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

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2021 - 22 Examination

Semester: 5 **Date: 22-10-2021**
Subject Code: 203108301 **Time: 10:30 am to 01:00 pm**
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 - (Each of one mark) **(15)**

1. The Grammar can be defined as: G=(V,T, P, S),In the given definition, what does P represents?
   a) Productive
   b) Product
   c) Production
   d) None of these
2. Concatenation Operation refers to which of the following set operations:
   a) Union
   b) Dot
   c) Kleene
   d) None of the above
3. Which of the following statement is correct?
   a) All Regular grammar are context free but not vice versa
   b) All context free grammar are regular grammar but not vice versa
   c) Regular grammar and context free grammar are the same entity
   d) None of the mentioned
4. Turing machine in more powerful than:
   a) Finite Autmeta
   b) Push Down Autometa
   c) Both (a) and (b)
   d) None of these
5. A recursive language is also called
   a) Decidable
   b) Undecidable
   c) Both (a) and (b)
   d) None of these
6. A language is regular if it can be expressed in terms of _____ expression.
7. The most restricted grammar is_____
8. Power of DPDA and NPDA are equal? _____
9. Type _____ grammar is also called unrestricted grammar according to Chomsky hierarchy
10. A problem can be solved by an algorithm if and only if it can be solved by a _____
11. For converting Finite autometa to Regular Expression which method you will follow?
12. Difference Between **string** and **alphabet?**
13. LBA have more power than NPDA but less power than Turing Machine. Is it true/false?
14. How many tuples does Turing Machine contains?
15. Is **Post Correspondence Problem (PCP)** is Decidable or Undecidable?

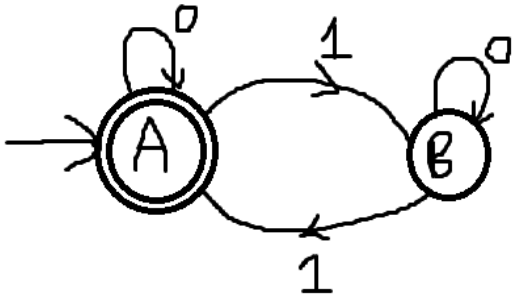
Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Is it possible to construct push down autometa for a language L = $a^n b^n c^m$ / n>m.? If it's possible then draw a pushdown autometa for language L, otherwise explain how it's not possible.

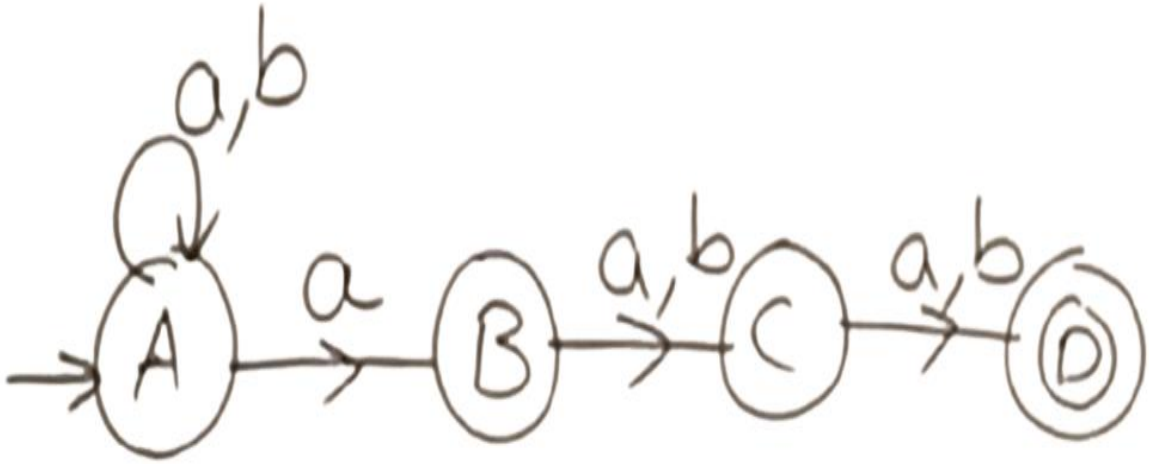
B) What is **Reducibility?** Explain with an example.

C) Explain Variants (Different types) of Turing Machine.

D) Write a regular expression for given finite autometa.



Q.3 A) Convert the given NFA to DFA. **(07)**

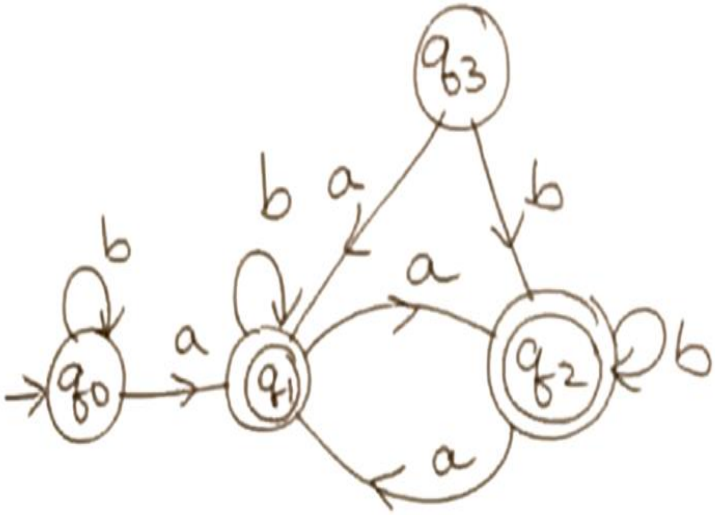


B) Draw a Push Down Autometa for a language L = ww^R / $w \in (a,b)^+$ **(08)**

OR

B) Draw a Turing Machine for a language L= $a^n b^n c^n$ / n>=1. **(08)**

Q.4 A) Minimize the given finte autometa **(07)**



OR

A) Is Turing Machine is equivalent to a computer? If it's Yes then what is the name of the turing machine and also explain the working operation of Turing Machine which acts as a computer, Otherwise explain how it's not. **(07)**

B) Convert the following CFG(Context Free Grammar) to CNF(**Chomsky Normal Form**) **(08)**

S→ASA|aB

A→B|S

B→b|ε