

Roll No.

TCS-402

B. TECH. (CSE)

(FOURTH SEMESTER)

MID SEMESTER EXAMINATION, 2021

**FINITE AUTOMATA AND FORMAL
LANGUAGES**

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing
any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Convert the following N DFA as given in
Table 1 to DFA and informally describe
the language it accepts. Here, P is initial
state, S* and T* is final state.

(2)

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Table 1		
Current State	Next State	
	0	1
$\rightarrow P$	{P, Q}	{P}
Q	{R, S}	{T}
R	{P, R}	{T}
S*	—	—
T*	—	—

10 Marks (CO2, CO6)

OR

- (b) Design a regular expression, where every string start with 01 over input symbol $\Sigma = \{0, 1\}$ using Arden's theorem.

10 Marks (CO2, CO6)

2. (a) Construct a minimal DFA that accept all the string of a's and b's where 4th symbol from left end is always b.

10 Marks (CO1, CO2)

OR

- (b) Construct a Moore machine that take set of all string over $\{a, b\}$ as input and count number of substring 'ab'.

10 Marks (CO1, CO2)

(3)

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3. (a) Construct a Moore machine equivalent to the Mealy machine M defined in Table 2.

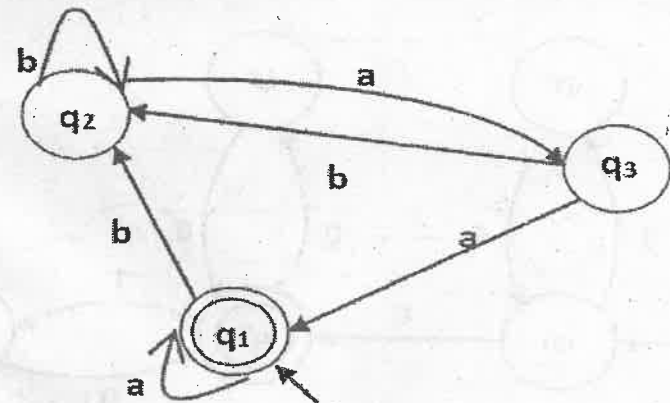
Table 2				
Current State	Next State			
	0	Output	1	Output
$\rightarrow Q_1$	Q_1	1	Q_2	0
Q_2	Q_4	1	Q_4	1
Q_3	Q_2	1	Q_3	1
Q_4	Q_3	0	Q_1	1

10 Marks (CO2, CO6)

OR

- (b) Write Regular expression for the given DFA.

10 Marks (CO2, CO6)

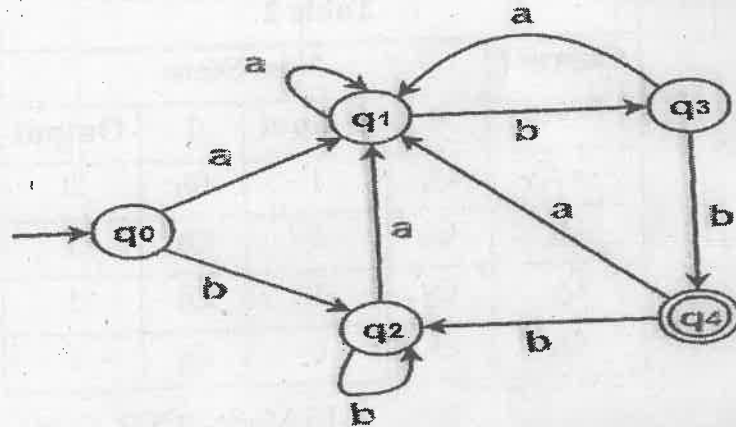


(4)

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4. (a) Construct a minimum DFA equivalent to the DFA given in below figure :

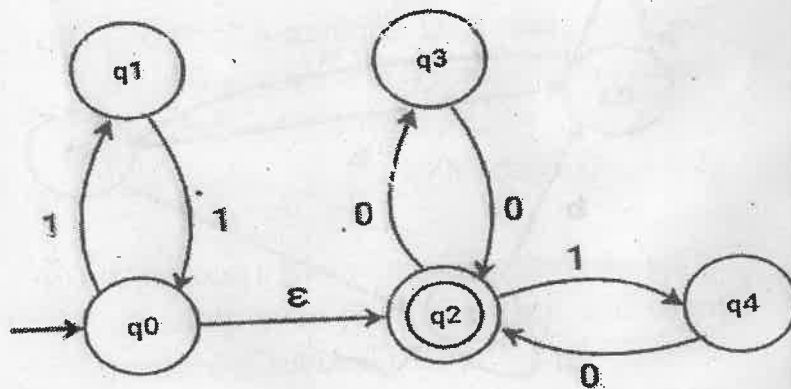
10 Marks (CO5)



OR

- (b) Convert epsilon-NFA to NFA :

10 Marks (CO5)



(5)

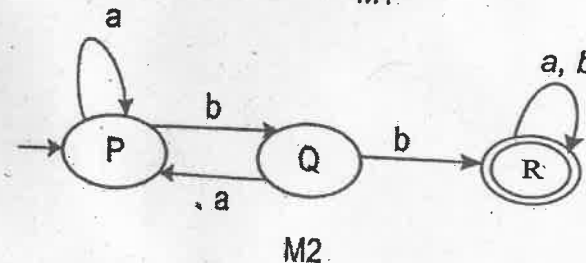
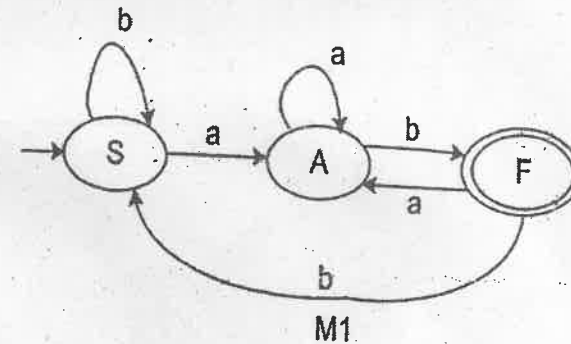
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5. (a) Using the pumping lemma, show that the language $L = \{a^n b^{2n} \mid n > 0\}$ is not regular.

10 Marks (CO2, CO6)

OR

- (b) Let M_1 and M_2 be two FA accepting languages L_1 and L_2 respectively as shown in the following figure. Construct a DFA to accept the language (i) $L_1 \cup L_2$ and (ii) $L_1 \cap L_2$: 10 Marks (CO2, CO6)



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1200