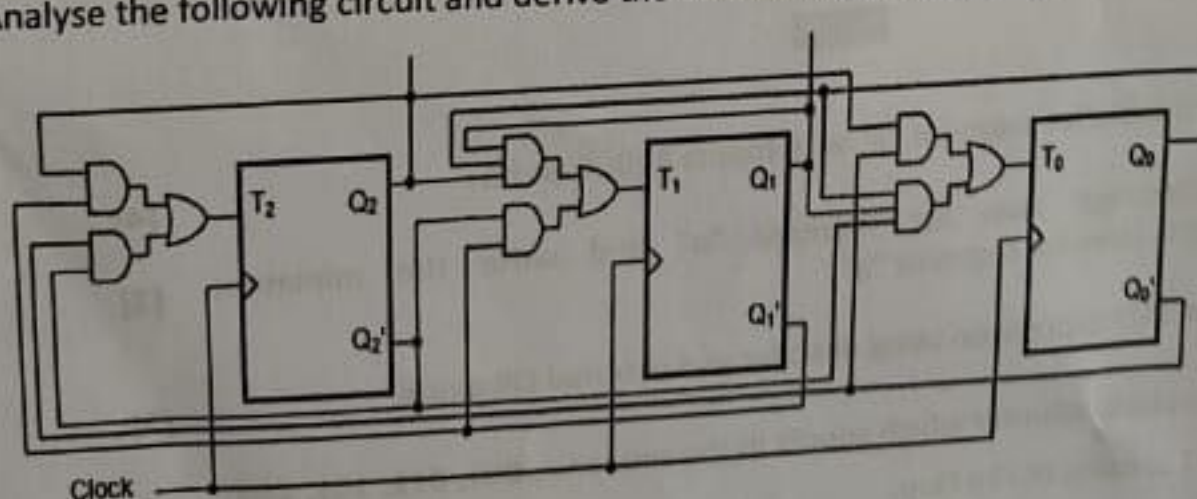
- a) Write the truth table for segment "a" with inputs A, B, C and D. [4]
 - b) Draw the Karnaugh map for segment "a" and write the minimum sum-of-products form for segment "a". [3]
 - c) Implement the SOP expression using decoder and external OR gates. [3]
3. Design an Asynchronous counter which counts in the sequence 001, 011, 101, 110, 010, 111, 000, 001 ... using JK Flip Flop.



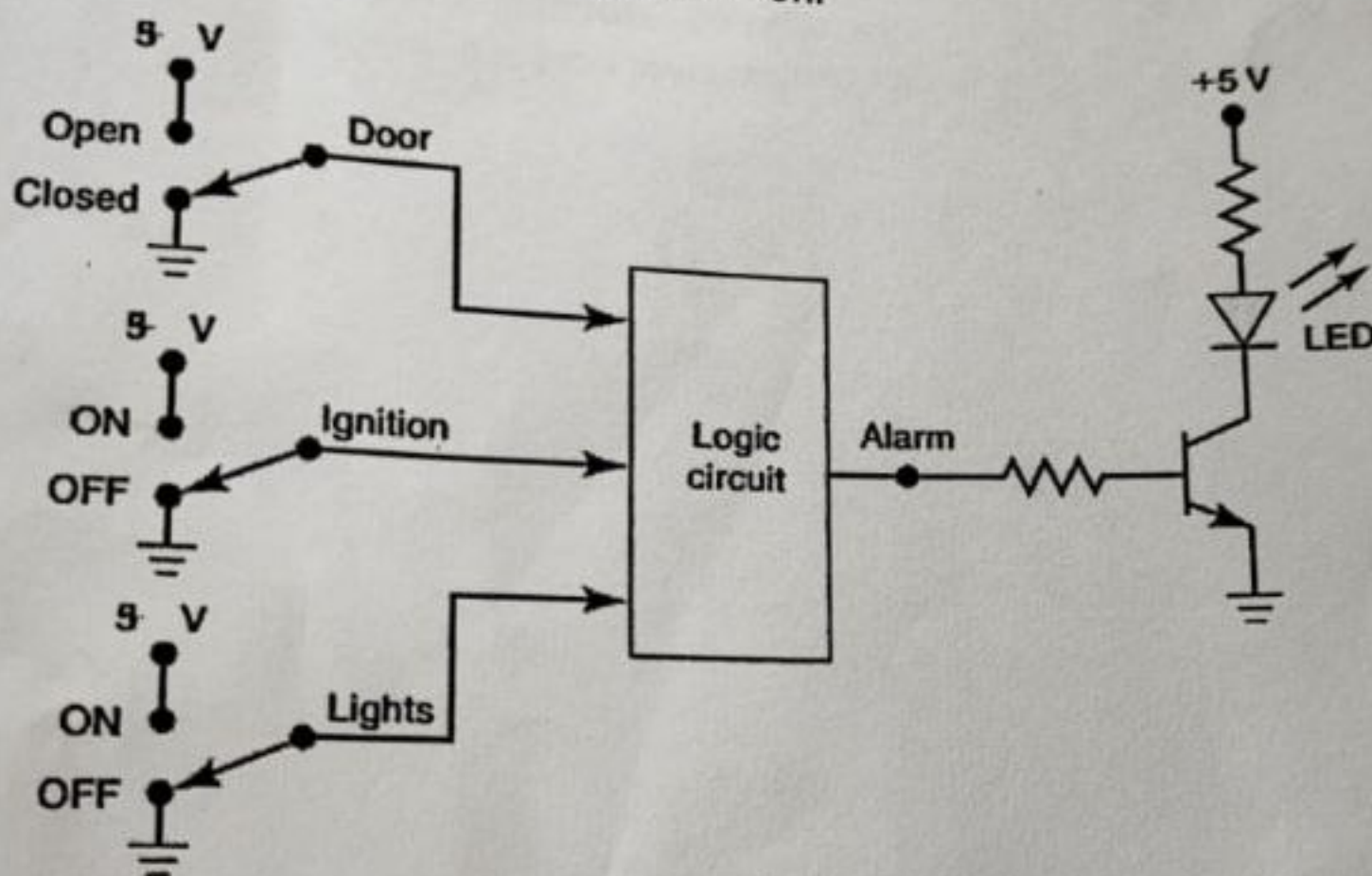
4. Design a synchronous sequential circuit using T flip flop for the following state diagram.



5. a) Illustrate the need for Flag Register in the microprocessor 8086 with the help of neat diagram and examples. [5]
- b) Analyse the use of the following instructions and specify the Addressing modes used. [5]
- MOV AX, DX
 - MOV BX, [1345H]
 - MOV CX, [BX]
 - MOV DX, [BX + SI + 0AH]
6. a) Inscribe an assembly language program in 8086 for finding the LCM of two numbers. [5]
- b) Create an assembly program in 8086 for finding the factorial of a given number. [5]
7. Analyse the following circuit and derive the state table and state diagram.



8. Illustrate the need for DMA access. Justify its need with the internal architecture of the peripheral chip that could be used for helping the microprocessors to perform Direct Memory Access.
9. Design a circuit for an automobile alarm circuit shown below used to detect certain undesirable conditions. The three switches are used to indicate the status of the door by the driver's seat, the ignition and the headlights, respectively. Design the logic circuit using a 2*1 multiplexer with these three switches as inputs so that the alarm will be activated whenever either of the following conditions exists.
- The headlights are on while the ignition is off.
 - The door is open while the ignition is on.



10. a) Convert the following into its equivalent Hexadecimal, Octal and Binary. [6]

$(123.8765)_{10}$

- b) Convert the following Gray code to its equivalent Binary number. [2]

10000100000111111001

- c) Convert the following to its 1's and 2's complement. [2]

10001000111000110

