Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech., Winter 2019 - 20 Examination

Semester: 5 **Date: 28/11/2019**
Subject Code: 03105303 **Time: 10:30am to 1:00pm**
Subject Name: Theory of Computation **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions : **(15)**

1. A Context free grammar is

A. Type-0
B. Type-1
C. Type-2
D. Type-3

2. Given the language L = {ab, aa, baa}, which of the following strings are in L*?
1) abaabaaabaa
2) aaaabaaaa
3) baaaaabaaaab
4) baaaaabaa

A. 1,2 and 3
B. 2,3 and 4
C.1,2 and 4
D.1,3 and 4

3. Regular expression for all strings starts with ab and ends with bba is.

A. aba*b*bba
B. ab(ab)*bba
C. ab(a+b)*bba
D. All of the mentioned

4. Which of the following statement is false?

A. Context free language is the subset of context sensitive language
B. Regular language is the subset of context sensitive language
C. Recursively enumerable language is the super set of regular language
D. Context sensitive language is a subset of context free language

5. Which of the following a turing machine does not consist of?

A. input tape
B. head
C.state register
D. none of the mentioned

6. A language is regular if and only if accepted by PDA. Is it True or False? - _____

7. L and ~L are recursive enumerable then L is Recursive. Is it True or False? - _____

8. The character empty null string (triangular shaped) is used to indicate a _____ in a tape cell.

9. _____ is a place where input letters or other information can be stored until we want to refer to them again.

10. Define: Turing Machine

11. Define: Recursive Enumerable Set.

12. Give the name of undecidable problem for CFG.

13. Write name of any two closure properties for recursive language.

14. Write the condition for the left recursive Grammar

15. The full form of CFG _____

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Give the difference between Mealy Machine and Moore Machine.

B) What is Chomsky Classification of Grammars? Explain it.

C) Draw Minimum Finite Automata (MFA) for following languages:
L1 = {x / 00 is not a substring of x }
L2 = {x / x ends with 01 }

D) For all positive integers n, prove that $1 + 2 + 3 + \ldots + n = n(n + 1)/2$

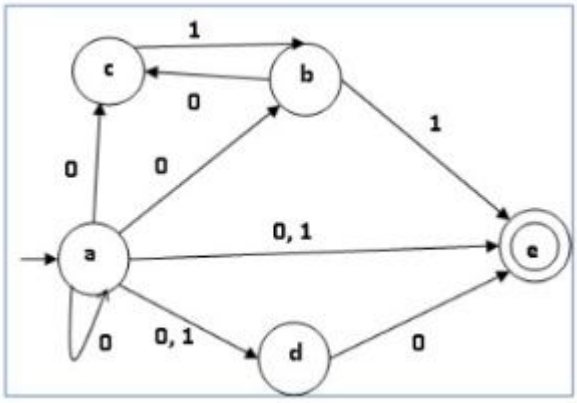
Q.3 A) Define Push Down Automata (PDA). Design and draw a PDA (Push Down Automata) accepting Strings with more a's than b's. Trace it for the string "abbabaa". **(07)**

B) What do you mean by Normal forms? Reduce the grammar G with the following productions to CNF. **(08)**

$S \rightarrow ASB$
$A \rightarrow aAS \mid a \mid \varepsilon$
$B \rightarrow SbS \mid A \mid bb$

OR

B) Convert NFA to DFA: **(08)**



Q.4 A) Construct a Turing Machine for language $L = \{0^n1^n2^n \mid n \geq 1\}$. **(07)**

OR

A) Prove Kleene's Theorem (Part I): Any Regular Language can be accepted by a Finite Automaton (FA). **(07)**

B) Convert following NFA- Λ to NFA and FA. **(08)**

q	δ (q, Λ)	δ(q, 0)	δ(q, 1)
A	{B}	{A}	Ø
B	{D}	{C}	Ø
C	Ø	Ø	{B}
D	Ø	{D}	Ø