THEORY OF COMPUTATION

AUTOMATA SET – 2

1. Which of the following are not equivalent to expression (a + b + c)* ?

(a) (a* + b* + c*)*

(b) ((ab)* + c*)*

(c) (a* b* c*)*

(d) (a* b* + c*)*

2. M = (Q, Σ, δ, S, F) be a FA.

Q = {A, B} F = {B}
δ(A, a) = A δ(B, a) = B
δ(A, b) = B δ(B, b) = A

A Grammar (V, Σ, P, S) is used to generate language accepted by M. Which set of rules will make L(G) = L(M)?

(a) {A → aB, A → bA, B → bA, B → aA, B → ε}

(b) {A → aA, A → bB, B → aB, B → bA, B → ε}

(c) {A → bB, A → aB, B → aA, B → bA, B → ε}

(d) {A → aA, A → bA, B → aB, B → bA, B → ε}

3. Consider these 2 statements:

S_1: $L^R = L$, if and only if L is the language of palindromes.
where L^R is obtained by reversing all the strings of L.

S_2: $| L_1 \cdot L_2 | = | L_1 | \times | L_2 |$

Which of the following is true?

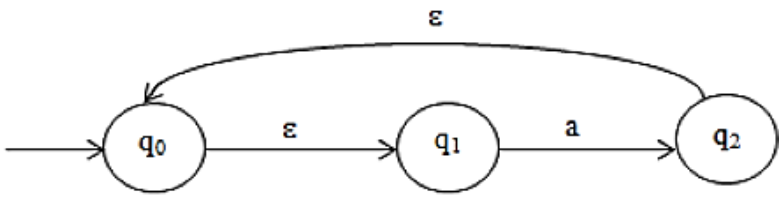
(a) Both are False

(b) Both are True

(c) $S_1 \rightarrow T$, $S_2 \rightarrow F$

(d) $S_1 \rightarrow F$, $S_2 \rightarrow T$

4. Consider NFA:



What will be δ* (q_0, a) ?

(a) {q_0, q_1, q_2}

(b) {q_1, q_2}

(c) {q_0, q_1}

(d) None

5. Consider an NFA and DFA:

L(M) = Language accepted by the machine M.
$L(\overline{M})$ = Language accepted by the compliment of the machine M i.e. making final to non-final and vice-versa.
$\overline{L(M)}$ = Complement of language accepted by machine.

Consider:

S_1: For DFA, $L(\overline{M}) = \overline{L(M)}$
S_2: For NFA, $L(\overline{M}) = \overline{L(M)}$

(a) Both are True

(b) Both are False

(c) $S_1 \rightarrow$ T, $S_2 \rightarrow$ F

(d) $S_1 \rightarrow$ F, $S_2 \rightarrow$ T

6. Based on the answer to the above question, if for any of the machines, statement is false, what could be the reason?

(a) Presence of ϵ-Move

(b) Dead- State Rejection

(c) Choice of State i.e. Non- determinism

(d) All of the above i.e. a, b, c

7. Which one of the following doesn't generate same language as rest?

(i) (a+b)*a(a+b)*a(a+b)*
(ii) b * a b * a (a + b)*
(iii) (a + b)* a b* a b*
(iv) b * a (a + b)* a b*

(a) Only (ii)

(b) Only (iii)

(c) Only (iv)

(d) All regular expressions generate same language

8. Consider two languages L_1 and L_2 given below.

$L_1 = \{a^m b^n \mid m+n = \text{Even}\}$
$L_2 = \{a^m b^n \mid m-n = 4\}$

(a) L_1 is Regular, L_2 is Not Regular

(b) Both are Regular

(c) Both are Non- Regular

(d) L_2 is Regular, L_1 is Not Regular

9. Let r be any Regular Expression:

$S_1 \rightarrow r + \phi = r = \phi + r$
$S_2 \rightarrow r + \varepsilon = r = \varepsilon + r$

(a) Both are true

(b) Both are False

(c) $S_1 \rightarrow T$, $S_2 \rightarrow F$

(d) $S_1 \rightarrow F$, $S_2 \rightarrow T$

10. Consider the following languages given below.

L_1 = Set of all strings having equal number of 00 and 11.
L_2 = Set of all strings having equal number of 01 and 10.

Which of the following is true?

(a) Both are Regular.

(b) Both are Context-Free but not regular.

(c) L_1 is regular, L_2 is Context Free but not regular.

(d) L_1 is Context free but not regular, L_2 is Regular

11. Suppose a Language L is accepted by Linear Bounded Automata A. Then,

(a) A always halts on all i/p's as L is decidable.

(b) L maybe undecidable as A need not halt on all i/p

(c) L need not be Context-Sensitive Language

(d) None of the above

12. Suppose there exist a NPDA of Language L. Then

(a) There always exist a DPDA for L

(b) There doesn't exist a DPDA for L

(c) There may or may not exist a DPDA for L

(d) None

13. $L \subseteq \Sigma^*$ is said to be co-finite iff their complement is finite. What can you say?

(a) All co-finite languages are regular 6

(b) There exists a co-finite language which is not context free

(c) There exists a co-finite language which is not decidable

(d) None of above

14. Suppose L is a context-Free Language. Then $\overline{L}$

(a) is necessarily context-free

(b) is necessarily non-context free

(c) is necessarily context-sensitive

(d) is necessarily Recursive

15. Let G be grammar in CNF. Let $w_1, w_2 \in L(G)$ such that $|w_1| < |w_2|$

(a) Any derivation of w_1 has exactly same number of steps as any derivation of w_2

(b) Some derivation of w_2 may be shorter than of steps as any derivation of w_1

(c) All derivations of w_1 will be shorter than any derivation of w_2

(d) None