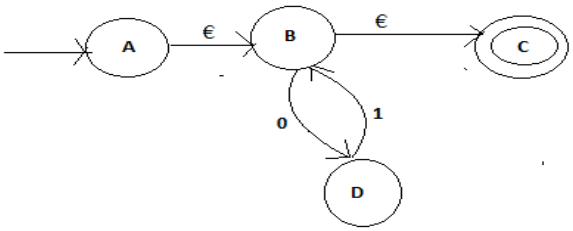
UNIT-1

Short Answer Questions

1. Define Strings, Alphabets & Languages with an example?
2. Define DFA & NFA with an example?
3. Define the Є-closures for the following FA.



4. Define NFA for the language over {a, b} such that all strings starting with "aba".
5. Write the differences between DFA & NFA.
6. Construct DFA which can accept two length strings over ∑={a,b}
7. Check whether the given strings accepted or not for given DFA.

   M= ({s0, s1, s2}, {0.1}, $, {s0}, s2),

   δ(s 0, 0) = s 2, δ(s 0, 1)= s 1, δ(s 1 ,1)= s 1, δ(s 1 ,0)= s 2, δ(s 2 ,1)= s 1,

   δ(s 2, 0)= s_2

   i. 1000 L1

   ii. 011

8. Define the Finite Automata Model with neat Diagram.
9. Check whether the given strings accepted or not for given NFA Transition Table,

δ	A	b
->q_0	**q_1**	**q_2**
q_1	**q_1**	**q_1, q_3**
q_2	**-**	**-**
***q_3**	**q_0, q_3**	**q_3**

i. abbaaab

ii. abaa

10. Write the applications of automata theory.
11. Define finite automata & transition diagram.
12. Construct DFA which accept even number of 0's.
13. Write Transition diagram which can accept ending with "00".
14. Write Transition diagram which can accept exactly one "a".
15. Construct DFA which can accept empty language.
16. Explain transitiondiagram& transition table with an example.
17. Define Transition function for DFA & NFA.
18. Define klean closure. Give one example.
19. Define δ in NFA with moves.
20. Define NFA to accept all string that does not contains 3 consecutive zeros.

Long answer Questions

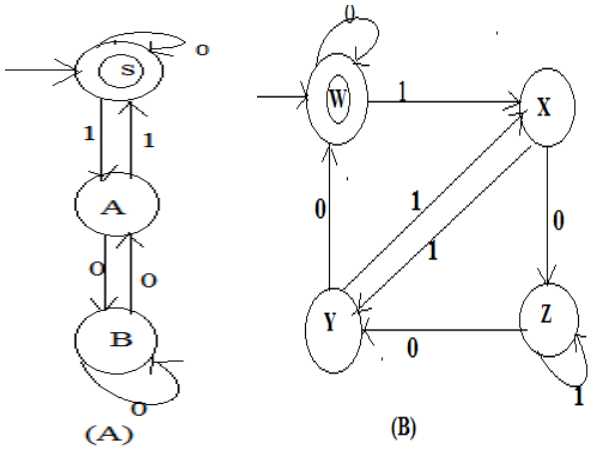
1. Design DFA that accepts all the strings containing even numbers of 0's & even number of 1's.
2. Construct DFA Equivalent to the given NFA.

δ	0	1
->p	p.q	p
q	r	r
r	s	--
*s	s	S

3. Minimize the following DFA.

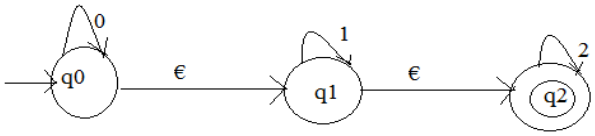
δ	0	1
->A	B	C
B	B	D
C	B	C
D	B	E
*E	B	C

4. Explain whether if the two FAs are equivalent. Check if the two Finite Automata's are equivalent.



5. Construct following €-NFA to NFA & convert to DFA

i.



ii. (0+1)*(00+11)(0+1)*

UNIT-2

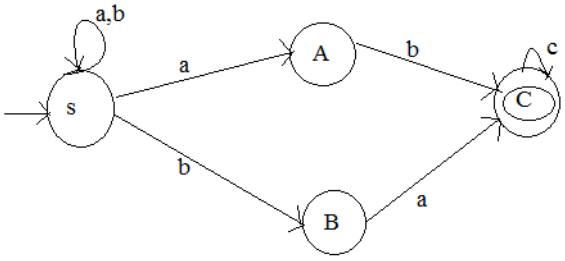
Short Answer Questions

1. Write the Regular Expression for the language L over {0, 1} such that every string must contain at least "000"
2. Define Regular Expression&Design a Regular expression set of all starting with "a" and ending with "b"
3. Construct finite automata for the given regular expression ((0)*1)*
4. Write Regular expression for Set of all the string over {a, b} containing at least one 'a'
5. Write Regular expression for Set of all the string over {a, b} containing exactly two a's
6. Define pumping lemma andWrite Regular Expression which denoting the language containing empty string.
7. Define context free grammar.
8. Difference between LMD & RMD.

9. Construct NFA with € moves for the regular expression (0+1)*.
10. Write the applications of pumping lemma
11. Define regular language
12. Write regular expression for the regular set {00, 001,0011,00111,...}
13. List out the operation s in regular expressions
14. Write regular expression for Set of all the string over {a, b} the number of a's are even
15. Write regular expression for Set of all the string over {a, b} whose length is 2
16. Write the difference between Regular expressions and CFG.
17. Write CFG productions for the Language "String of Balanced parenthesis".
18. Obtain a CFG to generate unequal number of a's and b's.
19. Draw the parse Tree for L={wcw^R| w in(a+b)* }
20. List the phases of a Compiler.
21. Define Chomsky normal forms(CNF).
22. State the Pumping Lemma for ContextFree Languages.

Long answer Questions

1. Find theRegular Expression for the given Finite automata



2. Construct Finite automata for the given regular expression(a(ab+cd)*)*ab
3. Explain pumping lemma for regular sets & check whether the language is regular or not $L=a^nb^n$
4. Construct finite automata for the given regular expression(((0)*)*)*)*
5. Construct DFA for the given regular expression (0+1)*(00+11)(0+1)*

UNIT-3

Short Answer Questions

1. Define what are UNIT productions? Give some examples.
2. Define NULL Variable
3. State the null able variables from the following CFG

   S->ABCa| bD
   A->BC | b
   B->b |€
   C->D|€
   D->d

4. Define the language of PDA accepted by final state
5. What is Left recursion?
6. How to eliminate Left recursion? Explain with example.
7. Define PDA.
8. Differentiate between deterministic and non deterministic PDA
9. What is the need for simplifying a Grammar
10. What is Left Recursion? How it can be Eliminated
11. What is a normal form & why is it required?
12. What are the closure properties of Regular sets
13. Define unit production.
14. Define leftmost and rightmost derivation with example
15. Construct parse tree for the following grammar

    S-> aAs|a

    A->SbA|SS|ba

16. Define Greibach normal form. Give one example
17. Define ambiguous grammar and give example.
18. What are the demerits of DFA (or NFA) when compared with PDA.
19. Give two reasons why finite automata cannot be used to recognize all CFL & why PDA is required for that purpose.
20. What is useless symbol ?explain with example.

Long answer Questions

1. Show that the following grammar is ambiguous with respect to the string **“aaabbabbba**”

S-> Ab / bA

A-> aS |Baa|a

B->bs|Abb|b

2. Write the procedure to convert CFG to PDA and also convert the following CFG to PDA

S->B|aBB

A->Abb|a

B->Bbb|A

C->a

3. Construct a PDA to accept the language L={0^n1^n|n>=1} by a final state.

   Draw the graphical representation of PDA .Also show the moves made by the PDA FOR THE STRING aaabbb

4. Construct PDA for L={ W W^R |W ∈(0+1)*}

   M=({q1,q2},{0,1}{R,B,G},&,q1,R,@}

5. Convert the following CFG to Chomsky Normal Form

S->ABA

A->aA | Є

B->bB | Є

and simplify the grammar.

UNIT-4

Short Answer Questions

1. Define regular Grammar.
2. Define Left Linear Grammar with example.
3. Define Right linear grammar with example.
4. Define Linear Bounded Automata.
5. Write a Procedure to convert Right linear Grammar to Left Linear Grammar.
6. Define Regular Grammar and list different types of Regular grammars.
7. Write a Procedure to convert regular grammar to Finite Automata.
8. Draw the equivalent Finite Automata for the given grammar.

   S->aB

9. Draw the equivalent Finite Automata for the given grammar.

   S->0B

   B->0|1|ε

10. Define Context sensitive Grammar.
11. Describe Linear Bounded Automata.
12. List the differences Between Finite Automata and Linear Bounded Automata.
13. Explain How Linear bounded Automata is more powerful than Finite Automata.
14. List few Languages which are accepted by LBA but not FA.
15. List the difference between PDA and LBA.
16. How FA can be equivalent to CFG show with example.
17. Write a Procedure to convert finite automata to right linear grammar.
18. How right linear is not equal to left linear show with example.
19. Explain the components of Linear bounded automata.
20. Write a Procedure to convert left linear grammar to right linear grammar

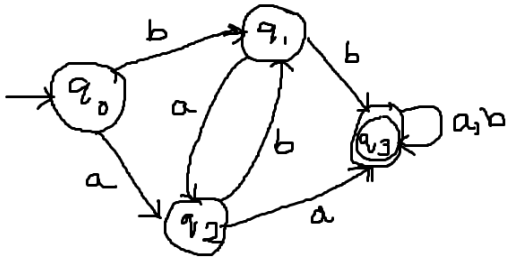
Long Answer Questions

1. Construct DFA for the given regular grammar

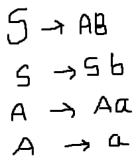
   S-->aS/bA/b

   A-->aA/bS/a

2. Construct Regular Grammar for the given DFA



3. Covert the following Left Linear Grammar to Right Linear Grammar.



4. Construct DFA for the given regular Grammar.

$A \rightarrow aB / bA / b$
$B \rightarrow aC / bB$
$C \rightarrow aA / bC / a$

5. Define Regular Grammar. List Different types of regular grammar and explain with examples.

UNIT-5

Short Answer Questions

1. Define Chomsky hierarchy of languages.
2. Define Universal Turing Machine.
3. Define Decidability & Undesirability.
4. Give examples for Undesirability problem.
5. Define Turing Machine halting problem.
6. Define Recursive Enumerable Languages .
7. Explain Turing Machine Halting Problem.
8. Define a context sensitive grammar.
9. List the differences between LBA and Turing Machine.
10. Explain How Turing Machine is more powerful than LBA.
11. Define a context sensitive grammar.
12. List Different types of Turing Machine.
13. Define Multi track Turing Machine.
14. Define Multi tape Turing machine.
15. Write short notes on context sensitive language and linear bounded automata.
16. Define Recursive Language.
17. Define Recursive Enumerable Language.
18. List Different types of Languages and their recognizers.

19. State church hypothesis.
20. Write the ID of Turing machine with one example.

Long answer Questions

1. Write a short notes on Chomsky hierarchy.
2. Construct TM to accept the following language

   $L=\{a^n b^n \mid n>=1\}$
3. Construct TM to accept the following language

   $L=\{a^n b^n c^n \mid n>=1\}$
4. Construct TM to accept the following language

   $L=\{0^n 1^n 0^n \mid n>=1\}$
5. Construct Turing machine for 2's Complement
6. Construct Turing machine to accept the language

   $L=\{WW^R \mid W€(a+b)^*\}$
7. Discuss about Church's Hypothesis in brief.