



## QUESTION BANK

### UNIT-I

S.No	Questions	BT	CO	PO
<b>Part-A: Short Answer Questions</b>				
1	Define DFA	L1	CO1	PO1
2	Mention the differences between DFA, NFA.	L4	CO1	PO2
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	PO 3
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	<b>PO 3</b>
5	Write down the decision properties of FA.	L1	CO1	PO2
6	List the differences between Moore and Melay machines.	L1	CO1	PO1
7	Obtain a DFA to accept strings of a's and b's starting with the string ab	L1	CO1	PO3
8	List limitations of Finite Automata.	L1	CO1	PO1
9	Define Moore machine.	L1	CO1	PO1
10	Obtain a DFA to accept strings of a's and b's having even number of a's and b's	L3	CO1	<b>PO 3</b>
<b>Part – B Long Answer Questions</b>				

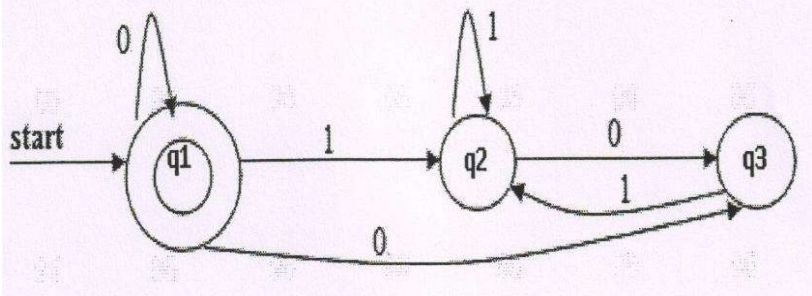
11	Convert the following NFA to DFA	L1	CO1	PO 3
<pre> graph LR     a((a)) -- 0 --&gt; a     a -- 0 --&gt; b((b))     a -- "0,1" --&gt; e(((e)))     a -- "0,1" --&gt; d((d))     b -- 1 --&gt; c((c))     c -- 0 --&gt; b     b -- 1 --&gt; e     d -- 0 --&gt; e   </pre>				

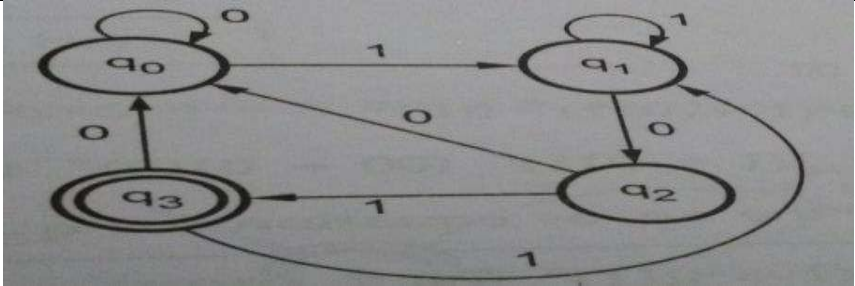
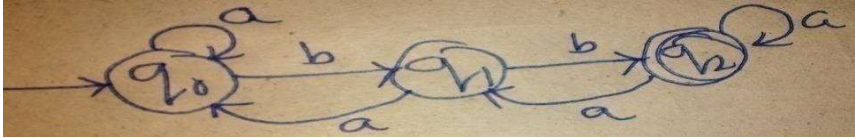
12	Convert the following NFA with $\epsilon$ to NFA without $\epsilon$	L1	CO1	PO 3
<pre> graph LR     start((start)) --&gt; q0((q0))     q0 -- a --&gt; q0     q0 -- epsilon --&gt; q1((q1))     q1 -- b --&gt; q1     q1 -- epsilon --&gt; q2(((q2)))     q2 -- c --&gt; q2   </pre>				
13	A) Define the following i). power of an String ii). Transition Table	L1	CO1	PO1
	iii) Language iv) power set			
	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	PO1
	B) Obtain a DFA to accept strings of a's and b's having even number of a's and b's.	L2	CO1	PO3
15	A) Minimize following DFA.	L3	CO1	PO 1
<pre> graph LR     a((a)) -- 0 --&gt; b((b))     a -- 1 --&gt; c(((c)))     b -- 1 --&gt; d(((d)))     b -- 0 --&gt; a     c -- 0 --&gt; e(((e)))     c -- 1 --&gt; f(((f)))     d -- 1 --&gt; f     d -- 0 --&gt; e     e -- 0 --&gt; e     e -- 1 --&gt; f     f -- "0,1" --&gt; f   </pre>				

	B)	<p>Check whether following two finite automata are equivalent or not.</p>	L1	CO1	<b>PO 1</b>
--	----	---	----	-----	-------------

## UNIT-II

S.No	Questions	BT	CO	PO
<b>Part-A: Short Answer Questions</b>				
1	What is regular set and Regular Expression?	L4	CO 2	PO1
2	Simplify the RE $(ab^*+(ab)^*)^*a^*$	L3	CO 2	PO2
3	Construct the RE that generates all the strings of a's and b's i) including $\epsilon$ ii) excluding $\epsilon$	L3	CO 2	<b>PO 3</b>
4	Define CFG, LMD, RMD.	L1	CO 2	PO1
5	Find a RE for the set of all strings containing no three consecutive 0's	L1	CO 2	PO4
6	What is the difference between Regular and context free grammar?	L1	CO 2	PO1
7	Construct a regular grammar for the regular expression $a^*b(a+b)^*$	L1	CO 2	PO3
8	List closure properties of regular languages.	L1	CO 2	PO2
9	Prove for the RE a and b i. $(ab+a)^*a=a(ba+a)^*$ ii $(a^*b^*)^*=(a+b)^*$	L1	CO 2	PO2
10	Find the left most derivation for the word abba in the grammar $S \rightarrow AA, A \rightarrow aB, B \rightarrow bB/\epsilon$	L1	CO 2	<b>PO 4</b>
<b>Part-B: Long Answer Questions</b>				
a)	Show that $L = \{ a^n b^n \mid n \geq 1 \}$ is not a regular language using pumping lemma	L1	CO 2	<b>PO 2</b>

1 1	b)	Derive the RE for the following finite automata 	L1	CO 2	<b>PO 2</b>
12	a)	Construct the RE , where the length of the string is at least 2 and exactly2	L1	CO 2	<b>PO 3</b>
	b)	Convert the RE $(02+1)^*$ to an NFA- $\epsilon$	L2	CO 2	<b>PO 3</b>
13	a)	State and prove pumping lemma for regular languages.	L1	CO 2	<b>PO 2</b>
	b)	Explain the procedure of converting FA to RE with example	L1	CO 2	<b>PO 1</b>
14	a)	Consider the FA and construct RE that accepts by the following diagram.	L1	CO 2	<b>PO 3</b>

					
	b)	Find the RE accepted by the following DFA 	L1	CO 2	<b>PO 2</b>
1 5	a)	Construct a regular grammar for $(ab+a)^*(aa+b)$	L1	CO 2	<b>PO 1</b>
	b)	Convert the given right linear grammar to equivalent left linear grammar $S \rightarrow bB, B \rightarrow bC, B \rightarrow aB, C \rightarrow a, B \rightarrow b$	L1	CO 2	<b>PO 1</b>

### UNIT-III

S.No	Questions	BT	CO	PO
<b>Part-A: Short Answer Questions</b>				
1	Prove the grammar is ambiguous. $S \rightarrow a Sa bSS SSb SbS$	L1	CO 3	PO1
2	Convert the following grammar to Greibach normal form $S \rightarrow ABA AB BA AA B, A \rightarrow aA a, B \rightarrow bB b$	L1	CO 3	<b>PO 2</b>
3	Construct the PDA for the following grammar $S \rightarrow AA a, A \rightarrow SA b$	L1	CO 3	PO2
4	What is DPDA?	L2		PO1
5	What are the difference between PDA and DPDA?	L1		PO4
6	For the CFG remove the $\epsilon$ production $S \rightarrow aSa/ bSb/\epsilon$	L1		PO4
7	Explain Chomsky's normal form with example.	L1	CO 3	PO1
8	Explain Greibach normal form with example.	L1		PO1
9	When a CFG is said to be GNF?	L1		PO2
10	List out the properties of CFG?	L1	CO 3	PO1
<b>Part-B: Long Answer Questions</b>				
11	a) What is Chomsky's normal form explain.?	L1	CO 3	PO1
	b) Define CNF . convert the following CFG to CNF $S \rightarrow ASB  \epsilon, A \rightarrow aAS a, B \rightarrow SbS A bb$	L1	CO 3	<b>PO 2</b>

### UNIT-IV

S.No	Questions	BT	CO	PO
<b>Part-A: Short Answer Questions</b>				
1	Define Turing Machine?	L1	CO4	PO2
2	What is Type 1 grammar?	L1	CO4	PO1

3	Design TM for $L = \{0^n 1^n 0^n   n \geq 1\}$	L1	CO4	PO2
4	Define Recursively enumerable language?	L1	CO4	PO2
5	Construct TM to add two given integer?	L1	CO4	PO3
6	What are the types of TM?	L1	CO4	PO3
7	What are the properties of Recursive and recursively Enumerable language?	L3	CO4	<b>PO4</b>
8	Define Church's Hypothesis?	L1	CO4	PO2
9	What are the limitations of TM?	L3	CO4	PO2
10	Make a comparison between FM, PDA and TM?	L1	CO4	PO5

### Part-B Long Answer Questions

11	a)	Explain TM in Brief?	L1	CO4	PO1
	b)	Explain importance and limitations of TM?	L1	CO4	PO2
12	a)	Given $\Sigma = \{0,1\}$ , design a TM that accepts the language denoted by regular expression $00^*$	L3	CO4	PO2
	b)	Design A TM that accepts $L = \{anbn   n \geq 0\}$	L1	CO4	PO1
13	a)	Explain counter machine in details?	L2	CO4	PO1
	b)	make a compare between PDA and TM?	L3	CO4	PO1

14	a)	Explain with diagram for the the working of a TM model?	L1	CO4	PO2
	b)	Design a TM that accept $L = \{02n1n   n \geq 0\}$	L1	CO4	PO2
15	a)	Construct a Multitrack TM for checking a given number is prime or not?	L1	CO4	PO1
	b)	Construct a TM for $\Sigma = \{a,b\}$ which will covert lower case to upper case letters.	L3	CO4	PO4

### UNIT-V

S.No	Questions	BT	CO	PO
1	What is P class?	L2	CO 5	PO2
2	State and explain rice theorem?	L2	CO 5	PO2
3	What are the difference between NP-Hard and NP- complete?	L5	CO 5	PO3

4	What is Hierarchy Theorem?	L2	CO 5	PO1
5	Is the language $a^n b^n c^n$ is context sensitive?	L5	CO 5	PO2
6	What is halting problem is it solvable?	L2	CO 5	PO1
7	Explain halting problem of TM?	L3	CO 5	PO2
8	What is Decidability? Explain with example?	L2	CO 5	PO1
9	Explain Universal TM?	L4	CO 5	PO2
10	What is COUNTER Machine?	L5	CO 5	PO1
11	a) What is P, NP, NP-complete and NP-hard?	L1	CO 5	PO1
	b) Explain Chomsky Hierarchy in details?	L1	CO 5	PO2
12	a) What is PCP ? Or Universal TM	L1	CO 5	PO1
	b) explain Homomorphism ii) Recursive language	L2	CO 5	PO2
13	a) What is Turing Machine and Multi tape Turing Machine? Show that the languages accepted by these machines are same.	L2	CO 5	PO1
	b) What is decidability of a problem explain in details?	L1	CO 5	PO1
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	CO 5	PO3
	b) What is halting problem and Turing reducibility ?	L3	CO 5	PO1
15	a) Define LR(0) grammars.	L2	CO 5	PO3
	b) Give examples for Undecidable Problems	L1	CO 5	PO1

