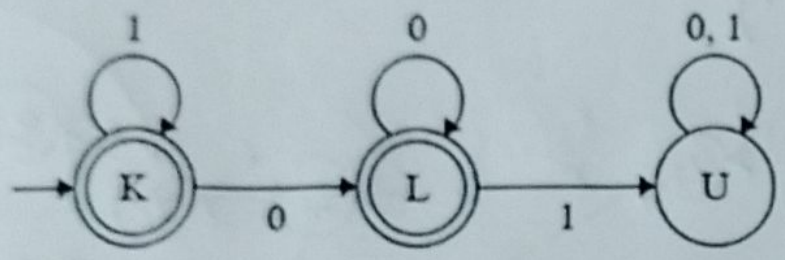
Tutorial #	5	Student ID	2300032088
Date	20/8/24	Student Name	Yogesh

Pre-Tutorial (To be completed by student before attending tutorial session)

1. Construct the regular set accepted by the finite automaton whose transition diagram is as shown below.



Solution:

Equation:

$K = E + K_1 \rightarrow (1)$

$L = K0 + L0 \rightarrow (2)$

$U = L1 + U0 + U1 \rightarrow (3)$

from (1) $\Rightarrow \underset{R}{K} = \underset{Q}{E} + \underset{RP}{K1}$

$K = E1^* = 1^*$

$L = 1^*0 + L0$

$R = Q \quad RP$

$L = 1^*00^*$

R.E for given DFA is $= 1^* + 1^*00^*$

Regular set $= \{1, 11, 1111, 1110000, \ldots\}$

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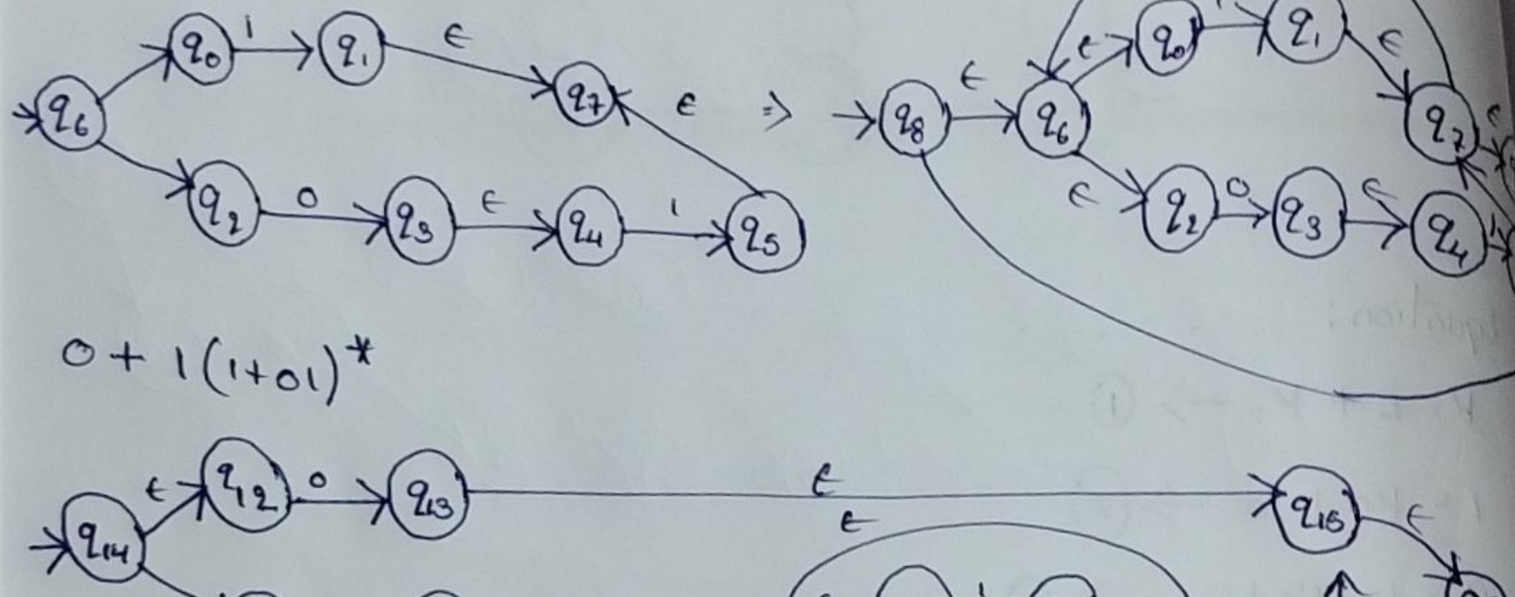
Date	<TO BE FILLED BY STUDENT> 20/8	Student Name	<TO BE FILLED BY STUDENT> Tejesh

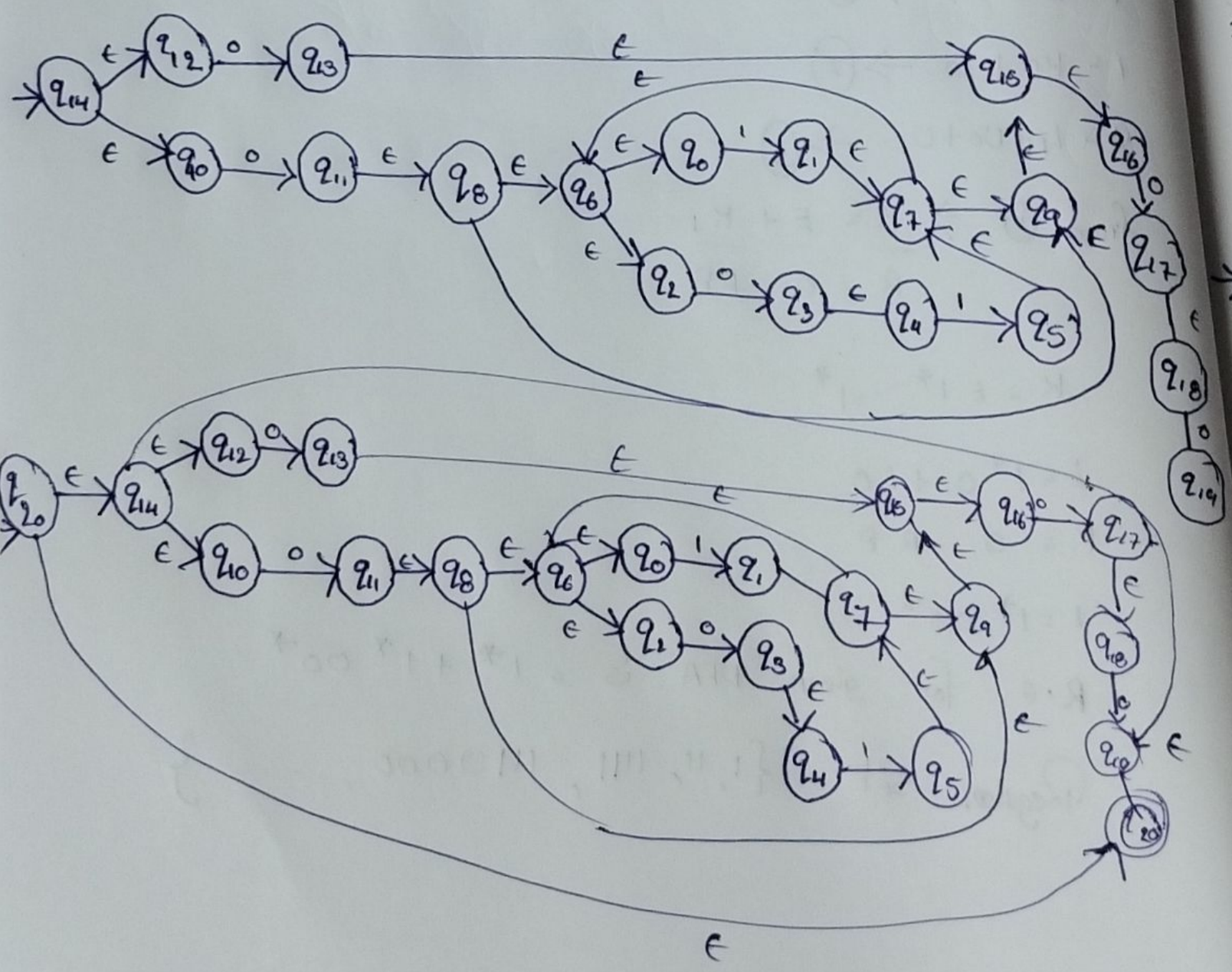
2. Construct a NFA for the regular expression (0 + 1(1 + 01)* 00)* Write each step.

Solution: $(0 + 1(1+01)^* 00)^*$

$(1+01)^* \Rightarrow (1+01)$



$0 + 1(1+01)^*$

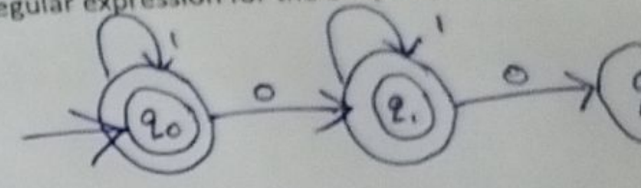


Course Title	THEORY OF COMPUTATION	ACADEMIC YEAR: 2024-25
Course Code(s)	23MT2014	Page 56 of 261

Tutorial #	<TO BE FILLED BY STUDENT> 5	Stude
Date	<TO BE FILLED BY STUDENT> 20/8	Student

3. Write the regular expression for the L = {w ∈ (0,1)* | w has

Solution:



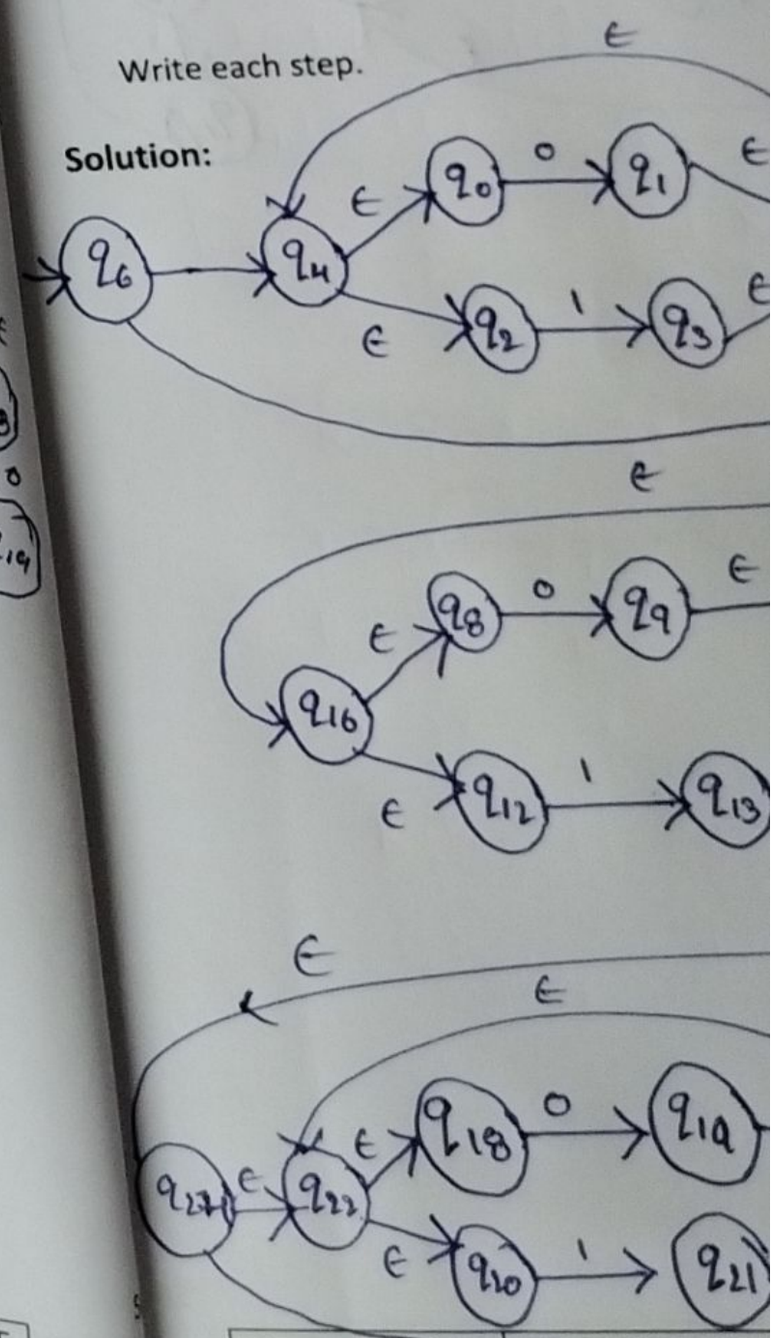
$(1+01)^*$

IN-TUTORIAL (To be carried out in presen

1. Construct the finite automaton equivalent to
$(0 + 1)^*(00 + 11)(0 + 1$

Write each step.

Solution:

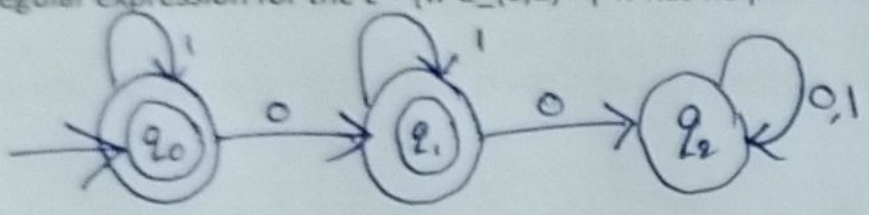


Course Title	THEORY OF COM
Course Code(s)	23MT2014

Tutorial #	5	Student ID	300988
Date	2018	Student Name	Tejesh

3. Write the regular expression for the L = {w ∈_{0,1}* | w has no pair of consecutive zeros?

Solution:



$(1+01)^*$

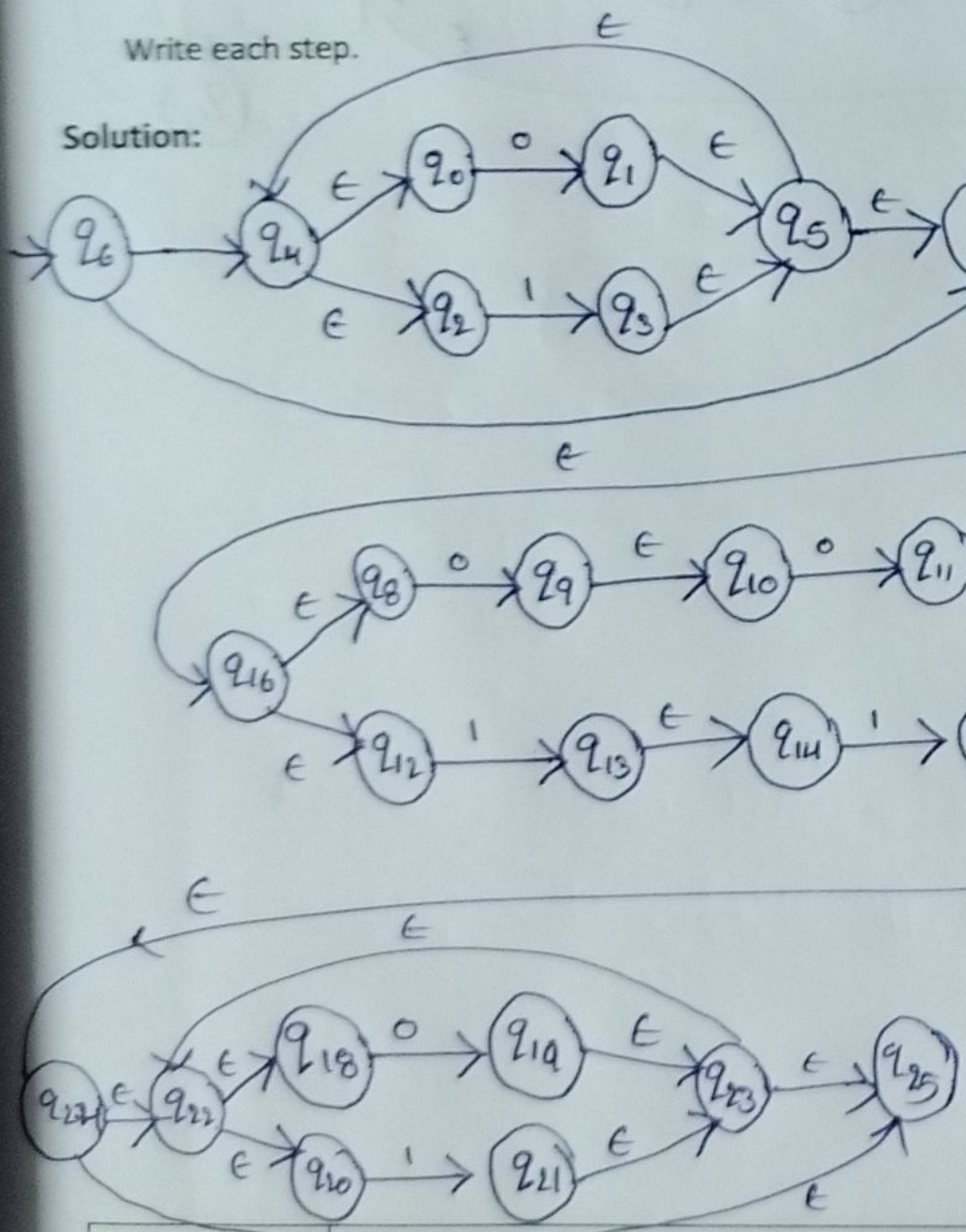
IN-TUTORIAL (To be carried out in presence of faculty in classroom)

1. Construct the finite automaton equivalent to the regular expression

$$(0 + 1)^*(00 + 11)(0 + 1)^*$$

Write each step.

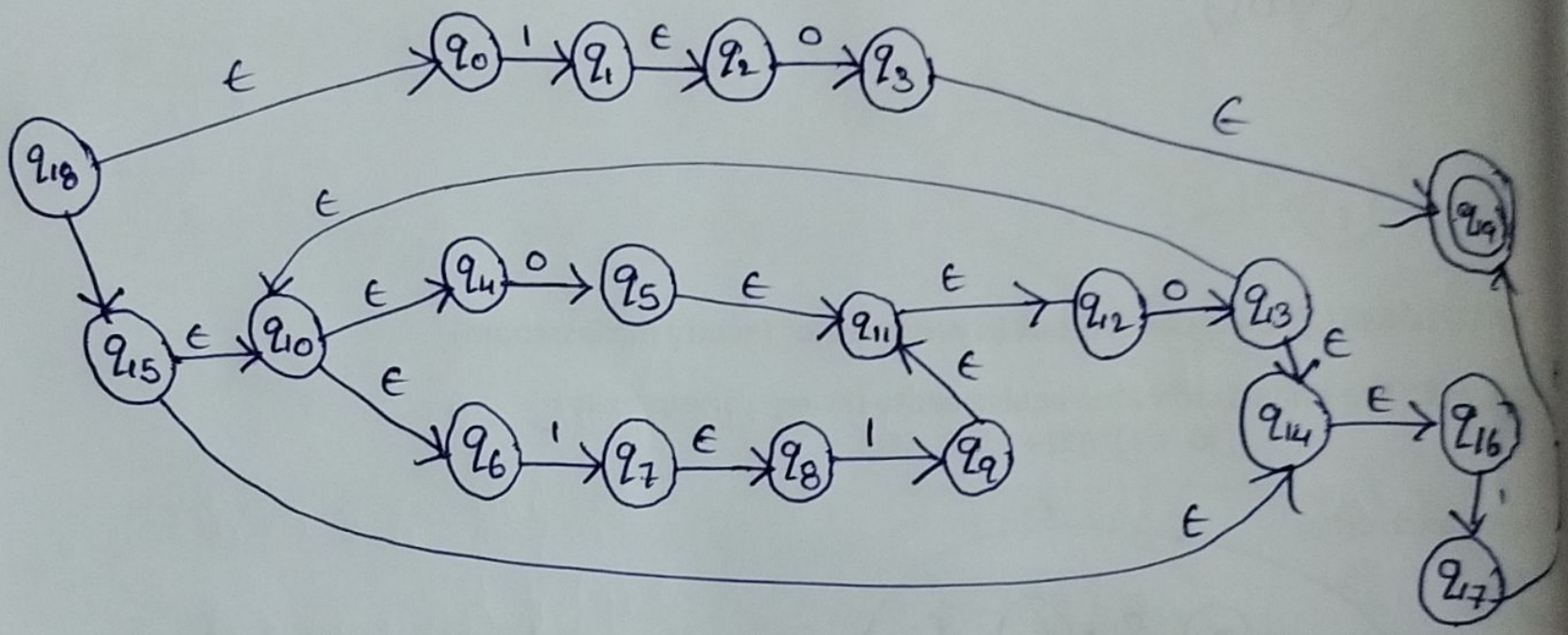
Solution:



Tutorial #	5	Student ID	20088
Date	20/8	Student Name	Tejesh

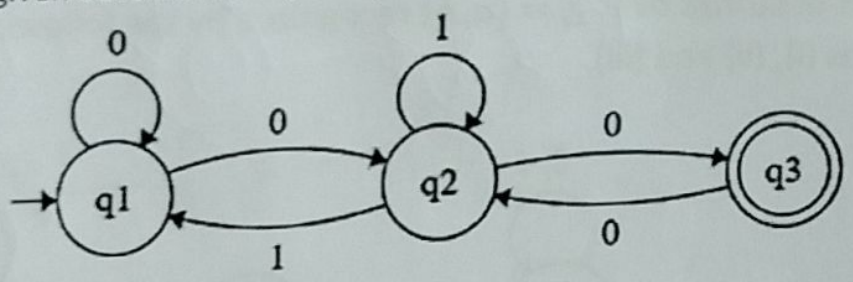
2. Construct a DFA with reduced states equivalent to the regular expression $10 + (0 + 11)0^*$

Solution:



Tutorial #	5	Student ID	30088
Date	20/8	Student Name	Tejesh

3. Consider the following transition diagram of a finite automaton. Prove that the strings recognized by this given automaton is **(0 + 0(1 + 00)*1)* 0(1 + 00)* 0.**



4.

Solution: $(0+0(1+00)^*1)$: Represents the first part of the string, which consists of zero or more repetitions of either a single 0(1) a sequence of 0's followed by a

→ This corresponds to the transition blw q_1 and q_2

→ 0: Represents mandatory zero

→ $(1+00)^*$: Represents 1 (or) 3 or 0 followed by zero

→ 0: Represents the final 0 in string.

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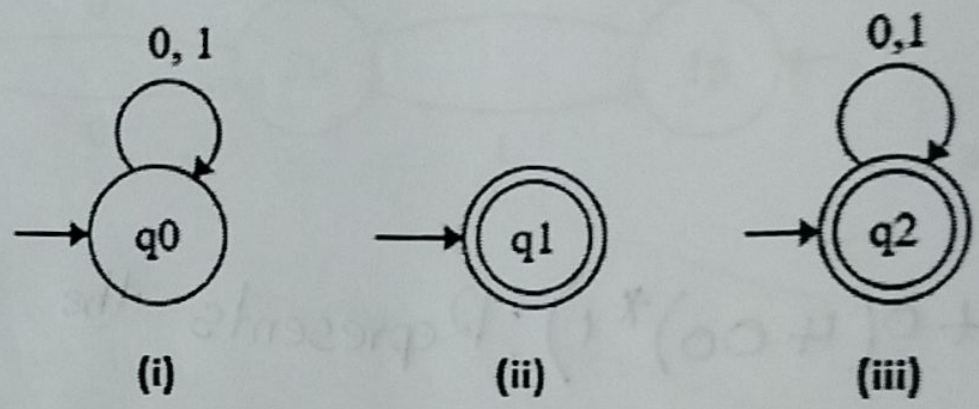
Post-Tutorial (To be carried out by student after attending tutorial session)

1. Find the set of strings over $\sum = \{a, b\}$ recognized by the following transition diagrams automatons (i), (ii) and (iii).



Solution:

(i) No strings are accepted because there is no Final state

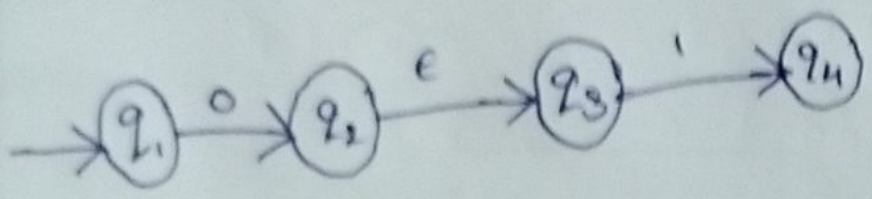
(ii) { } (or) ϵ

(iii) {0, 1, 001, 0001, 011, ---}

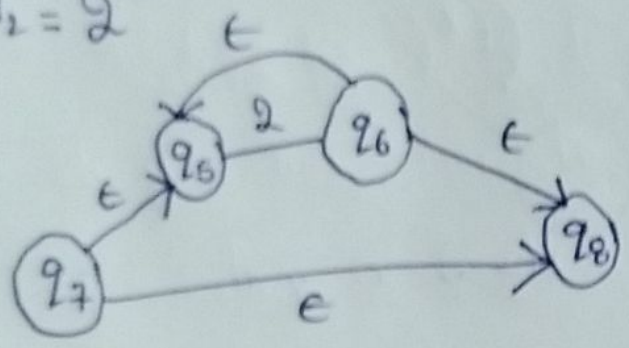
Tutorial #	5	Student ID	230388
Date	20/8	Student Name	Tejesh

2. Construct a finite automaton for the regular expression (01 + 2*)*1

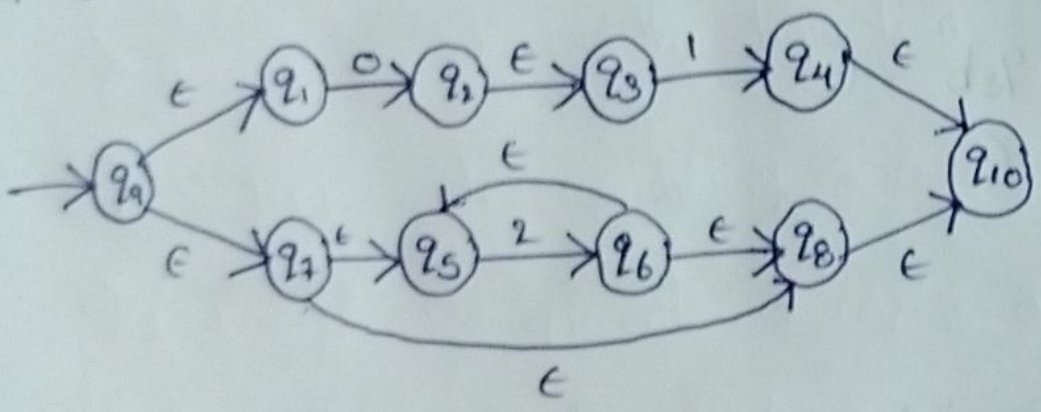
Solution: $r_1 = 01$



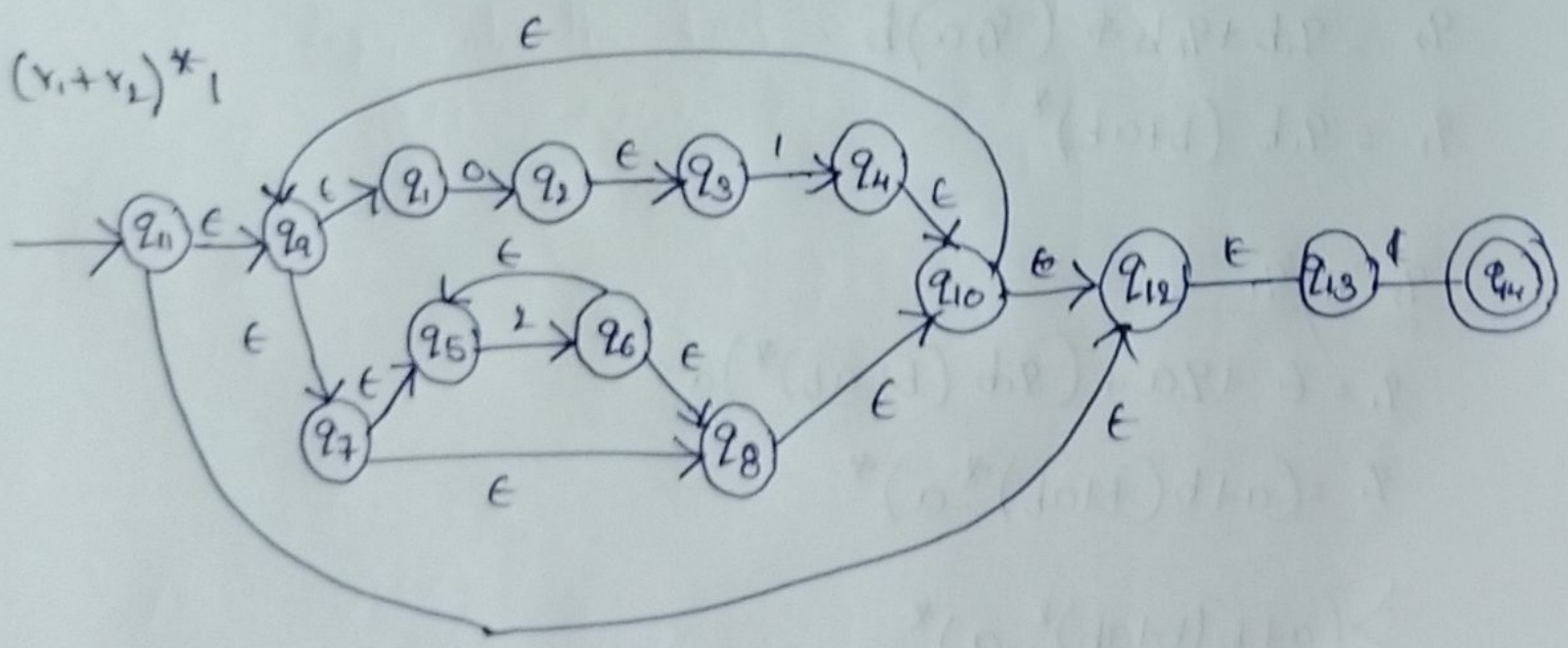
$r_2 = 2^*$



$r_1 + r_2$

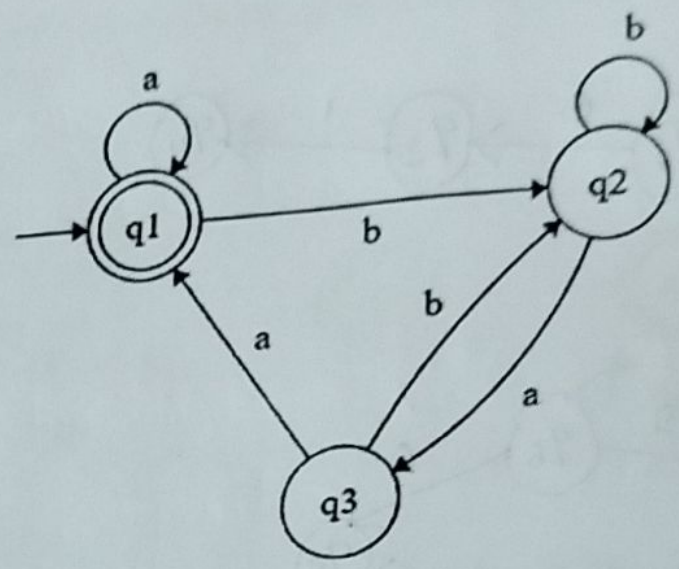


$(r_1 + r_2)^* 1$



Tutorial #	<TO BE FILLED BY STUDENT> 5	Student ID	<TO BE FILLED BY STUDENT> 30088
Date	<TO BE FILLED BY STUDENT> 2018	Student Name	<TO BE FILLED BY STUDENT> Tejesh

3. Construct a regular expression corresponding to the state diagram described by the following figure.



Solution:

$q_1 = \epsilon + q_1 a + q_3 a$ — (1)

$q_2 = q_1 b + q_2 b + q_3 b$ — (2)

$q_3 = q_2 a$ — (3)

q_3 in q_2

$q_2 = q_1 b + q_2 b + (q_2 a) b$

$q_2 = q_1 b (b + ab)^*$

q_2 in q_1

$q_1 = \epsilon + q_1 a + (q_1 b (b + ab)^*) a$

$q_1 = (a + b(b + ab)^* a)^*$

$\Rightarrow (a + b(b + ab)^* a)^*$

Tutorial #	5	Student ID	30088
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Viva Questions:

1.How does the structure of the NFA produced by Thompson's construction technique differ from the structure of the original regular expression?

Solution: i) Graphical Vs Linear

The NFA is a graphical structure with states and transitions, whereas there is a linear, and transitions coh Symbolic representation

ii) Epsilon Transitions:—

The NFA Explicitly represents transition and intermediate states, while the R.E implies them through operation

iii) Size

The NFA is generally larger then R.E

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Date	<TO BE FILLED BY STUDENT> 20-8-24	Student Name	<TO BE FILLED BY STUDENT> Tejesh

2.How does the structure of the regular expression produced by the state elimination method differ the structure of the original DFA?

Solution:

i) DFA : Represents the language as a sequential process of state transitions based on input symbols.

ii) R.E : Represents the language as a Combination of Symbols and operators.

(For Evaluator's use only)

Comment of the Evaluator (if Any)	Evaluator's Observation
	Marks Secured:_____out of **50** Full Name of the Evaluator: Signature of the Evaluator Date of Evaluation: