THEORY OF COMPUTATION

DEPARTMENT OF COMPUTER ENGINEERING

Subject : TOC **ASSIGNMENT NO – 01** **Unit : I**

THEORY QUESTIONS

1. **Define the following terms with example -**

   i) DFA ii) NFA iii) epsilon NFA

2. **Define the following terms with example**.

   i) Alphabet

   ii) String

   iii) Regular Language

   iv) Regular Expression

3. **Give formal definitions for the following**.

   i) Deterministic finite automata

   ii) Moore machine

   iii) Reachable states of P

   iv) Acceptance of a string by FA

4. Explain the **extended Transition function of NFA-Epsilon**.
5. **Compare DFA and NFA.**
6. **Compare NFA and NFA epsilon.**
7. **Compare Moore machine and Mealy machine**.

FA AND DFA EXAMPLES

8. Construct DFA to **accept String end with 10.**
9. Construct **DFA** for language defined by input {a, b} where

   S = (String containing only a's)

   S = (String containing only b's)

   S = (String containing only a's or b's)

10.Construct **DFA** for language defined by input {0, 1} where

S = (String ending with 0 always)

S = (String representing odd binary number)

S = (String over alphabets * with total nos of 0's even)

11. Construct **DFA** to accepts string of 0's and 1's having at **least three consecutive 0's**.

12. Design **FA** which checks the **divisibility by 3 for binary number input.**

13. Construct a **Deterministic Finite Automata (DFA)** for the following.

i) L = {0,1 | Accept all the strings ending in 00 or 11}.

ii) Accept a binary number divisible by 3

14. Design **FA** that accepts set of all string over alphabets {0, 1}
Such that **third symbol from the right end is 1.**

15. Design **FA** accepting Following Language over {0, 1}

i) Set of all string **having atleast three consecutives zeros**

ii) Set of all string **that begin and end with same symbol.**

16.Design **DFA** accepting Following Language over {a, b}

i) Set of all **string that begin with the substring ab**

ii) Set of all string **which at most two consecutive b's**

17. Construct **DFA** for the language of all string the **begin and end with same symbol for alphabet {0, 1}.**

18.Construct **FA** for the following language L.
L=[w/w is a binary word of length 4i , i>=1 such that each **consecutive block 4 bits contains at least 2 0's]**

19. Design a **DFA** which checks the **divisibility by 4 for decimal number.**

20. Design a **DFA** which **accepts ternary number divisible by 4.**

21. Design **Finite Automata (FA)** for accepting strings over Σ ={0,1} **with even numbers of 0's and odd number of 1's.**

NFA TO DFA CONVERSION EXAMPLES

22. **Construct the equivalent DFA for the following NFA :-**

States/∑	0	1
→p	{p,q}	{q}
ⓠ	{r}	{r}
r	-	{r}

23.Let M = {{q0, q1}, {0,1}, d, q0, {q1}}

Where

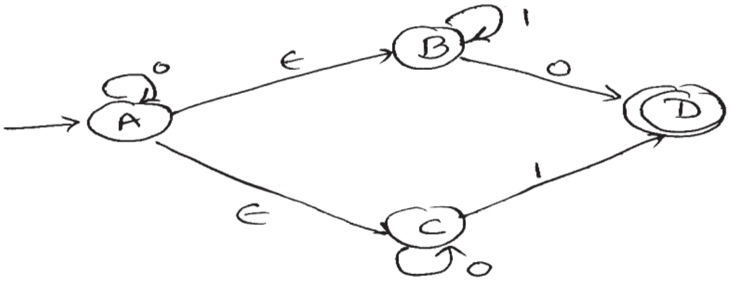
$$\delta(q_0,\ 0) = \{q_0,q_1\}$$
$$\delta(q_0,1) = \{q_1\}$$
$$\delta(q_0,0) = \varnothing$$
$$\delta(q_1,\ 1) = \{q_0,\ q_1\}$$

Construct equivalent DFA.

NFA WITH EPSILON EXAMPLES

24.Construct **NFA with ε moves** which accepts a language consisting the strings of any number of a's followed by any number of b's, followed by any number of c's.

25.Convert the following **NFA with e-moves** into NFA without e moves :



MEALY AND MOORE MACHINE EXAMPLES

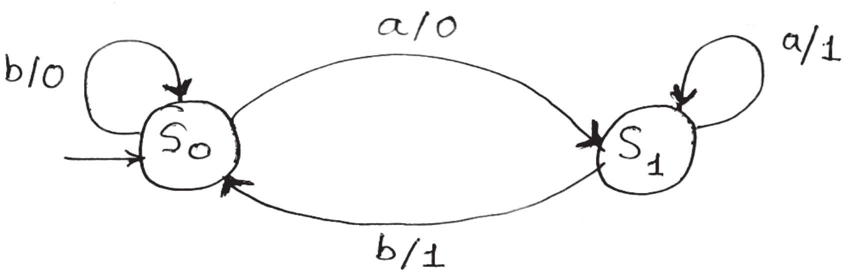
26.Construct a **Mealy Machine** which can output EVEN/ODD if the total number of 1’s in the input is even or odd. The input symbols are 0 and 1.

27.Construct a **Mealy and Moore Machine** for 1 's complement of a binary number.

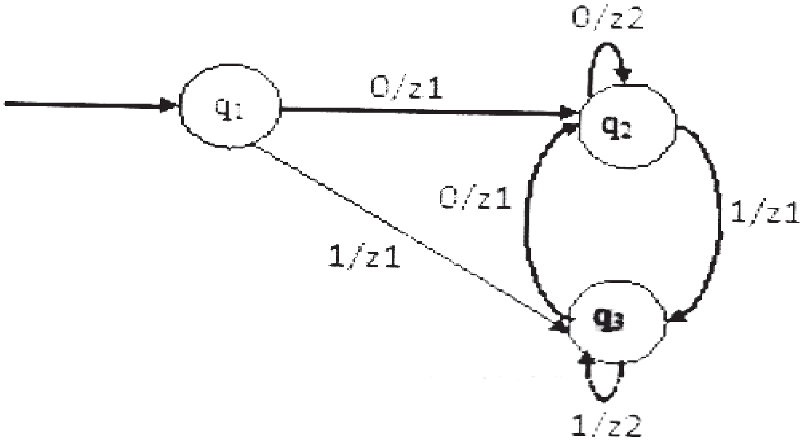
28.Construct a **Mealy Machine** for 2's complement of a binary number.

CONVERSION OF MEALY TO MOORE MACHINE EXAMPLES

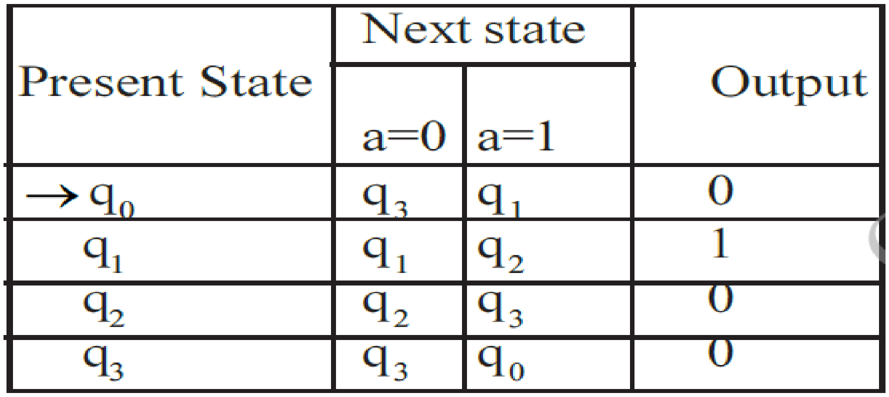
29.Convert the following **Mealy Machine to Moore machine** –



30.Consider the following **Mealy machine**, Construct a Moore machine equivalent to it.



31.Construct **Mealy machine** which equivalent to the Moore machine given in the foll. Table.



Present State	Next state		Output
	a=0	a=1	
→ q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

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