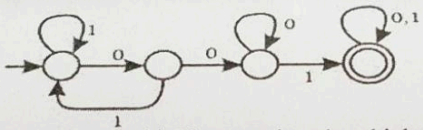
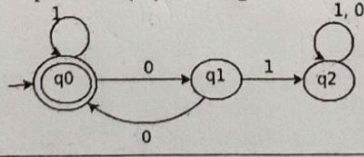
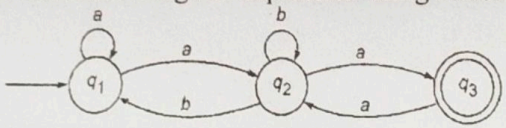
ITM UNIVERSITY
GWALIOR • MP • INDIA
"CELEBRATING DREAMS"

Mid Term Exam Sep2022

Class & Batch …B.Tech 5th Sem…….Subject Name& Code …Theory of Computation (CSL0516)……
Time 01:30 Hours Maximum Marks: 30
All Questions are Compulsory:

Q. No.	Questions	Marks	CO	BL
Q 1				
1.1	Define Moore Machine.	1	1,2	1,2
1.2	Construct a DFA accepting all strings over {a,b}. i. Having the set of all strings start with ab. ii. Having the set of all strings of length atleast '2'. OR Construct a DFA which accepts set of all strings over {a, b} in which number of a's are even and number of b's are also even.	5	1,2	1,2
Q 2				
2.1	Write down any *one* Identity of Regular Expression.	1	1,2	1,2
2.2	Define Finite Automata? What are its different tuples? Also explain the difference between DFA and NFA. OR "Every DFA is NFA". Prove it.	5	1,2,3	1,2,3
Q 3				
3.1	Define Regular Expression.	1	1,2	1,2
3.2	Consider the following deterministic finite state automaton M.  Let S denote the set of seven bit binary strings in which the first, the fourth, and the last bits are 1. What are the maximum possible strings in S that are accepted by M? Explain. OR Let M= {Q, ∑, δ, q0, F} be a given DFA that accepts a language L. What will be the complement (L') of the given DFA. Explain it.  	5	1,2,3	3,4
Q 4				
4.1	Define DFA.	1	1,2	1,2
4.2	Determine the DFA for the given NFA transition table. OR Construct a minimum state automaton equivalent to a given automaton M whose transition table is given below:	5	1,2	2,3,4

Present State	Next State	
	a	b
→q0	q0 ,q1	q0
q1	q2	q2
(q2)	-	-

	<table><tr><th>State</th><th>Input</th></tr><tr><th></th><th>a</th><th>b</th></tr><tr><td>→ q0</td><td>q0</td><td>q3</td></tr><tr><td>q1</td><td>q2</td><td>q5</td></tr><tr><td>q2</td><td>q3</td><td>q4</td></tr><tr><td>q3</td><td>q0</td><td>q5</td></tr><tr><td>q4</td><td>q0</td><td>q6</td></tr><tr><td>q5</td><td>q1</td><td>q4</td></tr><tr><td>(q6)</td><td>q1</td><td>q3</td></tr></table>			
Q 5				
5.1	What is the purpose of pumping lemma for regular languages?	1	1,2	1,2,3
5.2	Construct a Moore Machine equivalent to given Mealy Machine. <table><tr><th rowspan="3">Present State</th><th colspan="4">Next State</th></tr><tr><th colspan="2">a = 0</th><th colspan="2">a = 1</th></tr><tr><th>State</th><th>Output</th><th>State</th><th>Output</th></tr><tr><td>-> q0</td><td>q3</td><td>0</td><td>q1</td><td>1</td></tr><tr><td>q1</td><td>q0</td><td>1</td><td>q3</td><td>0</td></tr><tr><td>q2</td><td>q2</td><td>1</td><td>q2</td><td>0</td></tr><tr><td>q3</td><td>q1</td><td>0</td><td>q0</td><td>1</td></tr></table> OR Conversion of FSM into a regular expression using Arden's theorem. 	5	1,2	2,3,4