UNIT I

1. Conversion of Mealy machine to Moore Machine give one example.

2. Conversion of Moore machine to Mealy Machine give one example.

3.i. Construct a Moore machine that print **'a'** whenever the sequence **'01'** is encountered in any input binary string.

ii. Construct a Mealy machine that print **'a'** whenever the sequence **'01'** is encountered in any input binary string.

4. i. Design a Moore machine determine residue module **4** for binary number.

ii. Design a Moore machine determine residue module **3** for binary number.

ii. Construct a Moore machine that count that occurrence of the sequence **'abb'** in any input string over {a,b}

5. Construct a Moore machine that for the following Moore machine the input alphabet is∑={a.b}and the output alphabet Δ={0,1} run the following input sequence and find the respective output. **i).aabaa ii).aabb iii).ababb**

6. Prove by induction on n that $1 + 2 + 3 + \cdots + n \; that \sum_{i=0}^{n} i = n(n+1)/2$

7. Prove by induction on n $1^{2+}2^2+3^2+\ldots\ldots\ldots+n^2= \sum_{i=0}^{n} i = n(n+1)(2n+1)/6$

8. Prove by induction on n that $1 + 2 + 3 + \cdots + (3n-2) = \frac{n(3n-1)}{2}$ for n>0

9. i. Design FA which accept only those string which start with **1** and ends with **0.**

ii. Design FA which accepts odd number of **1's** and any number **0's.**

10. Design FA to check whether given decimal is divisible by **3**.

11. Draw transition diagram for recognition the set of all operation in C language.

12. Write a DFA to accept the language L ={L:|W| mod 5≠0}

13.i. Design FA which accept even number of **0's** and even number **1's.**

ii. Design FA which accept even number of **a's** and even number **b's.**

14. Prove that √2 is not rational.

15. Construct a NFA in Which double '1' is followed by double '0's .over ∑={0,1}.

16. Construct the Finite state machine(FSM) M given in the following table test whether the string 101101,1111 are accept by M.

state	0	1
$\rightarrow q_0$	q_0	q_1
q_1	q3	q_0
q_2	q_0	q3
q3	q_1	q_2

17. Define DFA .Give one example.

18. Define NDFA .Give one example.

19. Briefly describe the block diagram of FA with a neat Sketch.

20. Define Mealy .Give one example.

21. Define Moore .Give one example.

UNIT II

1. Convert the RE **(a|b)*abb** into NFA E and find the equivalent minimum state DFA. **P.2.99**

2. Explain the DFA Minimization algorithm with an example.**P.2.70**

3.i. prove **L={a^p |p is a prime}** is not regular. **P.2.132**

ii. Construct NFA for the Regular Expression **b+ba* P.2.81**

4.Construct DFA equivalent to the NFA **M ={p,q,r},{0,1}, δ,p,{q,s**} where δ is defined in the following table.

δ	0	1
p	{q,s}	{q}
q	{r}	{q,r}
r	{s}	{P}
s	-	{p}

5. Convert the RE **(b|a)*baa** into NFA E and find the equivalent minimum state DFA. **P.2.90**

6.Construct an NFA for the following Regular expression:

a) ((01+001)*0)*)*

b) (0+1)*(11+00)

7. Convert the given DFA from €- NFA.

	€	0	1
p	-	{P}	{q}
q	{P}	{q}	{r}
*r	{q}	{r}	-

8. prove **L={a^n b^n | n≥1}.**is not regular.

UNIT III

1. Explain in detail Push down automata(PDA). Give an example.

2. Design Push down Automata for the language L = **{wcw^R | w is in (a+b)*}.**

3. Design Push down Automata for the language **L = {a^n b^n | n≥1}.**

4. Design Push down Automata for the language **L = {a^n b^{2n} | n≥1}.**

5. Design Push down Automata for the language **L = {a^{2n} b^n| n≥1}.**

6. Design Push down Automata for the language L = **{ww^R | w is in (a+b)*}.**

7. Design Push down Automata for the language **L={ 0^n 1^m 0^n|m, n≥1 }** by empty stack.

8. Design Push down Automata for the language **L={ a^m b^m c^n|m, n≥1 }** by empty stack.

9. Design Push down Automata for the language **L={ w/w€(a+b)* and $n_a(w)=n_b(w)$}.**

10. i. List out the properties of PDA.

ii. Construct the PDA to the following grammar:

S→AB

A→BS/b

B→A/a

11. i. Prove the following grammar is ambiguous: S →SbS | a

ii. Let G be a grammar s->OB/1A, A->O/OS/1AA, B->1/1S/OBB. For the string 00110101 find its leftmost derivation and derivation tree.

12. i. Show that **E->E+E/E*E/(E)/id** is ambiguous.

ii. Give an example for a context free grammar.

13. Explain various components of context free grammar and derivation tree in detail.

14. Explain in detail about ambiguity. Give an example.

15. Explain in detail about Context free Grammar. Give an example.

16. Explain in detail about Push down Automata. Give an example.

17. Explain in detail about Non-Deterministic Push down Automata. Give an example.

18. Difference between Deterministic Push down Automata and Non-Deterministic Push down Automata.

UNIT IV

1. Design Turing Machine for the Language **L={ a^n b^n |n≥1 }**

2. Construct a TM for the addition function for the unary number system.

3. Explain in detail Turing machine. Give an example. **p.5.2**

4. Construct a TM for checking the palindrome of a string odd palindrome for ∑={0,1}

5. Design Turing Machine for the Language **L={ a^n b^n c^n|n≥1 }**

6**.** Construct a TM for the performing subtraction of two unary number **f(a-b)=**c where a is always greater than b.**p.5.25**

7. Design Turing Machine for the Language **L={ 1^n 0^n 1^n|n≥1 } p.5.44**

8. Construct a TM for the subroutine **f(a,b)= a*b** where **a** and **b** are unary numbers. **p.5.6**

9. Briefly explain about counter machine. Give an example.

10. Convert the following context free grammar to Chomsky Normal Form.

S→aSa|bSb|a|b.

11. i. State the Pumping Lemma for Context Free Languages.

ii. Write and explain closure properties of Context Free Languages.

12. Convert the following grammar to Greibach Normal Form

S→ ABA

A→ aA | Є

B→ bB | Є

and simplify the grammar.

13. i. Write and explain closure properties of Context Free Languages.

ii. Determine whether the language given by **L = {a^{n^2}| n≥1}** is context free or not. **P.4.53**

14. Show that Language **L={ a^n b^n c^n|n≥0}** is a not CFL.P.4.51

UNIT V

1. Explain what undecidable problem is and post correspondence problem.

2. State and explain in detail about P and NP problems.

3. Explain in brief about Turing Reducibility

4.i. Explain in detail about Post Correspondence Problem.

A=(1; 0; 010; 11) and **B=(10; 10; 01; 1)** .The input set is ∑={0,1}.Find the solution.

ii. Obtain the solution for the following Post Correspondence Problem **P.6.21**

A=(ba ; ab ; a; baa; b) and **B=(bab; baa; ba; a; aba)** The input set is ∑={a,b}. **P.6.22**

iii. Obtain the solution for the following Post Correspondence Problem

A=(ba ; abb ; bab)and **B=(bab; bb; abb)** The input set is ∑={a,b}.**P.6.22**

iv. Obtain the solution for the following Post Correspondence Problem

A=(1 ; 10111 ; 10)and **B=(111; 10; 0)** The input set is ∑={0,1}.**P.6.22**

ii. Explain in detail about Halting problem of TM.

5. Difference between Recursively language and Recursively Enumerable languages.

6. Difference between Tractable and Intractable problem with Examples.

7. Explain in detail Tractable and Intractable problem with Examples.

8. Explain in detail P and NP class problem with Examples.

9. Explain in detail P and NP complete problem with Examples.

10. Explain in detail P and NP hard problem with Examples.