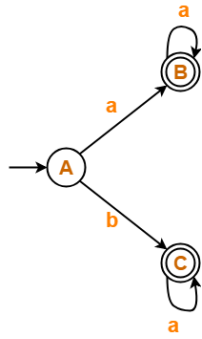


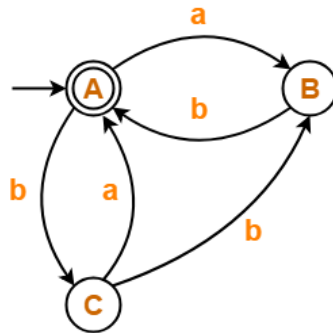
**Birla Institute of Technology and Science, Pilani**  
**CS F351, Theory of Computation**  
**Practice Questions on Regular Languages**

1. Construct a DFA which accept the language  $L = \{ w \mid w \in \{a,b\}^* \text{ and } n_a(w) \bmod 3 = n_b(w) \bmod 3 = 0 \}$
2. Construct a DFA which accept the language  $L = \{ a^n b^m \mid n \geq 1, (m) \bmod 3 = 1 \}$
3. Construct a DFA which accept the language  $L = \{ ww^R \mid |w| = 2, \Sigma = \{a, b\}^* \}$
4. Construct a minimal DFA accepting a set of strings over  $\{a, b\}$  in which the second symbol from left-hand side is always 'b'.
5. Construct a minimal DFA accepting a set of strings over  $\{a, b\}$  in which the third symbol from left-hand side is always 'b'.
6. Construct a minimal DFA accepting set of strings over  $\{a, b\}$  in which every 'a' is followed by a 'b'.
7. Construct a minimal DFA accepting set of strings over  $\{a, b\}$  in which every 'a' is never followed by 'b'.
8. Construct a minimal DFA accepting the language  $L = \{ abwba \mid w \in \{a, b\}^* \}$ .
9. Construct a DFA for the set of string over  $\{a, b\}$  such that length of the string  $|w|$  is divisible by 3 i.e,  $|w| \bmod 3 = 0$ .
10. Construct a minimal DFA accepting set of strings over  $\{a, b\}$  in which Number of  $a(w) \bmod 2 = 0$  or Number of  $b(w) \bmod 2 = 0$  i.e, number of 'a' should be divisible by 2 or number of 'b' should be divisible by 2 or both are divisible by 2, where 'w' is the any string over  $\{a, b\}$ .
11. Construct DFA for strings not containing consecutive two a's and starting with a.
12. Draw DFA of the language containing the set of all strings over  $\{a, b\}$  in which 2nd symbol from RHS is 'a'.
13. Draw DFA of the language containing the set of all strings over  $\{a, b\}$  in which 3rd symbol from RHS is 'a'.

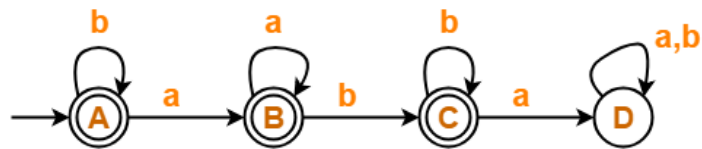
14. Design a DFA for accepting the language  $L = \{a^m b^n \mid (m+n) \text{ is even} \}$
15. Design a DFA for accepting the language  $L = \{a^m b^n \mid (m+n) \text{ is odd} \}$
16. Construct a DFA accepting the strings over  $\{0, 1\}$  which when interpreted as binary number is divisible by 2.
17. Construct a DFA accepting the strings over  $\{0, 1\}$  which when interpreted as binary number is divisible by 3.
18. Draw DFA of the language containing the set of all strings over  $\{a, b\}$  in which the starting and ending symbols are same.
19. Draw DFA of the language containing the set of all strings over  $\{a, b\}$  in which the starting and ending symbols are different.
20. Design a DFA for accepting the language  $L = \{a^n \mid n \geq 0, n \neq 3\}$
21. Design a DFA for accepting the language  $L = \{a^n \mid n \geq 0, n \neq 2 \text{ and } n \neq 4\}$
22. Construct a DFA for the regular expression  $(b|ab^*ab^*)^*$
23. Construct a DFA for the regular expression  $(a|b)^*ab(a|b)^*$
24. Construct a DFA for the regular expression  $(0|1(01^*0)^*1)^*$
25. Construct a DFA for the regular expression  $(b^*ab^*ab^*)$
26. Construct a DFA for the regular expression  $b^*aa(a+b)^*+b^*ab^*aa(a+b)^*$
27. Construct a DFA for the regular expression  $(a+b)(a+b)(a+b)^*$
28. Construct a DFA for the regular expression  $((a+b)(a+b))^*(a+b)$
29. Construct a DFA for the regular expression  $(a + b)^*abba$
30. Construct a DFA for the regular expression  $(0 + 1)^*0011$
31. Construct Regular Expression from the following DFA:



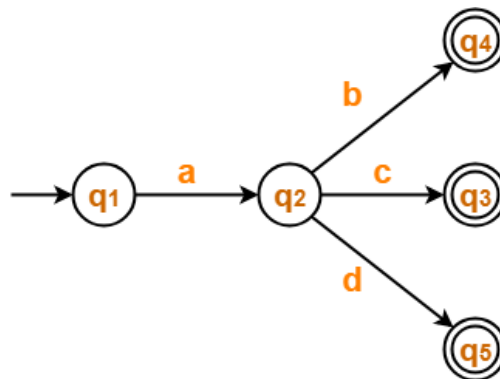
32. Construct Regular Expression from the following DFA:



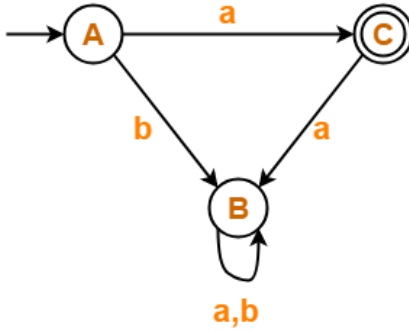
33. Construct Regular Expression from the following DFA:



34. Construct Regular Expression from the following DFA:



35. Construct Regular Expression from the following DFA:



36) Write Regular Expression for the Language L

$L = \{ w : w \in \{a,b\}^*, |w| \text{ is odd, } w \text{ has exactly one } b \}$

37) Write Regular Expression for the Language L Over

$L = \{ w : w \in \{a,b\}^*, \text{ no 2 a's and no 2 b's should come together } \}$

38) check whether the Language  $L = \{ wxw^R \mid w, x \in (0,1)^+ \}$  is regular or not and if it is give Regular Expression also.

39) Draw DFA for the following Regular Expression

$(ab)^* + (a + ab^*)^* + (a + ab)^* b^* (a + b)^*$