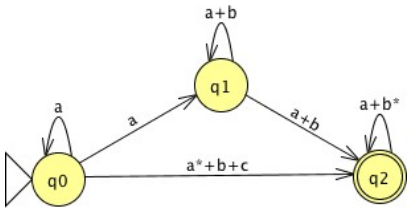
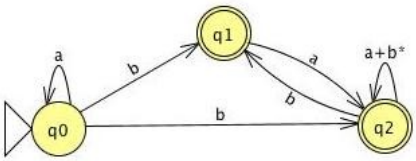
PES University Electronic City Campus, Hosur Road, Electronic City, Bengaluru – 560100 Department of Computer Science & Engineering	
Subject: **THEORY OF COMPUTATION**	Code - **UE18CS254**
HOMEWORK	Semester : IV sem CSE Sec : E. & F Sec
Faculty : Prof. R.Bharathi	Date : 10/02/2020

1. Find all strings in $L((a+b)^*b(a+ab)^*)$ of length less than four.
2. Find a regular expression for the set $\{a^n b^m : (n+m) \text{ is odd}\}$.
3. Give regular expression for the complement of $L_1\{a^n b^m, n \geq 3, m \leq 4\}$.
4. Find a regular expression for $L = \{w \in \{0,1\}^* : w$ has exactly one pair of consecutive zeros.
5. Find a regular expression over $\{0, 1\}$ for the all strings not ending in 10.
6. Determine whether or not the following claim is true for all regular expressions r_1 and r_2. The symbol $\equiv$ stands for equivalence regular expressions in the sense that both expressions denote the same language.
   (a) $(r_1^*)^* \equiv r_1^*$.
   (b) $r_1^*(r_1 + r_2)^* \equiv (r_1 + r_2)^*$.
   (c) $(r_1 + r_2)^* \equiv (r_1 r_2)^*$.
   (d) $(r_1 r_2)^* \equiv r_1^* r_2^*$.
7. Use the construction in Theorem 3.1 to find an nfa that accepts the language $L(ab^*aa+bba^*ab)$.
8. Find an nfa that accepts the language $L((abab)^* + (aaa^* + b)^*)$.
9. Find the minimal dfa that accepts $L(abb)^* \cup L(a^*bb^*)$.
10. What language is accepted by the following automata.



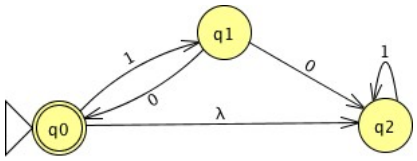
11. Find regular expression for the language accepted by the following automata.



12. Write a regular experssion for the set of all C real numbers.
13. Construct a dfa that accepts the language generated by the grammar

$$S \rightarrow abS|A,$$
$$A \rightarrow baB,\ B \rightarrow aA|bb.$$

14. Construct right- and left-linear grammars for the language $L = \{a^n b^m : n \geq 3, m \geq 2\}$.
15. Use the construction suggested by the above exercises to construct a left-linear gram- mar for the nfa bellow.



16. User the construction in Theorem 4.1 to find nfa that accept $L = ((ab)^*a^*) \cap L(baa^*)$.

17. Show that the following language is not regular. $L = \{a^n b^k c^n : n \geq 0, k \geq n\}$.

18. Determine whether or not the following language on $\Sigma = \{a\}$ is regular

$$L = \{a^n : n = 2^k \text{ for some } k \geq 0\}.$$

19. Is the following language regular? $L = \{uww^R v : u, v, w \in \{a, b\}^+\}$