Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. winter 2022 - 23 Examination

Semester: 5 **Date: 14/10/2022**
Subject Code: 203108301 **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** - (All are compulsory) (Each of one mark) **(15)**

1.In Chomsky hierarchy of languages, Context Sensitive Languages come under
a) Type-3 b) Type-2 c) Type-1 d) Type-0

2. Pick the incorrect one wrt Positive Closure of (a+b).
a) { ϵ,a,b….} b) { a,b….} c) {a,b,aa,bb…….} d) {a,b,aa,bb,ab,ba….}

3. if n-state NFA then equivalent DFA would have_____ maximum no of states.
a) 1 b) n c) 2^n d) n^n

4.Pick the correct option in following relationships.
a) CFG ⊂ Regular b) CSG ⊂ CFG c) Regular ⊂ CSG d) REC ⊂ CSG

5. If Language A pass the Pumping lemma test for context free languages then A would be always
a) Context Free b) not Context Free c) undecidable d) none of these

6. Minimization of NFA is also Possible same as DFA (True/False)

7. Number of languages are accepted by NFA and DFA would be same (True/False)

8. L= { a^nb^n|n>1} would be accepted by Finite automata (True/False)

9. Every NPDA can be converted to equivalent DPDA (True/False)

10. Moore Machine acts as output generator (True/False)

11. Finite Automata + Memory= _____ Automata

12. L= { a^n|n>1}is a_____Language

13. Dead state is possible only in_____automata

14. Any Finite Automata having no self-loop and cycle accept always _____Language.

15. Write the production rule for Context free Grammar.

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

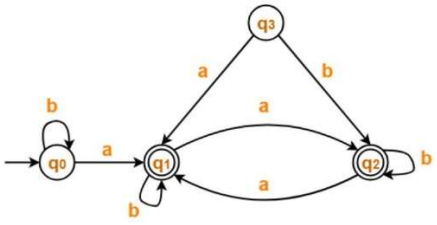
A) Explain Pumping lemma for Context free Languages.

B) Design DFA for Language L={a^n b^m | n,m>0}

C) Write the Grammar for Language L={a^n b^n | n>0}

D) Write down the name of output generators? Explain any one output generator with example.

Q.3 A) Minimize the Following DFA. **(07)**



B) Explain Turing Machine with all variants and also design Turing Machine for L={a^n b^n | n>0}. **(08)**

OR

B) Consider the following Grammar and construct the parse tree in both fashion i.e Top-down and Bottom up for following string id +id*id. **(08)**

A→A+A/A*A/id

Q.4 A) Explain Push-Down Automata and how is it better than Finite Automata. Design DPDA for given **(07)**

language L={0^n 1^n | n>=0}

OR

A) Explain Context Sensitive Grammar with Production rule and also write down the Normal form of CFG with example. **(07)**

B) Explain about decidable and undecidable problem and also tell the ambiguity in CFG and membership for Recursive enumerable languages are decidable or not justify. **(08)**