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 NDFA 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
→ 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)

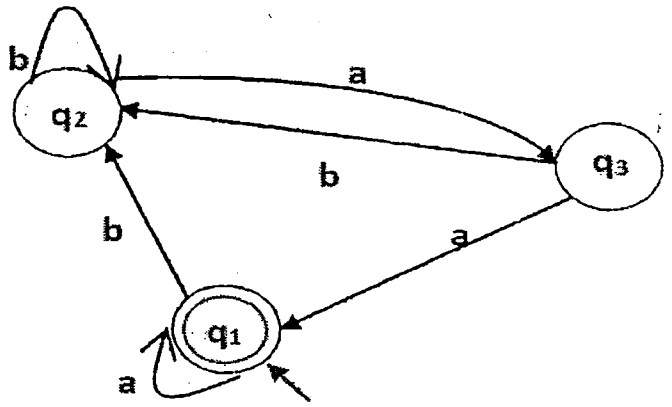
3. (a) Construct a Moore machine equivalent to the Mealy machine M defined in Table 2.

Table 2				
Current State	Next State			
	0	Output	1	Output
→ 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)

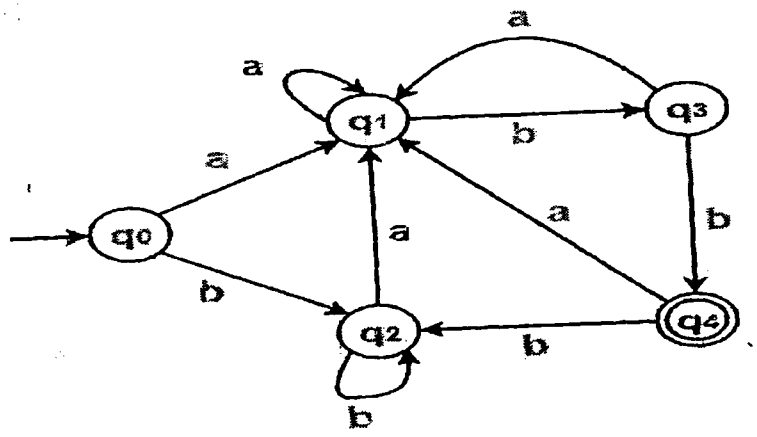
OR

(b) Write Regular expression for the given DFA. 10 Marks (CO2, CO6)



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

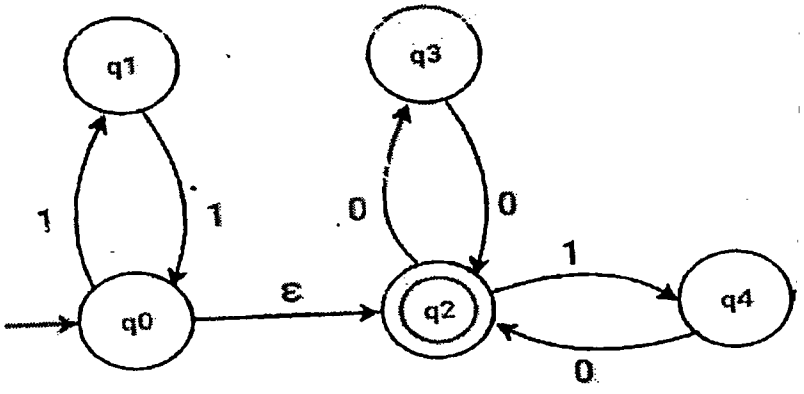
10 Marks (CO5)



OR

(b) Convert epsilon-NFA to NFA :

10 Marks (CO5)

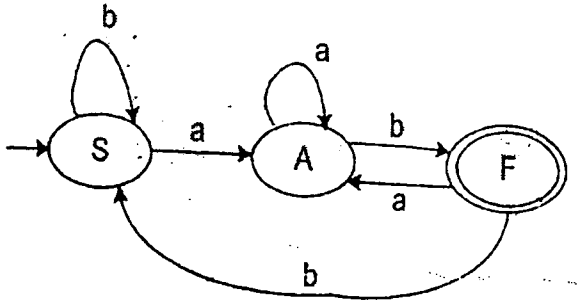


5. (a) Using the pumping lemma, show that the language $L = \{a^n b^{2n} \square n > 0\}$ is not regular.

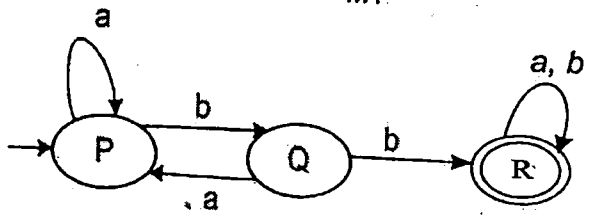
10 Marks (CO2, CO6)

OR

(b) Let M1 and M2 be two FA accepting languages L1 and L2 respectively as shown in the following figure. Construct a DFA to accept the language (i) L1 ∪ L2 and (ii) L1 ∩ L2 : 10 Marks (CO2, CO6)



M1



M2

1200