GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Computing Science and Engineering

Bachelor of Science in Computer Science
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - E1UP401T - Theory of Computation

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Write CFG for regular expression r = 0*1(0+1)* K1(2)

2) Construct the DFA over Σ ={a, b} which accepts all strings of odd length K2(4)

3) Consider the following finite automata and check the given strings are acceptable or not.(i) 1110 (ii) 0001 (iii) 1010 K2(6)

States (Q)	Input Alphabtes 0	1
→q0	q1	q3
q1	q0	q2
(q2)	q3	q1
q3	q2	q0

4) Convert the following CFG into CNF S → ASA | aB, A → B | S, B → b | ε K3(9)

5) Construct the PDA for the following language: $L = a^m b^n | n < m$ K3(9)

6) Prove R=Q+RP has unique solution, R=QP* K5(10)

7) Construct a finite automata for the regular expression (0+1)* (00+11) (0+1)*. K4(12)

8) Show that $L = \{a^p \ I \ is \ a \ prime\}$ is not a context-free language, K5(15)

9) Show that L = {a"b"c" I n>=1} is not context-free but context-sensitive. K5(15)

10) Define Mealy machine as (Q, q0, ∑, O, δ, λ') where λ' is the output function that maps Q×∑→ O and Moore machine as (Q, q0, ∑, O, δ, λ) where λ is the output function which maps Q → O and Construct a Mealy Machine (finite state machines) from The following transition table. K6(18)

States (Q)	Next States I/P=0	I/P=1	Output
→q1	q1	q2	0
q2	q1	q3	0
q3	q1	q3	1