THEORY OF COMPUTATION

DEPARTMENT OF COMPUTER ENGINEERING

Subject : TOC **ASSIGNMENT NO – 02** **Unit : II**

THEORY QUESTION

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

   i) Kleene closure ii) Positive closure

2. Explain in brief, **applications of regular expressions.**

3. **Justify if true or false the following**:

   Every subset of a regular language is regular.

4. **Prove that : Regular language is closed under complementation**.

5. What is **Kleen closure** and What **is positive closure**? For given language L under what circumstances L+ and L* is equal?

6. What are the **algebraic laws of Regular Expression**.

7. Explain the **application of Regular Expression in Text Search and Replace.**

8. With respect to **properties of Regular Language explain what is pumping Lemma** and closure properties of Regular Language.

REGULAR EXPRESSION TO FA/DFA/NFA

9. **Define Following with suitable example** :

   i) Regular Expression and Operations

   ii) Prove or Disprove the following : (rs + r)*r = r(sr + r)*

10. **Construct Finite Automata defined over { 0, 1} for the following R.E.**

    1(01 + 10) + 0(11 + 10)*

11. **Construct a Finite Automata for the following Regular Expressions**.

i) (1+0)* (00+11+10)

ii) 1(01+10)*+0(11+10)*

12. **Convert the following regular expression to epsilon-NFA and find epsilon closure**

of all the states : (0+1)*.1.(0+1)

13. **Construct DFA with reduced states equivalent to the regular expression**

10+(0+11)0*1

14. Prove the formula :

i) (r* s*)* = (r + s)*

ii) (ab)* != a* b*

iii) $(a+b)^* = (a+b)^* + (a+b)^*$

15. Construct minimized DFA accepting language represented by regular expression

0* 1 * 2 *. Convert given regular expression to NFA with ε moves.

16. Determine a regular expression over the alphabet Σ ={a,b}.

i) All strings that contain an even number of 'b's

ii) All strings that do not end with 'aa'

17. Illustrate in English the language of the following regular expression:

(1+ε) (00*1) *0*

18. Give the Regular Expression for the following :

i) The set of string over alphabets {a, b}starting with b and ending with odd number of a's or even number of b's.

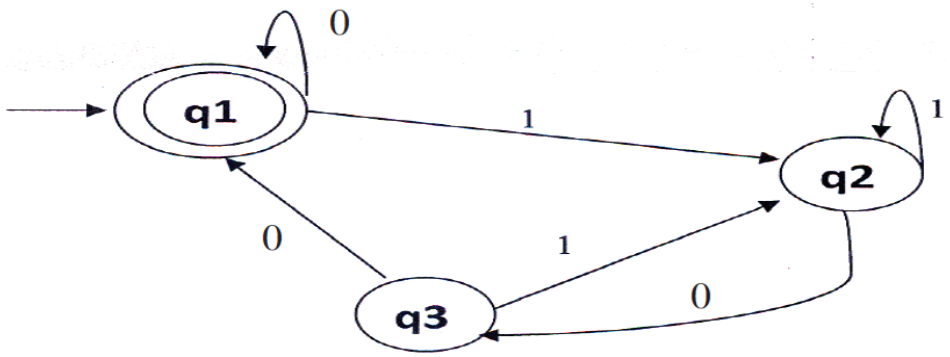
ii) The set {10, 1010}

19. For the following Regular Expression defined over alphabets {a, b} , Draw

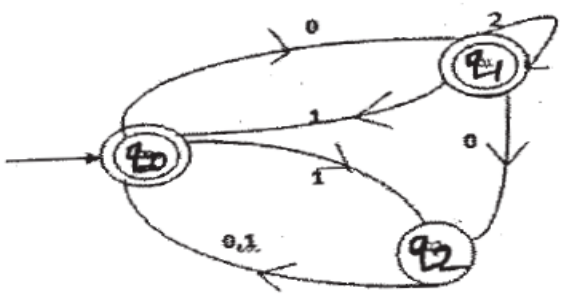
epsilon-NFA recognizing the corresponding language (ab+ba)* aa(ab+ba)

ARDEN'S THEOREM PROBLEMS

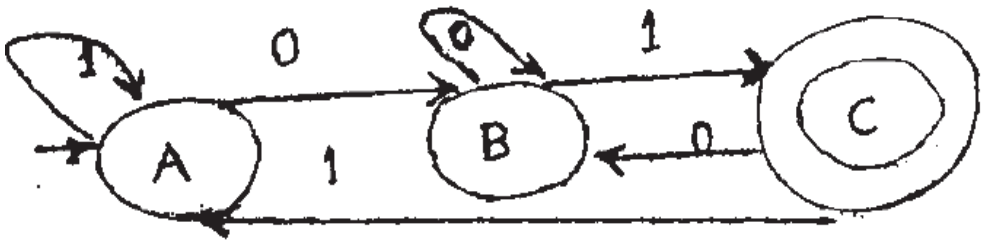
20. Find the regular expression for the set of string recognized by the given FA. Use **Arden's Theorem.**



21. Make use of **Arden's theorem to** determine the Regular Expression for the Finite Automata :



22. Convert following **FA into its equivalent regular expression using Arden's theorem**



PUMPING LEMMA PROBLEMS

23. Using **Pumping Lemma for the regular set** , Prove that L = $\{a^{i \text{ square}} \mid i >= 1\}$ is not regular.

24. Using **Pumping Lemma for the regular set** , Prove that L = $\{a^n b^n \mid i >= 1\}$ is not regular.

25. Using **Pumping Lemma for the regular set** , Prove that L = $\{a^m b^n \mid i >= 1\}$ is not regular.

26. Define **Pumping Lemma** and Define it for prove the following :

L = $\{0^m 1^n 0^{m+n} \mid m >= 1 \text{ and } n >= 1\}$ is not regular.

************************THE END************************