Unit1

1. What is finite automaton? Briefly explain with suitable example the acceptability of a string by a finite automaton.
2. Compare between Mealy and Moore models.
3. Construct DFA accepting all strings w over {*a, b*} such that the number of a's in *w* is 3 mod 4.
4. Define Grammar. Also explain what is a language generated by a grammar. Give examples.
5. Compare between deterministic and non-deterministic finite automaton. Give suitable examples.
6. Write a note on operations on Languages.

7. Explain the process of construction of minimum automaton. Give suitable example to explain the concept.
8. Construct a DFA accepting all strings over {*a, b*} ending in *ab*.
9. Construct a grammar G generating {xx |x ∈ {a, b}*}
10. If G = ({S}, {0,1}, {S → 0S1, S → Λ}, S), find L(G).
11. Define Ambiguous Grammar. Find if the grammar G with the following productions is ambiguous?
    S → S*b*S S → *a*
12. Write a note on classification of Grammar.

13. Define an automaton. Explain its various components.
14. Construct a Mealy Machine which is equivalent to the Moore machine given by the following table.

Present state	Next state()		Output
	a=0	a=1	
->q0	q3	q1	0
q1	q1	q2	1
q2	q2	q3	0
q3	q3	q0	0

15. Construct a DFA accepting all the string *w* over {0, 1} such that the number of 1's in *w* is 3 mod 4.
16. Construct a grammar G accepting the set L of all strings over *{a, b}* having
17. Construct a finite automaton equivalent to (0+1)*(00+11)(0+1)*
18. State and prove Pumping Lemma for regular sets.

Unit2

1. Prove that *(a+b)** = *a*(ba*)**.
2. Explain with suitable example the leftmost derivation and rightmost derivations. Give example.
3. What is meant by ambiguity in context free grammar? Give example to explain the concept.
4. Write a note on Chomsky Normal Form.
5. State and prove pumping lemma for regular sets.
6. Draw the transition diagram for the expressions

i. *a*+ba**
ii. *a*b+ba**

7. State and prove pumping lemma for regular sets.
8. Give a regular expression for representing the set L of strings in which every 0 is immediately followed by at least two 1's.
   Also prove that the regular expression R=λ+1*(011)*(1*(011)*)* also describes the same set of strings.
9. Explain the steps for reduction of grammar to Chomsky normal form.
10. Convert the nondeterministic systems to deterministic systems.
11. State and prove Arden's theorem.
12. What is a derivation tree? Generate the derivation tree for the string aabaa using the grammar G with following set of productions
    S → aAS | a | SS
    A → SbA |ba

13. Define pushdown automata. Explain its design.

14. What is context free grammar? Construct a context free grammar G
15. Define ambiguous grammar. Find if the following set of production of a grammar make it ambiguous?
    P:S → *if b then* U
    S → *if b then* U *else* S
    S → *a*
    U → *for c do* S
    U → a
16. Show that L= { a_p | *p* is a prime} is not regular.
17. Define Regular grammar. Also Generate the transition diagram for the following regular expressions.
    *a*b*(*a+b*)*
    a+b*
18. What is derivation tree? Give example to explain the concept.

Unit3

1. Briefly explain the structure and operation of Push down automata.
2. Write a note on representation of Turing machine. VEL OF EDUCATION
3. Design a Turing machine to recognize all strings consisting of even number of a's
4. Writ a note on model of Linear Bounded Automaton.
5. Write a note on nondeterministic Turing machine.
6. Write a note on properties of recursive languages.

7. Explain the Linear Bound Automata Model.
8. Construct a PDA accepting L= {wcw^T| *w* ∈ {*a, b*}*}
9. Write a note on Halting problem of Turing Machine.
10. Design a Turing Machine that accepts {0^n1^n| n ≥ 1 }
11. What is Turing Machine? Design a Turing Machine to recognize all strings consisting of an even number of 1's.
12. Explain the structure and operation of pushdown automata.

13. What is Turing machine? Explain its composition and its operation.
14. Describe the characteristics of a linear bound automata model.
15. What are the ways in which we can represent Turing machines? Explain.
16. Consider the Turing machine with five states with initial state q_1 and final state q_5 and the transition table given below.

Present state	Tape symbol		
	b	0	1
->q1	1Lq2	0Rq1	
q2	bRq3	0Lqq2	1lq2
q3		bRq4	bRq5
q4	0Rq4	0Rq4	1Lq4
q5	0Lq2		

Write the computation sequence of the input string 00.

17. Write a note on unsolvable problems.
18. Design a Turing machine that accepts {0^n1^n| n ≥ 1}

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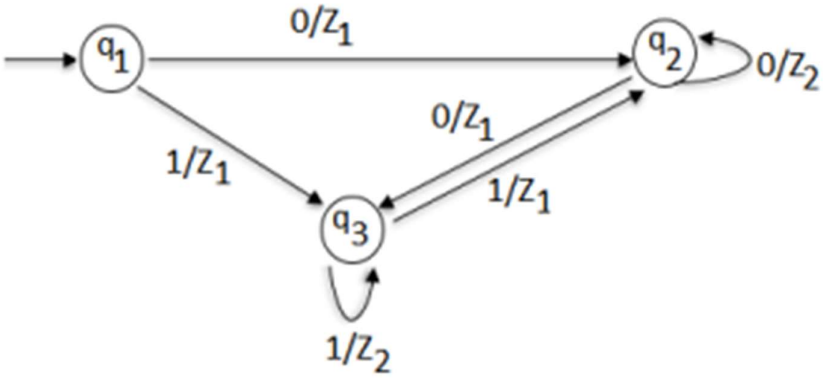
1. Briefly explain with example the steps of construction of minimum automaton.
2. Consider the grammar G given by
   S→ OSA12 S→012
   Test whether (a) 00112 € L(G) (b) 001122 € L(G)
3. Construct a DFA with reduced states equivalent to the regular expression
   10+ (0+11))0*1
4. Design a Turing Machine that accepts *{a" 1" | n ≥1}*

5. Write a note on Universal Turing machines
6. Briefly outline the halting problem of Turing machine.

7. Construct a DFA with reduced states equivalent to the regular expression 10+(0+11)0*1
8. Let G be the grammar with productions
    1. S → *0B | 1A,*
    2. *A → 0 |0S | 1AA*
    3. B → *1 | 1S| 0BB*

    For the string 00110101, find
    4. the leftmost derivation
    5. rightmost derivation
9. Consider a Mealy machine represented by the figure given below.
    Construct a Moore machine equivalent to this Mealy machine.



10. What is regular set? Is L= $\{a^{2n} \mid n \geq 1\}$ regular?
11. Construct the finite automaton equivalent to the regular expression (0+1)*(00+11)(0+1)*
12. Write a note on operations on language.

13. Construct a deterministic automaton equivalent to
    M=({q0, q1},{0,1},δ,q0,{q0}) where δ is defined by its state table give below.

State/∑	0	1
->q0	q0	q1
q1	q1	q1,q1

14. Find if the set L= {*ww* | *w*∈{a,b}* is not regular.
15. Write a note on multitape Turing machines.
16. Briefly describe Halting problem.
17. Describe the sets represented by the following regular expressions.
    a. (*a+b*)*(*aa+bb+ab+ba*)*
    b. (*aa*)*+(*aaa*)*
    c. (1+01+001)*(Λ+0+00)
    d. *a+b*(*a+b*)*
    *e. ab*a*

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Change Number: 25
Last Saved On: 27-07-2023 10:08:00 PM
Last Saved By: ramesh verma
Total Editing Time: 82 Minutes
Last Printed On: 27-07-2023 10:08:00 PM
As of Last Complete Printing
Number of Pages: 3
Number of Words: 858 (approx.)
Number of Characters: 4,894 (approx.)