Theory of Automata & Formal Languages

Section-A (Short answers question)

1) Write a regular expression to denote a language L, which accepts all the strings that begin or end with either 00 or 11. (2018-19)

2) For the given language $L_1 = \epsilon$, $L_2 = \{a\}$, $L_3 = \phi$, Compute $L_1 L_2^* \cup L_3^*$ (2018-19)

3) Write regular expression for set of all strings such that the number of a's divisible by 3 over $\Sigma = \{a, b\}$ (2018-19)

4) Design a regular expression that accepts all the strings for input alphabet {a,b} containing exactly 2 a's. (2017-18)

5) Define and give the difference between positive closure and Kleene closure. (2017-18)

6) Give the regular expression for set of all strings {0,1} containing exactly three 0's. (2017-18)

7) State the pumping lemma theorem for regular languages. (2016-17)

8) Differentiate between L^* and L^+. (2015-16)

9) Write regular expression for set of all strings such that number of 0's is odd. (2015-16)

10) Write the regular expression for the language containing the strings over {0,1} in which there are atleast two occurrences of 1's between any two occurrences of 0's.
(2014-15)

11) Describe the language of the given regular expression $(1+01)^*(0+01)^*$
(2014-15)

Section-B (Long answer questions)

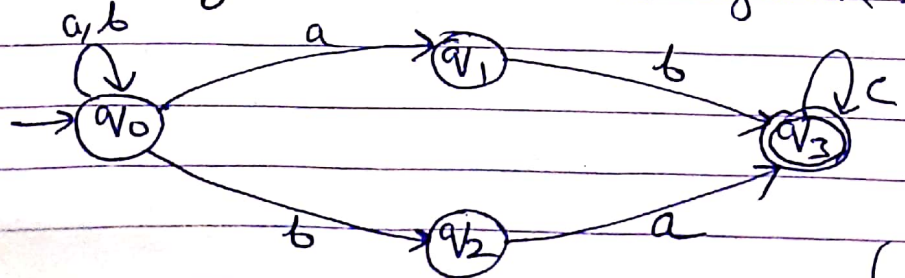
1) State Arden's theorem and construct regular expression for the following FA using Arden's theorem.
(2018-19)

State	Input 0	Input 1
A	{A,B}	∅
B	C	{A,B}
C	B	∅

A is the initial state and C is final state

2) Using pumping lemma, prove that the language $L = \{a^{i^2} \mid i \geq 1\}$ is not regular.
(2018-19)

3) Find the regular expression corresponding to the finite automata given below.



(2018-19)

4) Prove that the language $L = \{a^n b^n\}$ is not regular.

(2018-19)

5) Explain the closure properties of regular expression (2018-19)

6) State recursive definition of regular expression and construct a regular expression corresponding to the state transition diagram as shown in Fig 1.

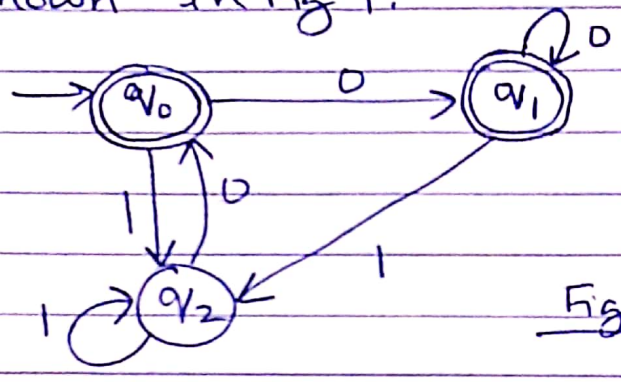


Fig-1

(2017-18)

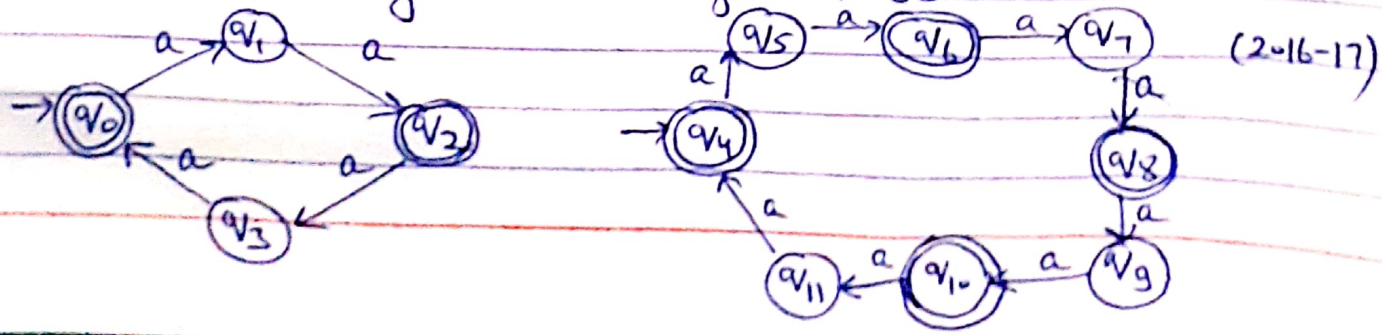
7) State pumping lemma for regular sets. Show that the set $L = \{a^p \mid p \text{ is a prime}\}$ is not regular.

(2017-18)

8) Discuss closure properties ie concatenation, union, intersection, complement of regular languages.

(2017-18)

9) Check with the comparison method for testing equivalence of two FA given below.

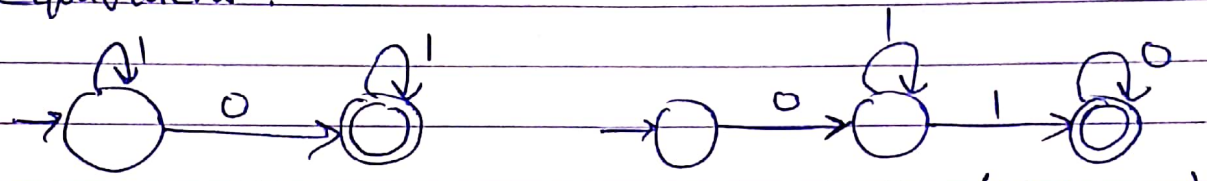


(2016-17)

10) Prove that the compliment, homomorphism and inverse homomorphism closure of a regular language is regular. (2016-17)

11) State and prove Kleen's theorem with an example. (2016-17)

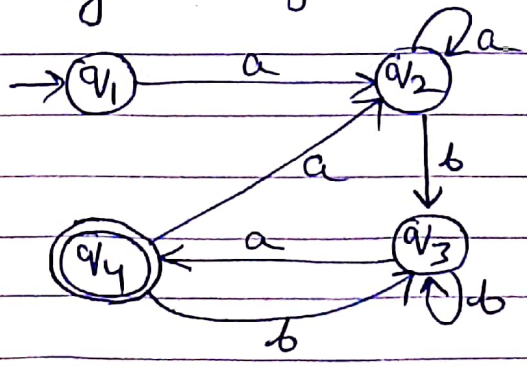
12) Explain the condition in which two machines M1 and M2 are said to be equivalent. Show that the following automata's are not equivalent.



(2014-15)

13) State and prove Pumping lemma of RE. Show that $L = \{a^p : p \text{ is prime}\}$ is not regular. (2015-16)

14) Find the regular expression using Arden's theorem of F.A given below.



(2014-15)

15) Prove that the language $L=\{0^n \mid n \text{ is perfect cube}\}$ is not regular. (2014-15)

16) Let L_1 be some language over Σ and $L_2=\phi$. Then prove that
(i) $L_1 L_2 \neq L_1$ (ii) $L_1+L_2 \neq \phi$ (2014-15)

17) For regular expression prove that:
$(a+b)^* \neq a^*+b^*$ (2014-15)

18) What is regular expression? Construct a DFA for the regular expression
$(00+001)^*1$ (2014-15)

19) Prove that the given set of languages is not regular $L=\{0^n 1 0^n \mid n \geq 1\}$ (2014-15)

20) Describe the closure properties of regular languages. Prove that regular languages are closed under complementation. (2014-15)