<u>Question Bank</u>

1 List any four ways of theorem proving.
2 Define Alphabets.
3 Write short notes on Strings.
4 What is the need for finite automata?
5 What is a finite automaton? Give two examples.
6 Define DFA.
7 Explain how DFA process strings.
8 Define transition diagram.
9 Define transition table.
10. Define the language of DFA.
11. Construct a finite automata that accepts $\{0,1\}^+$.
12. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings ending in 00.
13. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings with three consecutive 0's.
14. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings with 011 as a substring.
15. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings whose 10^{th} symbol from the right end is 1.
16. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings such that each block of 5 consecutive symbol contains at least two 0's.
17. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings that either begins or end(or both) with 01.
18. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings such that the no of zero's is divisible by 5 and the no of 1's is divisible by 3.
19. Find the language accepted by the DFA given below.
20. Define NFA.
21. Define the language of NFA.
22. Is it true that the language accepted by any NFA is different from the regular language? Justify your Answer.
23. Define ε-NFA.
24. Define ε closure.
25. Find the εclosure for each state from the following automata.
26. Define Regular expression. Give an example.
27. What are the operators of RE.
28. Write short notes on precedence of RE operators.
29. Write Regular Expression for the language that have the set of strings over {a,b,c} containing at least one a and at least one b.
30. Write Regular Expression for the language that have the set of all strings of 0's and 1's whose 10^{th} symbol from the right end is 1.

30 Write Regular Expression for the language that has the set of all strings of 0's and 1's with at most one pair of consecutive 1's.

31 Write Regular Expression for the language that have the set of all strings of 0's

32 and 1's such that every pair of adjacent 0's appears before any pair of adjacent

34 1's.

35 Write Regular Expression for the language that have the set of all strings of 0's and 1's whose no of 0's is divisible by 5.

36 Write Regular Expression for the language that has the set of all strings of 0's and 1's not containing 101 as a substring.

37 Write Regular Expression for the language that have theset of all strings of 0's and 1's such that no prefix has two more 0's than 1's, not two more 1's than 0's.

38. Write Regular Expression for the language that have the set of all strings of 0's and 1's whose no of 0's is divisible by 5 and no of 1's is even.

39. Give English descriptions of the languages of the regular expression $(1+\varepsilon)(00^*1)^*0^*$.

40. Give English descriptions of the languages of the regular expression $(0^*1^*)^*000(0+1)^*$.

41. Give English descriptions of the languages of the regular expression $(0+10)^*1^*$.

42. Convert the following RE to ε-NFA.01^*.

43. State the pumping lemma for Regular languages.

44. What are the application of pumping language?

45. State the closure properties of Regular language.

46. Prove that if L and M are regular languages then so is LUM.

47. What do you mean by Homomorphism?
Suppose H is the homomorphism from the alphabets {0,1,2} to the alphabets {a,b} defined by h(0)=a h(1)=ab h(2)=ba. What is h(0120) and h(21120).

48. Suppose H is the homomorphism from the alphabets {0,1,2} to the alphabets {a,b} defined by h(0)=a h(1)=ab h(2)=ba. If L is the language L(01*2) what is h(L).

49. Let R be any set of regular languages is U Ri regular?Prove it.

50 Show that the compliment of regular language is also regular.

51 . What is meant by equivalent states in DFA

Part B

1. a) If L is accepted by an NFA with ε-transition then show that L is accepted by an NFA without ε-transition.

b) Construct a DFA equivalent to the NFA.

M=({p,q,r},{0,1}, δ,p,{q,s})

Where δis defined in the following table.

δ	0	1
p	{q,s}	{q}
q	{r}	{q,r}
r	{s}	{p}
s	-	{p}

2. a)Show that the set L={$a^n b^n$ /n>=1} is not a regular. (6) b)Construct a DFA equivalent to the NFA given below: (10)

	0	1
p	{p,q}	P
q	r	R
r	s	-
s	s	S

3. a)Check whether the language L=($0^n 1^n$ /n>=1) is regular or not? Justify your answer.

b) Let L be a set accepted by a NFA then show that there exists a DFA that accepts L.

4.Define NFA with ε-transition. Prove that if L is accepted by an NFA with ε-transition then L is also accepted by a NFA without ε-transition.

5. a) Construct a NDFA accepting all string in $\{a,b\}^+$ with either two consecutive a's or two consecutive b's.

b) Give the DFA accepting the following language:set of all strings beginning with a 1 that when interpretedas a binary integer is a multiple of 5.

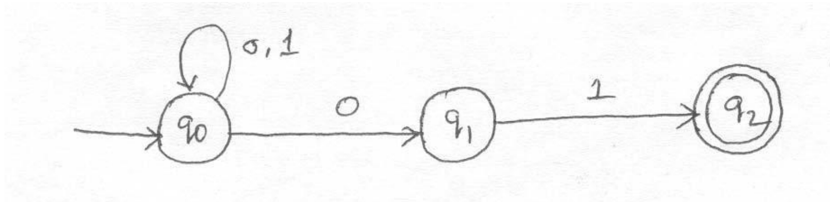
6. Draw the NFA to accept the following languages.

(i) Set of Strings over alphabet {0,1,…….9} such that the final digit has appeared before. (8)

(ii)Set of strings of 0's and 1's such that there are two 0's separated by a number of positions that is a multiple of 4.

7.a)Let L be a set accepted by an NFA.Then prove that there exists a deterministic finite automaton that accepts L.Is the converse true? Justify your answer. (10)

b)Construct DFA equivalent to the NFA given below: (6)



8.a) Prove that a language L is accepted by some ε–NFA if and only if L is accepted by some DFA. (8)

b) Consider the following ε–NFA.Compute the ε–closure of each state and find it's equivalent DFA. (8)

	ε	A	b	C
p	{q}	{p}	Φ	Φ
q	{r}	ф	{q}	Φ
*r	Φ	ф	ф	{r}

9.a) Prove that a language L is accepted by some DFA if L is accepted by some NFA.

b) Convert the following NFA to it's equivalent DFA

	0	1
p	{p,q}	{p}
q	{r}	{r}
r	{s}	ф
*s	{s}	{s}

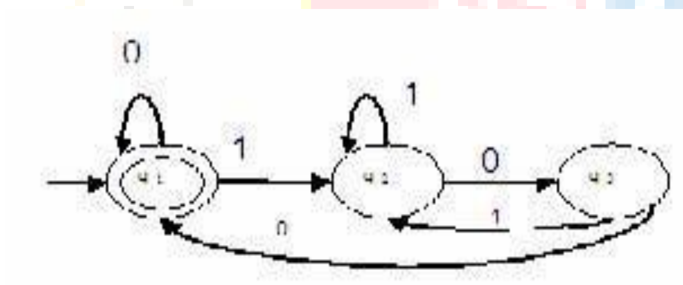
10.a) Explain the construction of NFA with εtransition from any given regular expression.

b) Let A=(Q,∑, δ, q0 ,{qf) be a DFA and suppose that for all a_k in ∑wehave δ(q0, a)= δ(qf ,a). Show that if x is a non empty string in L(A),then for all k>0,x is also in L(A).

PART-B

11.a)Construct an NFA equivalent to (0+1)*(00+11)

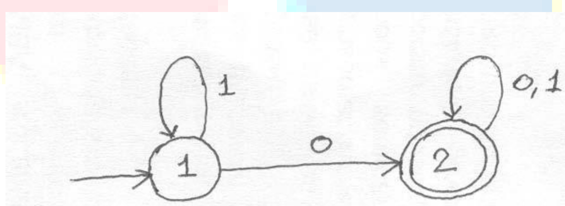
12.a)Construct a Regular expression corresponding to the state diagram given in the following figure.



b) Show that the set E={$0^i 1^i$ |i>=1} is not Regular. (6)

13.a)Construct an NFA equivalent to the regular expression (0+1)*(00+11)(0+1)*.

b)Obtain the regular expression that denotes the language accepted by the following DFA.

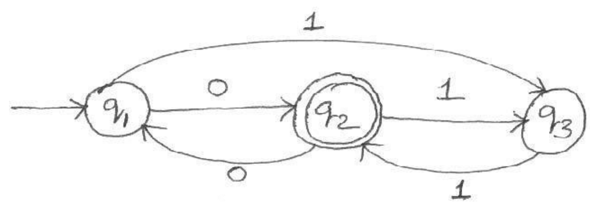


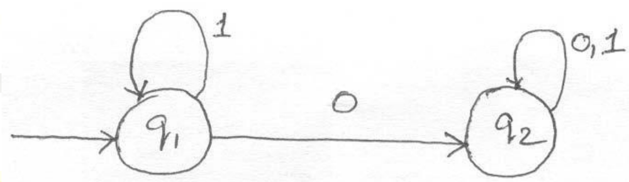
14.a)Construct an NFA equivalent to the regular expression ((0+1)(0+1)(0+1))*

b)Construct an NFA equivalent to 10+(0+11)0*1

15.a)Obtain the regular expression denoting the language accepted by the following DFA (8)

b)Obtain the regular expression denoting the language accepted by the following DFA by using the formula R_{ij}^{k}





16. a)Show that every set accepted by a DFA is denoted by a regular Expression

b)Construct an NFA equivalent to the following regular expression01*+1.

17. a)Define a Regular set using pumping lemma Show that the language $L=\{0^{i^2}$ / i is an integer,i>=1} is not regular

b)Construct an NFA equivalent to the regular expression 10+(0+11)0*1

18. a) Show that the set $L=\{O^{n2/n}$ is an integer,n>=1} is not regular.

b)Construct an NFA equivalent to the following regular expression $((10)+(0+1)^*$

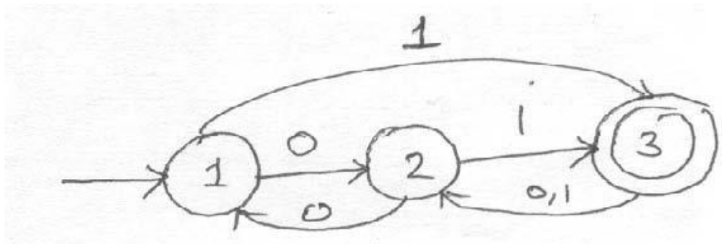
01. (10) 9.a)Prove that if L=L(A) for some DFA A,then there is a regular expression R such that L=L(R).

b) Show that the language $\{0^p$,p is prime} is not regular.

19.Find whether the following languages are regular or not.

(i) $L=\{w \in \{a,b\} | w=w^R\}$.
(ii) $L=\{0^n 1^m 2^{n+m}$,n,m>=1}
(iii) $L=\{1^k | k=n^2$,n>=1} . (4)
(iv) L1/L2={x | for some y εL2,xy εL1},where L1 and L2 are any two languages and L1/L2 is the quotient of L1 and L2.

20.a) Find the regular expression for the set of all strings denoted by R^2_{13} from the deterministic finite automata given below:

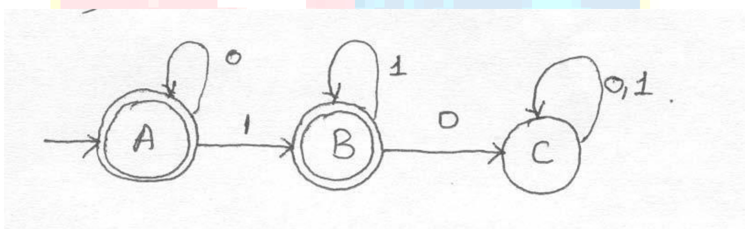


b)Verify whether the finite automata M1 and M2 given below are equivalent over

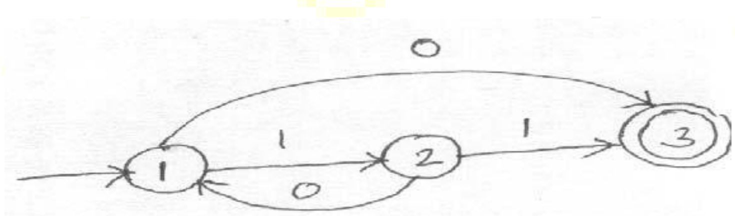
{a,b}.21.a)Construct transition diagram of a finite automaton corresponding to the

regular
expression $(ab+c^{*})^{*}$ b.

22..a)Find the regular expression corresponding to the finite automaton given below.



b)Find the regular expression for the set of all strings denoted by R^{2}_{23} from the deterministic finite automata given below.



23.a) Find whether the languages {ww,w is in (1+0)*} and {1_K | k=n , n>=1} are regular

or not.