K.N.S. INSTITUTE OF TECHNOLOGY

BENGALURU

(Affiliated to VTU, Belgaum & Approved by AICTE, New Delhi,
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ASSIGNMENTS / UNIT TESTS / QUIZ BOOK

Name of the student: CHANDANA · MANDAVA

Branch: CSE SEM: 5 Section: A

USN: 1 K N 1 9 C S 0 1 7

Subject Name: ATC Subject Code: 18CS54

Assignments	Date of Submission	Title & Description	C O No.	Marks		Signature of Student
				Maximum	Marks Obtain	
I	4/12/21	Assignment - 01	1			C. Mandava
II						
III						

Unit tests/ QUIZ	Date	Title & Description	C O No.	Maximum Marks	Marks Obtain	Signature of Student
I	4/12/21	CT - 01	1			C. Mandava
II						
III						
IV						
V						

Name of faculty

Signature of faculty

Marks Obtain / 10

Signature Of H.O.D

2/12/21 ATC - ASSIGNMENT - 01

1a) Explain the following terms.

(i) Length function: It is denoted by |s| - Gives length of the string in form of integer

Eg: |aab| = 3.

If the string is empty then $\varepsilon = |0|$

(ii) Replication: for each string w and each natural no i, the string w is defined as $w^{i+1} = ww^i$ and $w^0 = \varepsilon$

Eg: $(bye)^2$ = byebye

(iii) Reversal: w^R

If $|w| = 0$ then $w^R = w = \varepsilon$

If $|w| \geq 1$ then $\exists a \in \Sigma \ (\exists u \in \Sigma^* \ (w = ua))$,

i.e the last character of w is a

Then define $w^R = au^R$.

Eg: malayalam = malayalam

nametag = gateman (Reversal)

(iv) Proper substring: A string s is a proper substring of string t iff s is a substring of t and $s \neq t$.

Every string is a substring of itself

Eg: aaa is a substring of

aaabbaaabbb.

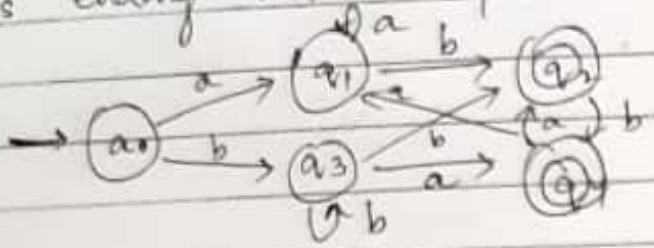
1b)

This subject deals with a theory of what can be computed and what can't. We study some theoritical framework that can inform the design of programs to solve problems. In this subject we study some of the properties:

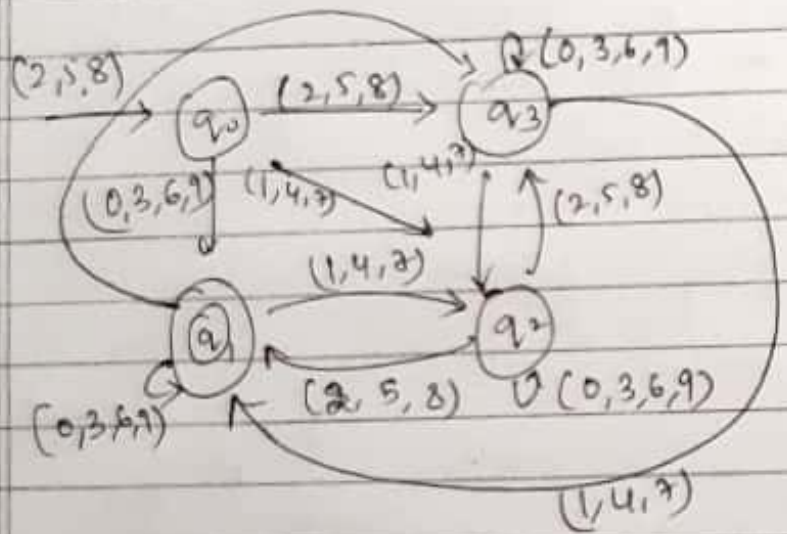
1) It provides a set of abstract structure that are useful for solving certain problems. These abstract structures can be implemented on whatever hardware/software platform is available.

2) It defines provable limits to what can be computed regardless of processor speed/ memory size.

Q.02) a) obtain a DFA which accepts strings of a's and b's ending with ab/ba



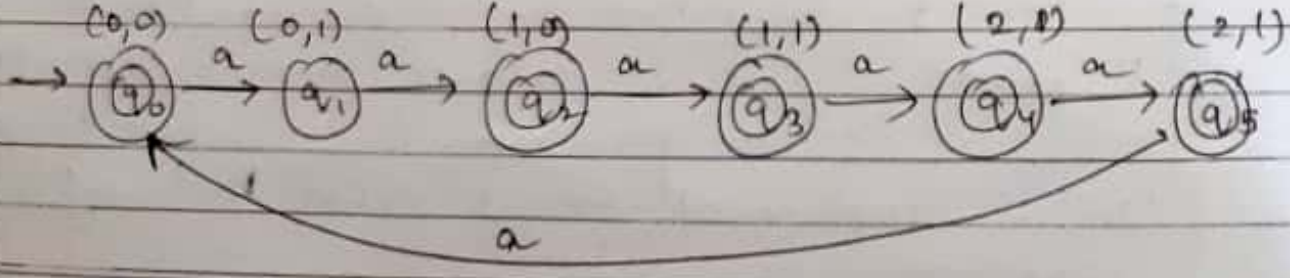
b) Draw a DFA to accept decimal strings divisible by 3.



Q3) obtain a DFA to accept string w satisfying the condition $|w| \bmod 3 > = |w| \bmod 2$ where $\Sigma = \{a\}$

→ mod 3 = {0,1,2} ≥ mod 2 = {0,1}

{0,0}, {0,1}, {1,0}, {1,1}, {2,0}, {2,1}

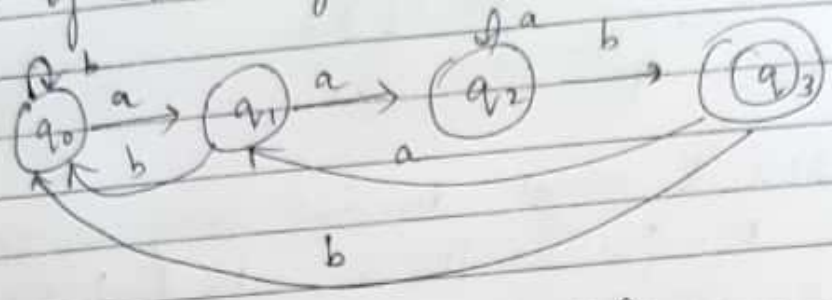


Q 04) Construct the DFA to accept the following languages over $\Sigma = \{a, b\}$

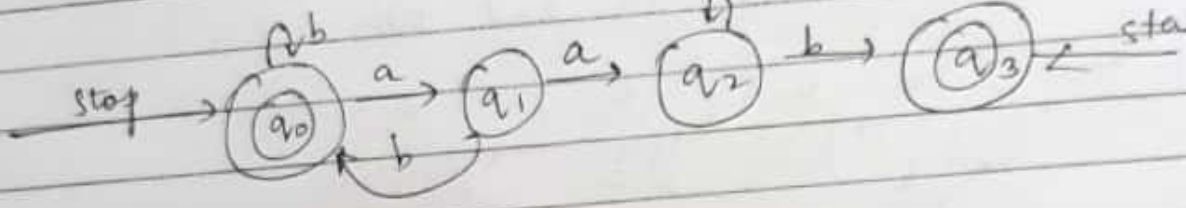
a. set of all strings ending with aab

b. set of all strings not containing substring aab

a)

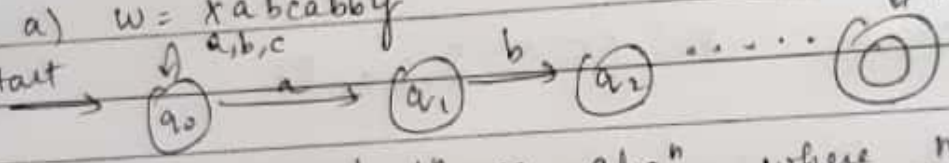


b)

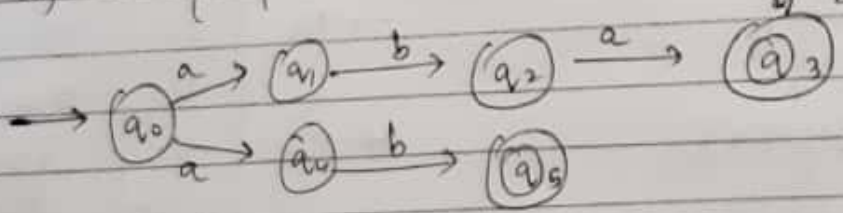


Q 05) Obtain NFA to accept

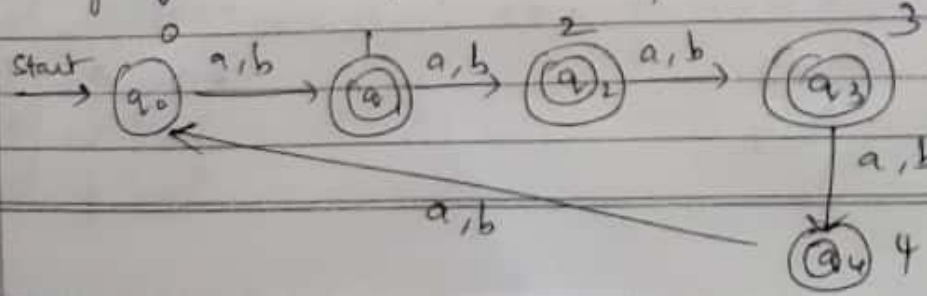
a) $w = xabcabby$



b) $L = \{w \mid w \in ab ab^n \text{ or } aba^n \text{ where } n \geq 0\}$



Q 06) Obtain DFA to accept strings of a's and b's for the language $L = \{w : |w| \bmod 5 \neq 0\}$ $\Sigma = \{a, b\}$



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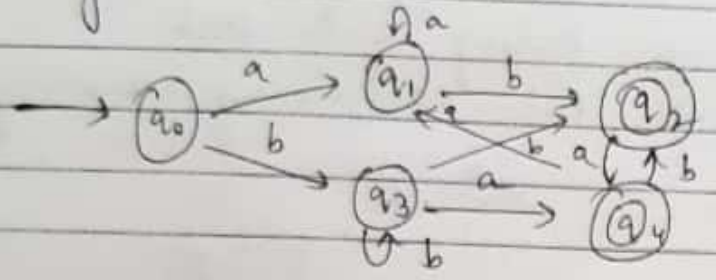
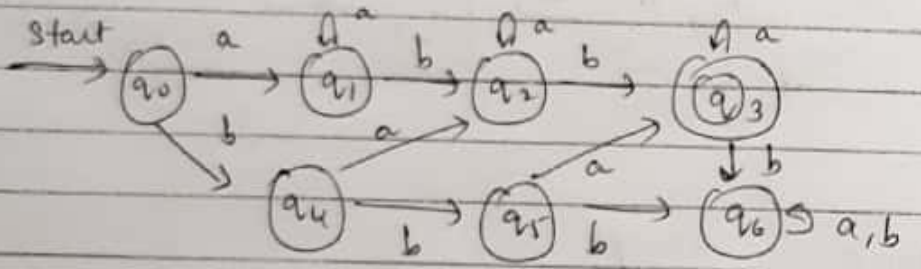
Q7) Obtain a DFA which accepts strings of a's and b's ending with ab or ba.



Q8) Draw a DFA to accept decimal string w satisfying the condition $L = \{w : n_a |w| \geq 1,\ n_b |w| = 2\}$

→ That is atleast 1a and 2b's



components : $M = (Q, \Sigma, \delta, q_0, F)$

Q02. a) $Q = \{q_0, q_1, q_2, q_3, q_4\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_0\}$
$F = \{q_2, q_4\}$

δ =	a	b
→ q_0	q_1	q_3
q_1	q_1	q_2
* q_2	q_4	q_3
q_3	q_4	q_3
* q_4	q_1	q_2

Q02 b) $Q = \{q_0, q_1, q_2, q_3\}$
$\Sigma = \{(2,5,8), (1,4,7), (0,3,6,9)\}$
$q_0 = \{q_0\}$
$F = \{q_1\}$

δ =	(2,5,8)	(1,4,7)	(0,3,6,9)
→ q_0	q_3	q_2	q_1
* q_1	q_3	q_2	q_1
q_2	q_1	ϕ	q_2
q_3	ϕ	$\{q_1, q_2\}$	q_3

Q3. $Q = \{q_0, q_1, q_2, q_3, q_4, q_5\}$
$\Sigma = \{a\}$
$q_0 = \{q_1\}$
$F = \{q_0, q_2, q_3, q_4, q_5\}$

δ	a
* q_0	q_1
→ q_1	q_2
* q_2	q_3
* q_4	q_5
* q_5	q_0

Q4) a) $Q = \{q_0, q_1, q_2, q_3\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_0\}$
$F = \{q_3\}$

δ =	a	b
→ q_0	q_1	q_0
q_1	q_2	q_0
q_2	q_2	q_3
* q_3	q_1	q_0

Q4) b) $Q = \{q_0, q_1, q_2, q_3\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_3\}$
$F = \{q_0\}$

δ =	a	b
* q_0	q_1	q_0
q_1	q_2	q_0
q_2	q_2	q_3
→ q_3	q_3	q_3

Q5 b) $Q = \{q_0, q_1, q_2, q_3, q_4, q_5\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_0\}$
$F = \{q_3, q_5\}$

δ	a	b
→ q_0	$\{q_1, q_4\}$	ϕ
q_1	ϕ	q_2
q_2	q_3	ϕ
* q_3	ϕ	q_3
q_4	ϕ	q_5
* q_5	ϕ	ϕ

Q6) $Q = \{q_0, q_1, q_2, q_3, q_4\}$
$\Sigma = \{a, b\}$
$q_0 = q_0$
$F = \{q_1, q_2, q_3, q_4\}$

δ	a	b
→ q_0	q_1	q_1
* q_1	q_2	q_2
* q_2	q_3	q_3
* q_3	q_4	q_4
* q_4	q_0	q_0

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Q07) $Q = \{q_0, q_1, q_2, q_3, q_4\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_0\}$
$F = \{q_2, q_4\}$

δ	a	b
$\rightarrow q_0$	q_1	q_3
q_1	q_1	q_2
$* q_2$	q_4	q_3
q_3	q_4	q_3
$* q_4$	q_1	q_2

Q08) $Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}$
$\Sigma = \{a, b\}$
$q_0 = \{q_0\}$
$F = \{q_3\}$

δ	a	b
$\rightarrow q_0$	q_1	q_4
q_1	q_1	q_2
q_2	q_2	q_3
$* q_3$	q_3	q_6
q_4	q_2	q_5
q_5	q_3	q_6
q_6	q_6	q_6