Type: MCQ

Q1. Consider the following NPDA = ({q0, q1, qf}, {a, b}, {1, z}, δ, q0, z, {qf})

δ(q0, λ, z) = {(qf, z)}

δ(q0, a, z) = {(q1, 11z)}

δ(q1, a, 1) = {(q1, 111)}

δ(q1, b, 1) = {(q1, λ)}

δ(q1, λ, z) = {(qf, z}

Which of the following Language L is accepted by NPDA? (2)

1. **L = $\{a^{2n}b^{n} : n \geq 0\}$
2. L = $\{a^{n}b^{2n} : n \geq 0\}$
3. L = $\{a^{2n}b^{n} : n > 0\}$
4. L = $\{a^{n}b^{2n} : n > 0\}$

Q2. Which of the following statement is/are correct?

Statement I: A language is context free if and only if it is accepted by PDA.
Statement II: PDA is a finite automata with push down stack (1)

1. Only I
2. Only II
3. **Both I and II
4. Both are incorrect

Q3. If the PDA does not stop on an accepting state and the stack is not empty, the string is: (1)

1. **Rejected
2. Goes into loop forever
3. All of the mentioned
4. None of the mentioned

Q4. Which of the following cannot be a possibility of a TM while it processes an input? (1)

1. **Enters accepting state
2. Enters non-accepting state
3. Enters infinite loop and never halts
4. None of the mentioned

Q5. A problem which is both _____ and _____ is said to be NP complete. (1)

1. **NP, P
2. NP, NP hard

3. P, P complete
4. None of the mentioned

Q6. State whether the following statements are TRUE or FALSE:

"The class of regular languages is closed under infinite union." (1)

1. TRUE
2. **FALSE

Q7. Let R1 and R2 be regular sets defined over the alphabet ∑ Then:

Statement I: R1 ∩ R2 is not regular.
Statement II: R1 R2 is regular.
Statement III: ∑* - R1 is regular
Statement IV: R1* is not regular

Choose correct statement (2)

1. Only I & II is correct
2. **Only II & III is correct
3. Only I, II, & III is correct
4. Only III & IV is correct

Q8. State whether the following statements are TRUE or FALSE:

"All subsets of regular sets are regular."

(1)

1. TRUE
2. **FALSE

Type: DES

Q9. Convert the given grammar to CNF-

S → 1A / 0B

A → 1AA / 0S / 0

B → 0BB / 1S / 1 (5)

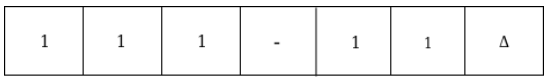
Q10. Construct a PDA for language L = {0^n1^m | n >= 1, m >= 1, m > n+2} (5)

Q11. Construct a TM for subtraction of two unary numbers f(a-b) = c where a is always greater than b.

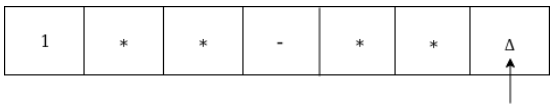
Hint:

The unary number is made up of only one character, i.e. The number 5 can be written in unary number system as 11111.Here we have certain assumptions as the first number is greater than the second one. Let us assume that a = 3, b = 2,

so the input tape will be:



The output will be



(5)

Q12. State the pumping lemma for regular language. Prove that $\{0^n 1^n \mid n>=0\}$ is not a regular language. (5)