FACULTY OF ENGINEERING, UNIVERSITY OF LUCKNOW

Mid Term Test-1

B.TECH. SEMESTER - IV, 2023-24

Branch: CSE/AI

Student's Roll No.....2210013155011.....

Subject Code: CS 402 **Subject Title: Theory of Automata**

Time: 1 Hrs. **Full Marks: 20**

Note: Attempt questions from each section as per instructions. The symbols have their usual meaning.

SECTION A

1. ***Attempt all parts of this question. Each part carries 1 mark.*** **(1 x5=5)**

a) Differentiate DFA and NFA.

b) Define Mealy machine and Moore machine.

c) Draw a DFA for the language accepting strings ending with '01' over input alphabets $\sum = \{0, 1\}$

d) Design a FA with $\sum = \{0, 1\}$ accepts the only input 101.

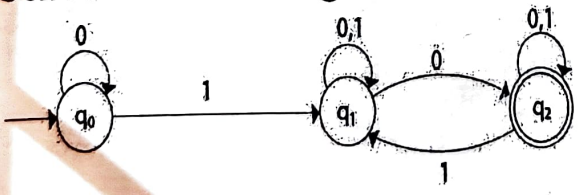
e) Write the regular expression for the language accepting all the string containing any number of a's and b's.

SECTION B

Attempt any THREE questions of the following. Each question carries 5 marks. **(5 x 3=15)**

2. State and prove the pumping lemma for regular languages.

3. Convert the following NFA to equivalent DFA.



4. Write about Arden Theorem with proper explanation. Prove that the regular expression R= ^+1*(011)*(1*(011)*)* also describe the string (1+011)

5. Construct DFA for a regular expression 10 + (0 + 11)0* 1.

4. Liang, "Introduction to Java Programming, Comprehensive Version ... Program" PHI Learning Private Li

CS - 403

OBJECT ORIENTED PROGRAMMIN

FACULTY OF ENGINEERING, UNIVERSITY OF LUCKNOW
Mid Term Test-2
B.TECH. SEMESTER - IV, 2023-24
Branch: CSE/AI

Student's Roll No.....

Subject Code: CS 402 **Subject Title: Theory of Automata**
Time: 1 Hrs. **Full Marks: 20**
Note: Attempt questions from each section as per instructions. The symbols have their usual meaning.

SECTION A

1. ***Attempt all parts of this question. Each part carries 1 mark.*** **(1 x5=5)**

a) Define CFG (Context Free Grammar).
b) Define left linear and Right linear Grammar.
c) Consider the Grammar G1=({S,A}, {a,b},S,{S → aAb, aA → aaAb, A → €}) generate the language from the grammar.
d) Define derivation tree with example.
e) What is Ambiguous grammar?

SECTION B

Attempt any THREE questions of the following. Each question carries 5 marks. **(5 x 3=15)**

2. Explain Chomsky hierarchy in details.

3. Verify whether the grammar S→0B|1A, A→ 0|0S|1AA|€, B → 1|1S|0BB generate the string 00110101.

4. Find the reduced grammar equivalent to the grammar G, having production rules P: S→ AC|B, A →a, C→c|BC, E →aA|e .

5. Remove unit productions from the Grammar whose production rule is given by P: S → XY, X → a, Y →Z|b, Z → M, M→ N, N →a

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B.Tech. IVth Semester Examination, 2024

THEORY OF AUTOMATA

Paper : CS–402

Time : 3 Hours] [*M.M. : 70*

Note :– Answer any *five* questions. All questions carry equal marks.

1. Define Alphabets and Finite Automata. Design a DFA for the following language :

$$L = \{0^m\ 1^n \mid m \geq 0 \text{ and } n \geq 1\}$$ [14]

2. Differentiate DFA and NFA. Find DFA equivalent to NFA described by the following state transition table, initial state = p, final states = {q, s}, Σ = {0, 1}. [14]

4. Liang, "Introduction to Java

States	0	1
p	q,s	q
q	r	q,r
r	s	p
s	–	p

3. Enlist the properties of regular expression. State and prove Arden's theorem. Prove that :

   $(1 + 00^*1) + (1 + 00^*1)(0 + 10^*1)^* (0 + 10^*1)$

   is equal to $0^*1(0 + 10^*1)^*$. [14]

4. State the steps to convert regular expression to FA. Design a FA from given regular expression $10 + (0 + 11)0^*1$. [14]

5. Explain Chomsky Hierarchy with types of Grammar. What do you mean by Ambiguity of grammar and derivation tree ? [14]

6. Construct the left-most and right-most derivations and parse trees for the following grammar :

   $S \rightarrow aB \mid bA$

   $A \rightarrow aS \mid bAA \mid a$

   $B \rightarrow bS \mid aBB \mid b$

   which accept the string "aaabbabbba". [14]

7. Define DPDA. Construct PDA, accept the language $L = \{a^n b^n \mid n \geq 0\}$. [14]

8. Explain about decision prosperities of DCFL's and closure properties of CFLs. [14]

9. What are the various variations of TM ? How to achieve complex tasks using TM ? [14]

10. Discuss recursive and recursive enumerable language. Explain the post correspondence problem of Turing Machine. [14]