CS 301 & Theory of Automata

Serial No:

Sessional 1

Total Time: 1 Hour

Total Marks: 30

Thursday, October 15, 2020

Signature of Invigilator

Course Instructor

Dr. Waseem Shahzad, and Ms. Mehreen Alam

Student Name	Roll No	Section	Signature
Pirzada	18I-0658	A	

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt on question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
2. No additional sheet will be provided for rough work. Use the back of the last page for rough work.
3. If you need more space write on the back side of the paper and clearly mark question and part number etc.
4. After asked to commence the exam, please verify that you have (06) different printed pages including this title page. There are total of (4) questions.
5. Calculator sharing is strictly prohibited.
6. Use permanent ink pens only. Any part done using soft pencil will not be marked and cannot be claimed for rechecking.

	Q-1	Q-2	Q-3	Q-4	Total
Marks Obtained	3	5	10	10	28
Total Marks	05	05	10	10	**30**

Question 1: Provide the recursive definition of the language defined over alphabet Σ = {a, b} having all strings not ending with aa or bb. [5 pts]

~~(a+b)*(ab+ba) + Λ + a+b~~

L = not ending with aa or bb

~~a, b, Λ belongs to Language L~~

1) a, b, Λ belongs to language L

2) if x belongs to language L

i) ~~ax~~

1) ~~a, b, Λ~~ ab, ba belongs to language L

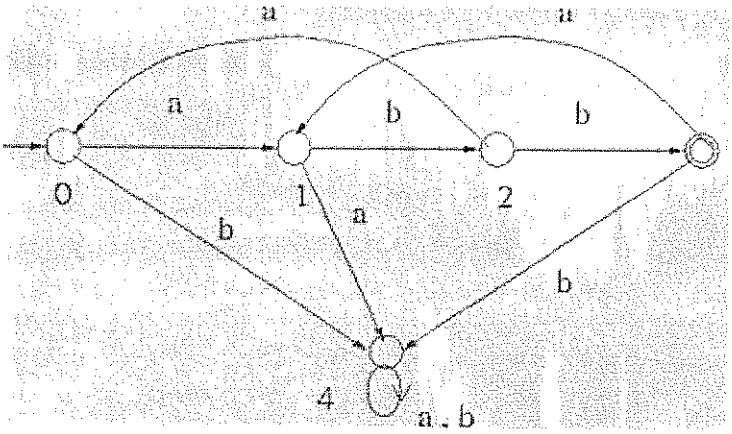
2) if x belongs to Language L

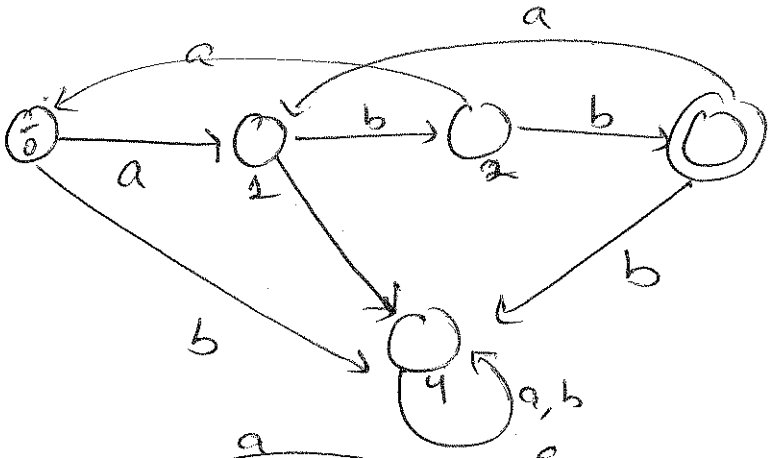
i) ax belongs to Language L

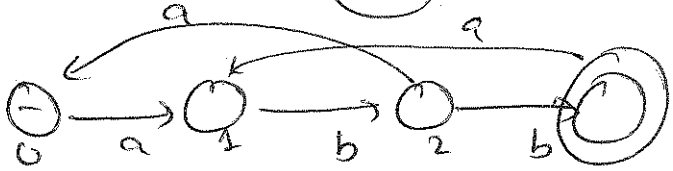
ii) bx belongs to language L

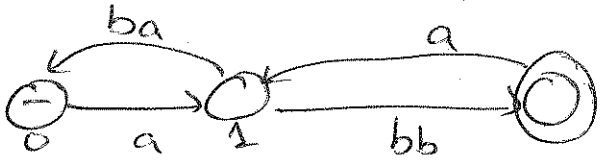
3) Only a, b, and Λ belongs to language L other than strings constructed above

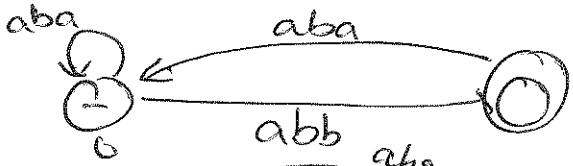
Question 2: Determine the RE for the following TG: [5 pts]

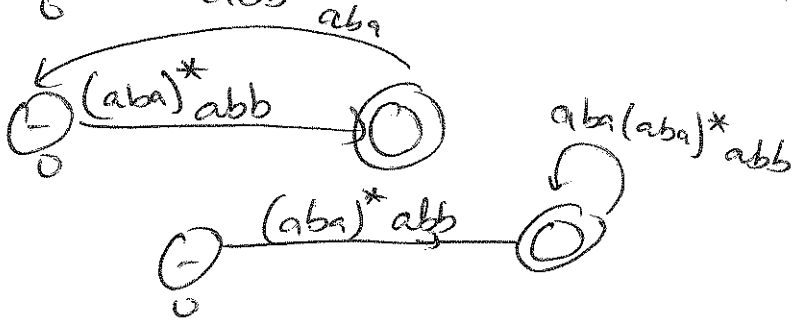












$$RE = (aba)^* abb (aba (aba^*) abb)^*$$

Question 3: Construct: [5+5 = 10 pts]

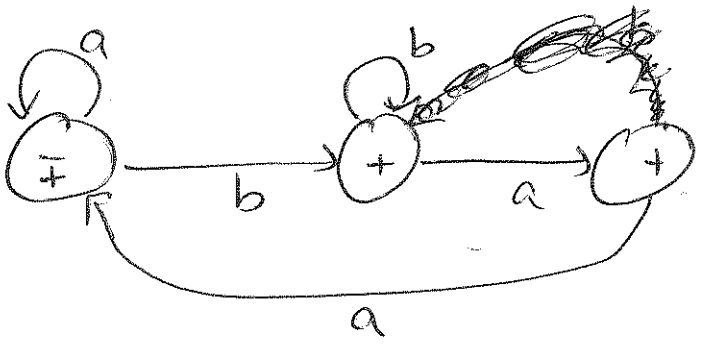
a. An RE for the language where every word has b's occurring in clumps of odd numbers and a's in multiples of 5, (e.g. abaabbbaba, bbb), and

$((bb)^*b)^*a((bb)^*b)^*a((bb)^*b)^*a((bb)^*b)^*a((bb)^*b)^*a((bb)^*b)^*$

$((bb)^*b+\Delta)a((bb)^*b+\Delta)a((bb)^*b+\Delta)a((bb)^*b+\Delta)a((bb)^*b+\Delta)a$

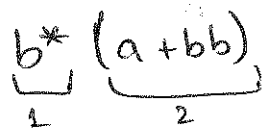
$((bb)^*b+\Delta)^*$

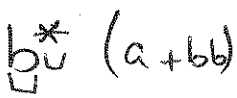
b. An FA that accepts only those words that never contain the substring bab.

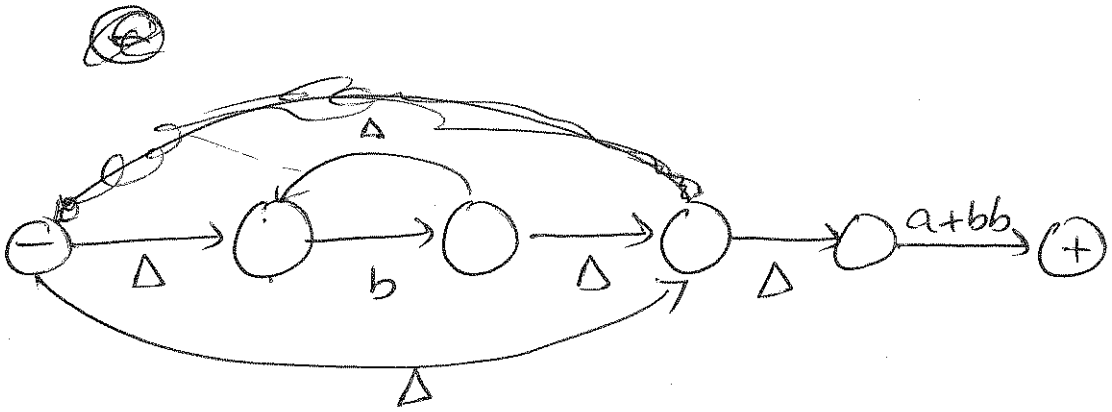


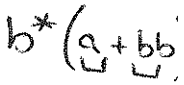
Question 4: Convert: [5+5 = 10 pts]

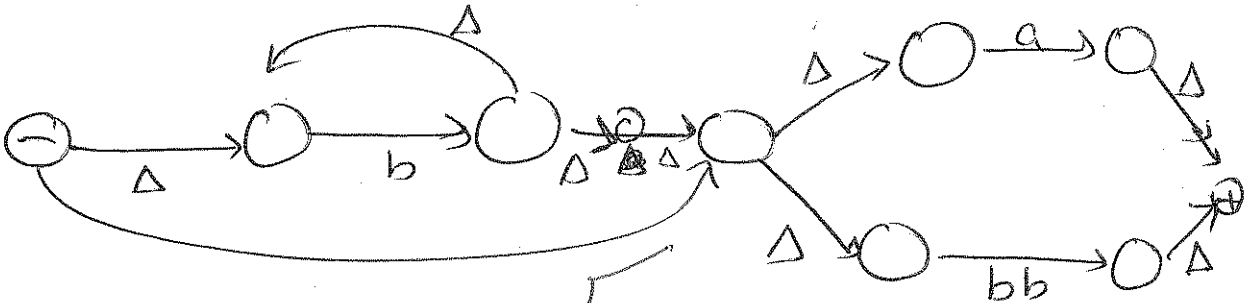
a. b*(a+bb) to NFA using the method studied in the class.

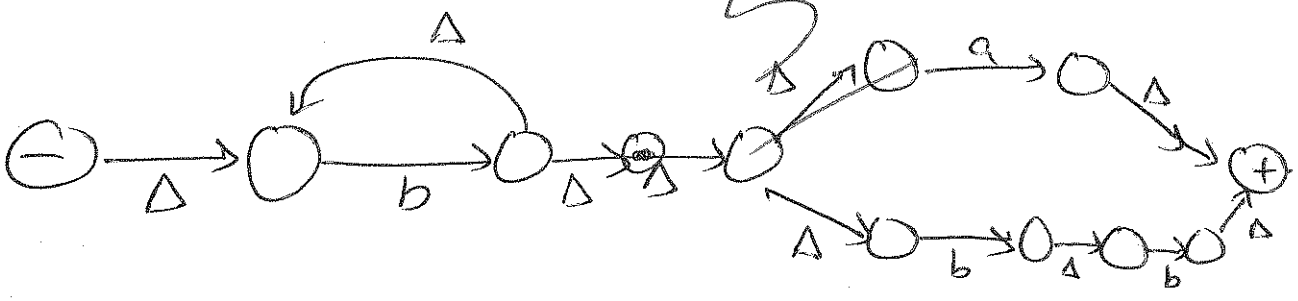


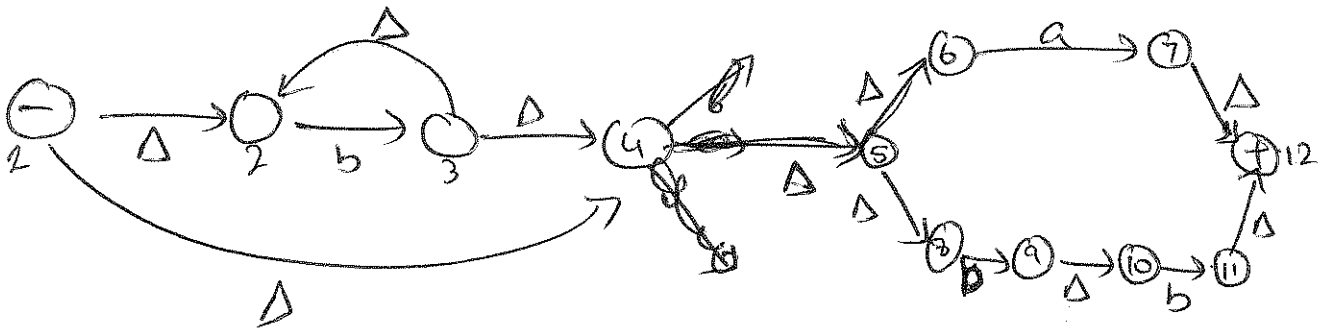











1
Δ
2
b
3
Δ
4
Δ
5
Δ
6
a
7
Δ
8
b
9
Δ
10
b
11
Δ
12
Δ

b. Convert the NFA from part (a) to an FA.

λ-closure {1} = {1, 2, 4, 5, 6, 8} → (A)

A/

goto set (a) = {7} → (B) (for B set)

goto set (b) = {3, 9} → (for C set)

B/

λ-closure {7} = {7, 12} → (B')

goto set (a) = {}

goto set (b) = {}

C/

~~λ-closure {3, 9}~~

λ-closure {3, 9} = {3, 2, 4, 5, 6, 8, 9, 10} → (C)

goto set (a) = {7} (same for B)

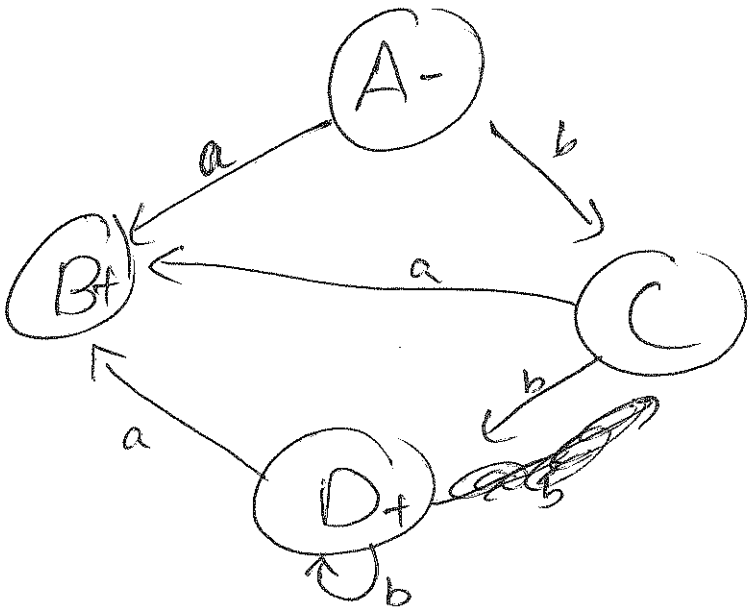
goto set (b) = {3, 9, 11} → (for D)

D/

λ-closure {3, 9, 11} = {3, 2, 4, 5, 6, 8, 9, 10, 11, 12} → (E

goto set (a) = {7} (same for B)

goto set (b) = {3, 9, 11} (same for D)



	a	b
A-	B	C
B+	—	—
C	B	D
D+	B	D

Cannot be further simplified