National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Theory of Automata	Course Code:	CS-3005	
Degree Program:	BS (CS)	Semester:	Fall 2021	
Exam Duration:	60 Minutes	Total Marks:	40	
Paper Date:	18-Oct-2021	Weight	17.5	
Section:	ALL	Page(s):	4	
Exam Type:	Midterm-I			

Student : Name: _____ Roll No. _____ Section: _____

Instruction/Notes: Answer in the space provided, showing all the working.
ROUGH SHEETS ARE NOT ALLOWED.
In case of confusion or ambiguity make a reasonable assumption.

Good luck!

Solution

Question 1:(10 point)
Following are some of the examples of valid and invalid numerals in Python. Based on these examples, create regular expression for valid numerals

Valid	+69	-258	588	+85.768	-679.23	873.030	+.23	-.758	
Invalid	.	8.	+1897.	-5456.					

RE_1 without . $(+/-/\lambda)(0-9)(0-9)^*$

RE_1 with . $(+/-/\lambda)(0-9)^*(.)(0-9)(0-9)^*$

final RE RE_1 / RE_2

/ is symbol for OR / union.

$\Sigma = \{(0-9), +, -, .\}$

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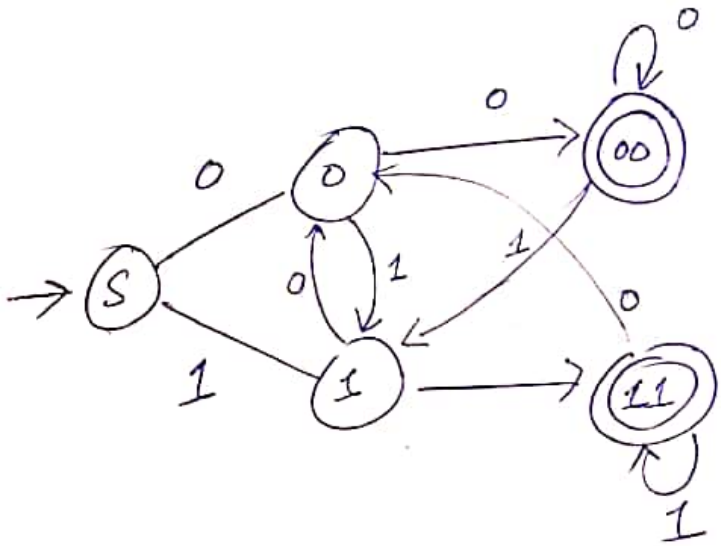
Question 3 (15+5 points):

a. Design a deterministic finite automate of following language:

$$\Sigma = \{0,1\}$$

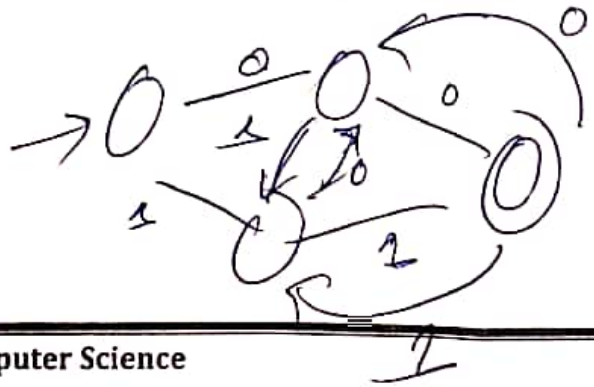
$$L = \{w \mid w \text{ ends with } 00 \text{ or } 11\}$$

Note: other than initial and final state(s) you can at max use 2 more states.



I have marked it from 10.

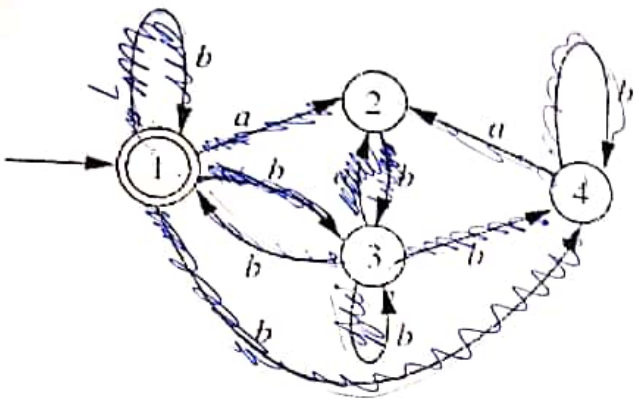
Note that following solution is incorrect,



I have only given 3/10 for this

Roll Number: _____ Section: _____

Question 2 (10 points): Convert following Finite Automate to Deterministic Finite Automata



Transition Table

		b	a
→ *	1	1,3,4	2
	2	3	ϕ
	3	1,3,4	2
	4	4	2.

Transition Table of ~~#~~DFA.

		b	a
→ *	{1}	{1,3,4}	{2}
*	{1,3,4}	{1,3,4}	{2}
	{2}	{3}	{ϕ}
	{3}	{1,3,4}	{2}
	ϕ	ϕ	ϕ

{1} is initial & final state

{1,3,4} is also a final state

~~{}~~ {2}, {3}, ϕ are non final.