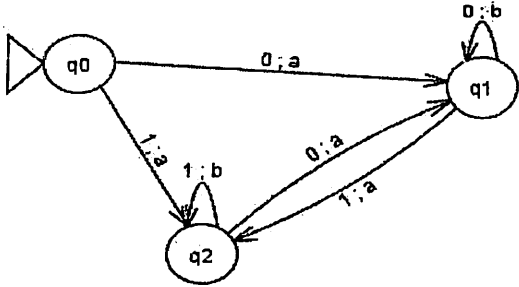# III YEAR B.TECH. EXAMINATION DECEMBER 2021

SUBJECT CODE: 150503
SUBJECT TITLE: THEORY OF COMPUTATION

Time: 3 Hours   **Maximum Marks: 70**   **Minimum Passing Marks: 22**

Note:	1. Answer all five questions. All questions carry equal marks. 2. In each question part a, b, c are compulsory and part d has internal choice, Out of which part a & b carries 2 marks each, part c carries 3 marks and part d carries 7 marks. 3. All parts of each question are to be attempted at one place. 4. Assume suitable value for missing data, if any.			
Question No.		**Marks**	**Course Outcomes**	**Bloom's Level**
1.	(a)	Define transition diagram and transition table.	02	CO2	L2
	(b)	Design a DFA to accept set of all string over Σ = {a, b} start with a and end with b.	02	CO1	L1
	(c)	Design a DFA to accept set of all string over Σ = {0, 1} not containing 101 as a sub string.	03	CO2	L2
	(d)	Construct a Moore machine equivalent to following Mealy machine. 	07	CO2, CO3	L1.L2
		OR			
	(e)	Design a mealy machine accepting the language consisting of string from Σ*, Where Σ = {a, b} and the string should end with either aa or bb.	07	CO1, CO3	L4,L5
2.	(a)	What is mean by minimization of DFA	02	CO1	L1
	(b)	Differentiate between NFA and DFA.	02	CO1	L1
	(c)	Prove that (1 + 00*1) + (1 + 00*1)(0 + 10*1)*(0 + 10*1)* is equal to 0*1(0 + 10*1)*	03	CO3	L3
	(d)	Convert NFA with epsilon move into NFA.	07	CO3, CO4	L3,L4

Note: The Question No. column spans two sub-columns (number and letter); Marks, Course Outcomes, and Bloom's Level columns follow.

		OR			
	(e)	Convert the following finite automaton to a regular expression.	07	CO2, CO3	L5,L4
3.	(a)	Define Derivation Tree.	02	CO4	L1
	(b)	Show that the grammar S → a / abSb / aAb , A → bS / aAAb is ambiguous.	02	CO3	L3
	(c)	Eliminate the unit production S → XY, X → a, Y → Z | b, Z → M, M → N, N → a	03	CO4	L2
	(d)	Find a grammar in Chomsky normal form equivalent to S → aAbB, A→ aA | a, B→ bB | b	07	CO4, CO5	L5,L3
		OR			
	(e)	Construct a grammar in GNF which is equivalent to the grammar S → AA / a , A → SS / b	07	CO4, CO5	L4,L3
4.	(a)	Define Acceptance by Final State	02	CO4	L2
	(b)	State the pumping lemma for CFL's?	02	CO4	L2
	(c)	Write rules to convert PDA to CFG.	03	CO5	L3
	(d)	Construct a PDA for the context free grammar S --> aSA | a, A --> bB, B --> b	07	CO5, CO6	L5,L4
		OR			
	(e)	Design PDA for Language L = { a^{m+n}, b^m, c^n / m, n >=1}	07	CO5, CO6	L2,L4
5.	(a)	What is Turing Machine?	02	CO3	L2
	(b)	Explain Recursively Enumerable set.	02	CO2	L1
	(c)	Explain Universal Turing Machine with example.	03	CO4	L4
	(d)	Construct a TM for the language L= {$a^n b^n c^n$ / n ≥0}.	07	CO4, CO6	L3,L4
		OR			
	(e)	Describe P, NP and NP complete problem.	07	CO5, CO6	L4,L5