

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.

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.

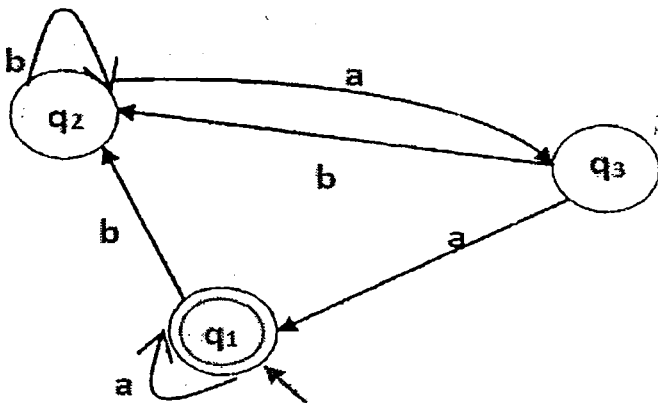
Table 2				
Current State	Next State			
	0	Output	1	Output
$\rightarrow Q_1$	$Q_1$	1	$Q_2$	0
$Q_2$	$Q_4$	1	$Q_4$	1
$Q_3$	$Q_2$	1	$Q_3$	1
$Q_4$	$Q_3$	0	$Q_1$	1

10 Marks (CO2, CO6)

OR

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

10 Marks (CO2, CO6)

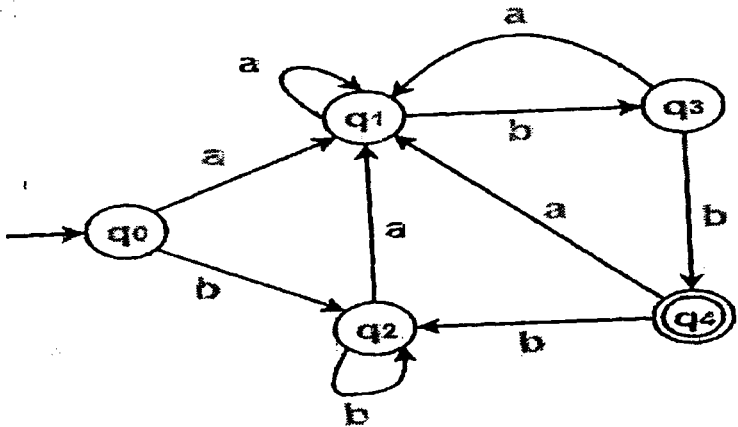


(4)

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

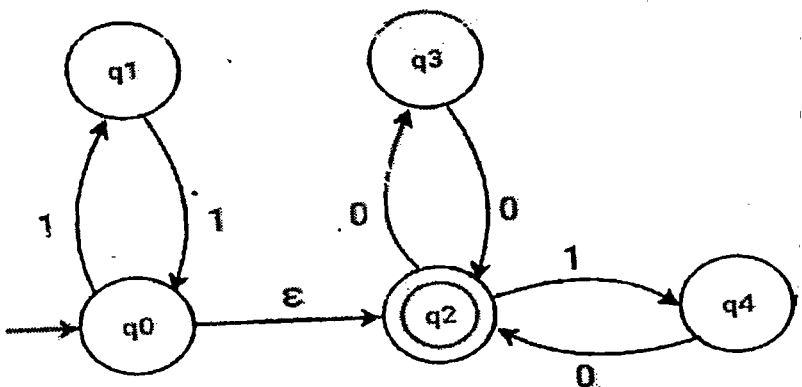
10 Marks (CO5)



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)

