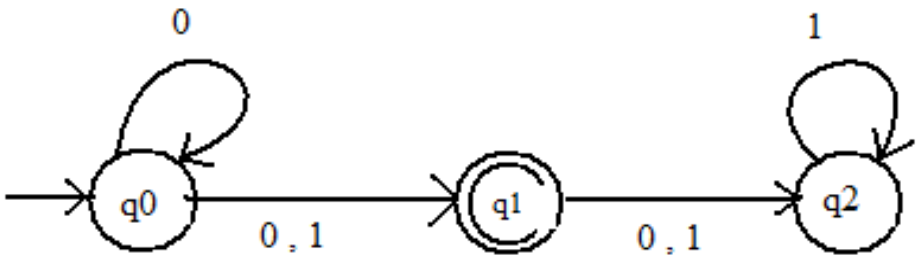
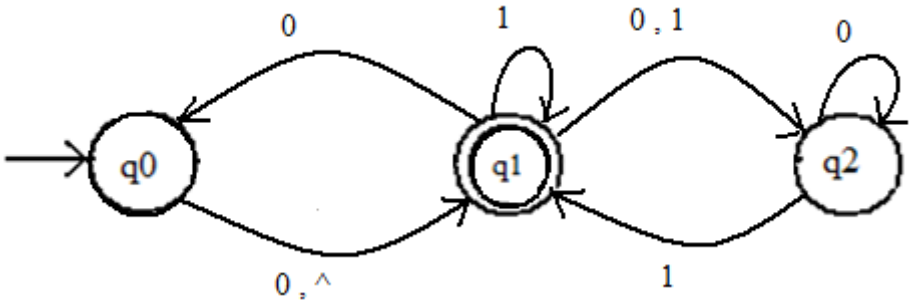
Subject Name TAFL	**Subject Code**	KCS-402
Date of Handover: 08/05/23	**Max Marks**	
Date of Submission:21/05/23		

Practice Set-2

Q.no	Question	Mapped CO
a.	i) Design a DFA which accepts the set of strings over alphabet Σ = { 1, 2, 3, 4 } such that string when interpreted as decimal numbers, sum of their digits are divisible by 5 ii) Design a DFA to accept the language L over {a, b} such that **L = { a^n b^m : n, m >= 1, n + m is even }**	**[CO1]**
b.	i) Find a deterministic finite accepter that recognizes the set of all strings on Σ = { a, b } starting with the prefix "ab". ii) Construct the transition graph for a FA which accepts a language L over Σ = { 0, 1 }in which every strings start with 0 and ends with 1.	**[CO1]**
c.	Find dfa's for the following language over **Σ = { a, b }** **L = { w : n_a(w) mod 3 > n_b(w) mod 3 }**	**[CO1]**
d.	i) Construct a nfa with three states that accepts the language { ab, abc }* ii) Design an nfa with no more than five states for the set {abab^n : n≥0} ∪ { aba^n : n≥0} iii) Convert the following nfa into equivalent deterministic machine. 	**[CO1]**
e.	i) Convert the following nfa into equivalent dfa	**[CO1]**

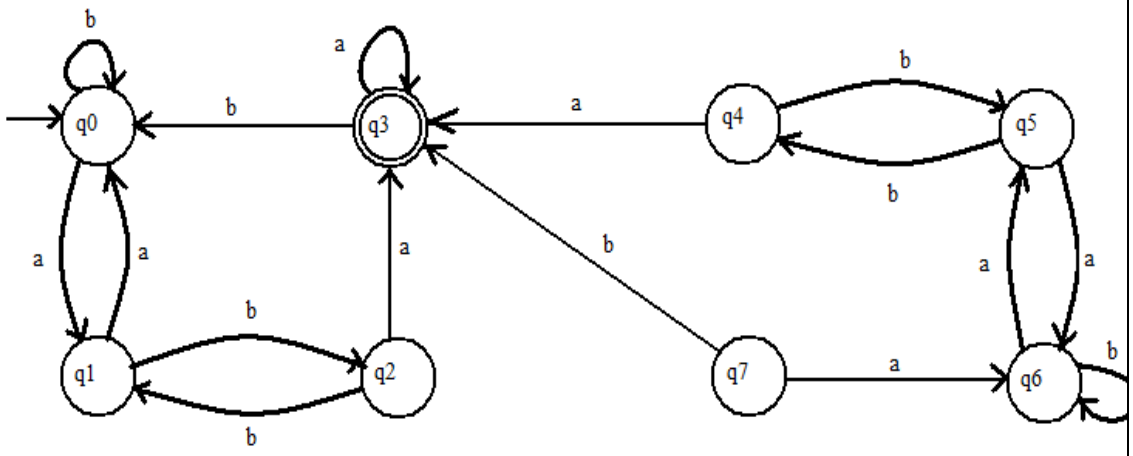


ii) Find a deterministic accepter equivalent to

M = ({ q_0, q_1, q_2 }, { a, b}, δ, q_0, {q_2 })
δ given by

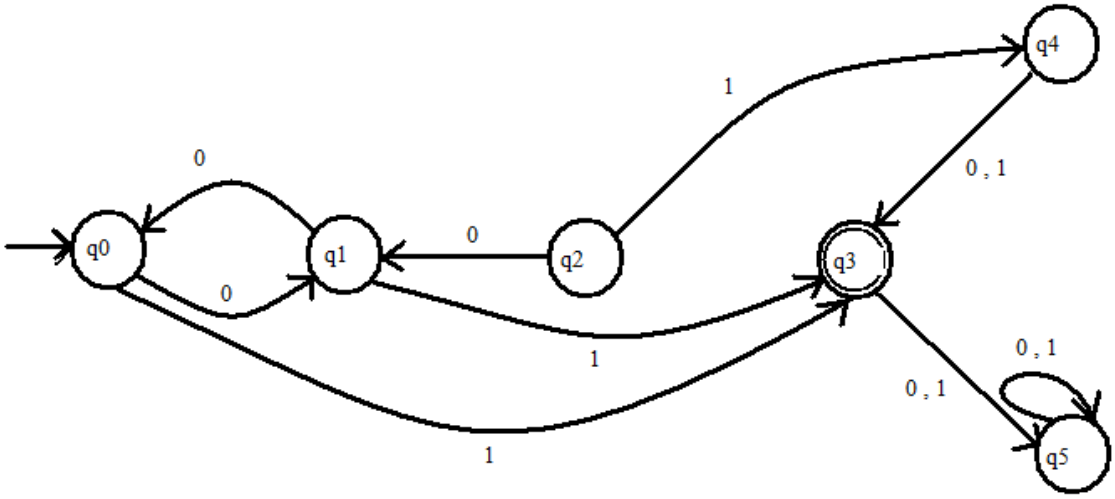
States \ Σ	a	b
→**q_0**	q_0, q_1	q_2
q_1	q_0	q_1
q_2	---	q_0, q_1

f. Construct a minimum state automation equivalent to the following transition diagram **[CO1]**

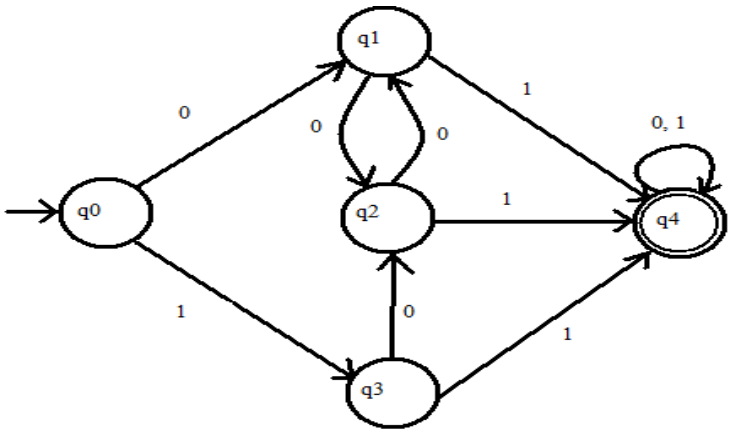


g. Minimize the states in the dfa depicted in the following diagram **[CO1]**

i)



ii)



h. **[CO1]**

i) For the given language **L1=ϕ**, **L2 = Є**, and **L3 = {0, 1}***. Compute **L1.L2** and **L1 U L2**

ii) Let **M=(Q, ∑, q0, F, δ)** be a NFA. Show that for any **q Є Q** and **a Є ∑**,
δ' (q, a) = δ (q, a)

iii) Using induction show that if for some state **q** and some string **n**, $\delta^*(q, n)=q$, then for every **n>=0**, $\delta^*(q, n^n)=q$

iv) Find two different FAs M_1 and M_2 recognizing language L_1 and L_2 respectively, such that the language $L_1 \cup L_2$ and $L_1.L_2$ are the same.

v) What do you mean by Kleen closure of set A?

vi) Let **S={ab, bb}** and **T={ab, bb, bbbb},** show that $S^* = T^*$

<table>
<tr>
<td>i.</td>
<td>i) Design a moore machine to generate 1’s complement of given binary number

ii) Design a mealy machine to generate 1’s complement of given binary number

iii) Design a moore and mealy machine for a binary input sequence such that if it has a substring “101” the machine outputs ‘A’ if input has substring “110” it outputs ‘B’ otherwise it outputs ‘C’</td>
<td>[CO1]</td>
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<tr>
<td>j.</td>
<td>Construct a minimum state automation equivalent to given automaton
<table>
<tr><th>States \ Σ</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>
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<td>[CO1]</td>
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