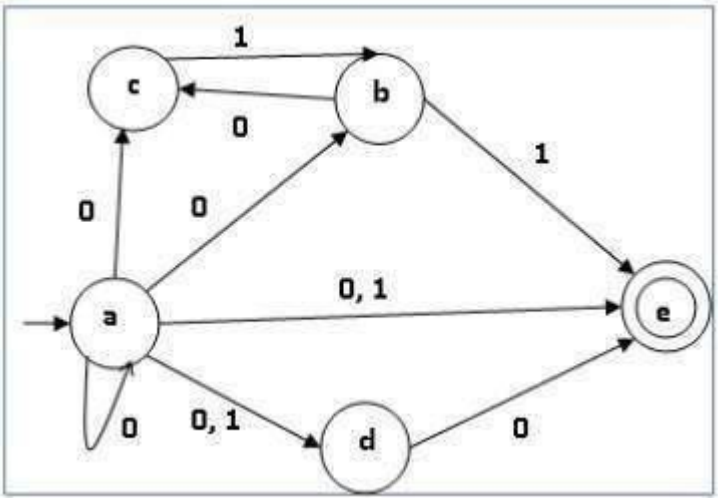
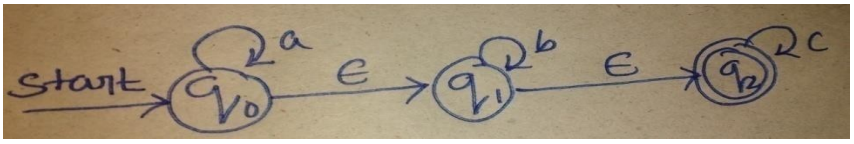
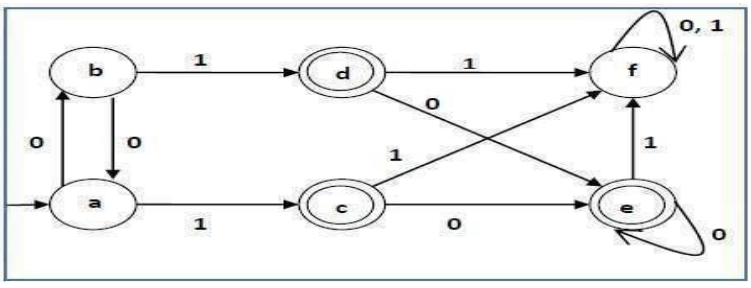
DEPARTMENT OF CSE (CYBER SECURITY)

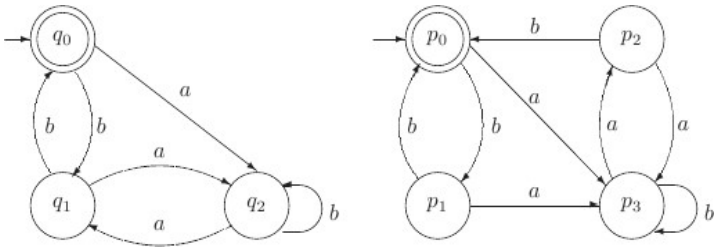
Subject: FORMAL LANGUAGE AUTOMATA THEORY (23CY503PC)

Unit wise Question Bank

UNIT-I

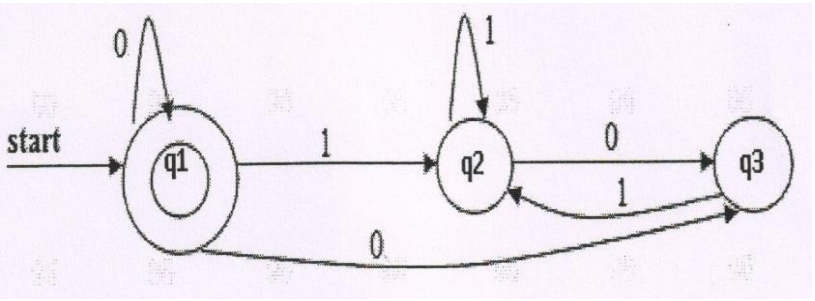
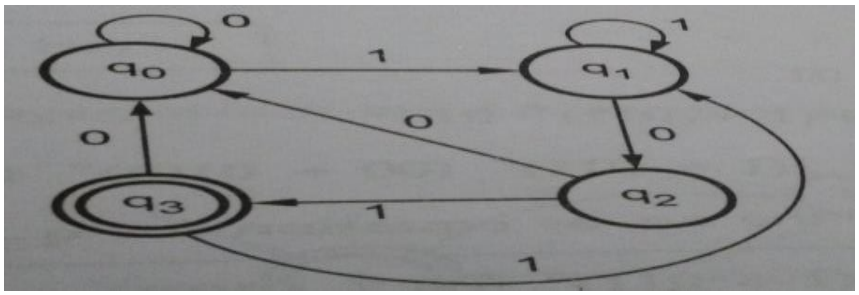
S.No	Questions	BT	CO
	Part-A: Short Answer Questions		
1	Define DFA	L1	CO1
2	Mention the differences between DFA,NFA.	L4	CO1
3	Construct the DFA that accepts all strings of a's and b's, no a's are even or no .of b's are even .	L1	CO1
4	Construct the FA that accepts all strings of a's and b's, that every string starts with a and length of the string not divisible by 3	L1	CO1
5	Write down the decision properties of FA.	L1	CO1
6	List the differences between Moore and Melay machines.	L1	CO1
7	Obtain a DFA to accept strings of a's and b's starting with the string a b	L1	CO1
8	List limitations of Finite Automata.	L1	CO1
9	Define Moore machine.	L1	CO1
10	Obtain a DFA to accept strings of a's and b's having even number of a's and b's	L3	CO1
	Part–B Long Answer Questions		

11		Convert the following NFA to DFA 	L1	CO1
12		Convert the following NFA with to NFA without 	L1	CO1
13	A)	Define the following i)power of an String ii)Transition Table iii)Language iv)power set	L1	CO1
	B)	With the help of diagram explain the function of DFA, Why it is called as deterministic?	L1	CO1
14	A)	Draw a DFA to accept string of 0's and 1's ending with the string 011	L1	CO1
	B)	Obtain a DFA to accept strings of a's and b's having even number of a's and b's.	L2	CO1
15	A)	Minimize following DFA. 	L3	CO1

	B)	Check whether following two finite automata are equivalent or not.  	L1	CO1

UNIT–II

S.No		Questions	BT	CO
Part-A:ShortAnswerQuestions				
1		What is regular set and Regular Expression?	L4	CO2
2		Simplify the RE (ab*+(ab)*)*a*	L3	CO2
3		Construct the RE that generates all the strings of a's and b's i)including ii)excluding	L3	CO2
4		Define CFG,LMD,RMD.	L1	CO2
5		Find a RE for the set of all strings containing no three consecutive 0'	L1	CO2
6		What is the difference between Regular and context free grammar?	L1	CO2
7		Construct a regular grammar for the regular expression a*b (a+b)*	L1	CO2
8		List closure properties of regular languages.	L1	CO2
9		Prove for the RE a and b i)(ab+a)*a=a(ba+a)*ii(a*b*)*=(a+b)*	L1	CO2
10		Find the left most derivation for the word a b b a in the grammar S□AA,A□aB,B□bB/ε	L1	CO2
Part-B:LongAnswerQuestions				
11	a)	Show that L={ a^nb^n|n>=1} is not a regular language using pumping lemma	L1	CO2

	b)	Derive the RE for the following finite automata 	L1	CO2
12	a)	Construct the RE, Where the length of the string is at least 2and exactly 2	L1	CO2
	b)	Convert the RE (02+1)* to an NFA-ε	L2	CO2
13	a)	State and prove pumping lemma for regular languages.	L1	CO2
	b)	Explain the procedure of converting FA to RE with example	L1	CO2
14	a)	Consider the FA and construct RE that accept by the following diagram. 	L1	CO2
	b)	Find the RE accepted by the following DFA 	L1	CO2
15	a)	Construct a regular grammar for (ab+a)*(aa+b)	L1	CO2
	b)	Convert the given right linear grammar to equivalent left linear grammar S→bB,B→bC,B→aB,C→a,B→b	L1	CO2

UNIT–III

S.No		Questions	BT	CO
Part-A:ShortAnswerQuestions				
1		Prove the grammar is ambiguous. S□a|Sa|bSS|SSb|SbS	L1	CO3
2		Convert the following grammar to Greibach normal form S□ABA|AB|BA|AA|B,A□aA|a,B□bB|b	L1	CO3
3		Construct the PDA for the following grammar S□AA|aA□SA|b	L1	CO3
4		What is DPDA?	L2	CO3
5		What are the difference between PDA and DPDA?	L1	CO3
6		For the CFG remove the production S□aSa/bSb/ε	L1	CO3
7		Explain Chomsky's normal form with example.	L1	CO3
8		Explain Greibach normal form with example.	L1	CO3
9		When a CFG is said to be GNF?	L1	CO3
10		List out the properties of CFG?	L1	CO3
Part-B:LongAnswerQuestions				
11	a)	What is Chomsky's normal form explain.?	L1	CO3
	b)	Define CNF. Convert the following CFG to CNF S□ASB|ε,A□aAS|a,B□SbS|A|bb	L1	CO3

UNIT–IV

S.No	Questions	BT	CO
Part-A:ShortAnswerQuestions			
1	Define Turing Machine?	L1	CO4
2	What is Type1grammar?	L1	CO4
3	Design TM for L={$0^n1^n0^n$|n>=1}	L1	CO4
4	Define Recursively enumerable language?	L1	CO4

5		Construct TM to add two given integer?	L1	CO4
6		What are the types of TM?	L1	CO4
7		What are the properties of Recursive and recursively Enumerable language?	L3	CO4
8		Define Church's Hypothesis?	L1	CO4
9		What are the limitations of TM?	L3	CO4
10		Make a comparison between FM, PDA and TM?	L1	CO4
Part-B Long Answer Questions				
11	a)	Explain TM in Brief?	L1	CO4
	b)	Explain importance and limitations of TM?	L1	CO4
12	a)	Given∑ ={0,1}, design a TM that accepts the language denoted by regular expression 00*	L3	CO4
	b)	Design ATM that accepts L={$a^n b^n$|n>=0}	L1	CO4
13	a)	Explain counter machine in details?	L2	CO4
	b)	Make a compare between PDA and TM?	L3	CO4
14	a)	Explain with diagram for the working of a TM model?	L1	CO4
	b)	Design a TM that accept L={$0^{2n}1^n$|n>=0}	L1	CO4
15	a)	Construct a Multi track TM for checking a given number is prime or not?	L1	CO4
	b)	Construct a TM for ∑={a,b} which will convert lowercase to uppercase letters.	L3	CO4

UNIT–V

S.No	Questions	BT	CO
1	What is P class?	L2	CO5
2	State and explain rice theorem?	L2	CO5
3	What are the difference between NP-Hard and NP-complete?	L5	CO5
4	What is Hierarchy Theorem?	L2	CO5

5		Is the language $a^n b^n c^n$ is context sensitive?	L5	CO5
6		What is halting problem is its lovable?	L2	CO5
7		Explain halting problem of TM?	L3	CO5
8		What is Decidability? Explain with example?	L2	CO5
9		Explain Universal TM?	L4	CO5
10		What is COUNTER Machine?	L5	CO5
11	a)	What is P,NP,NP-complete and NP-hard?	L1	CO5
	b)	Explain Chomsky Hierarchy in details?	L1	CO5
12	a)	What Is PCP? Or Universal TM	L1	CO5
	b)	Explain Homomorphism i)Recursive language	L2	CO5
13	a)	What is Turing Machine and Multi tape Turing Machine? Show that the languages accepted by these machines are same.	L2	CO5
	b)	What is decidability of a problem explain in details?	L1	CO5
14	a)	Design Turing Machine for the language to accept the set of strings with equal number of 0's and 1's and also give the instantaneous description for the input '110100'.	L1	CO5
	b)	What is halting problem and Turing reducibility?	L3	CO5
15	a)	Define LR(0) grammars.	L2	CO5
	b)	Give examples for Undecidable Problems	L1	CO5

* **Blooms Taxonomy Level (BT)** (L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analyzing; L5 – Evaluating; L6 – Creating)