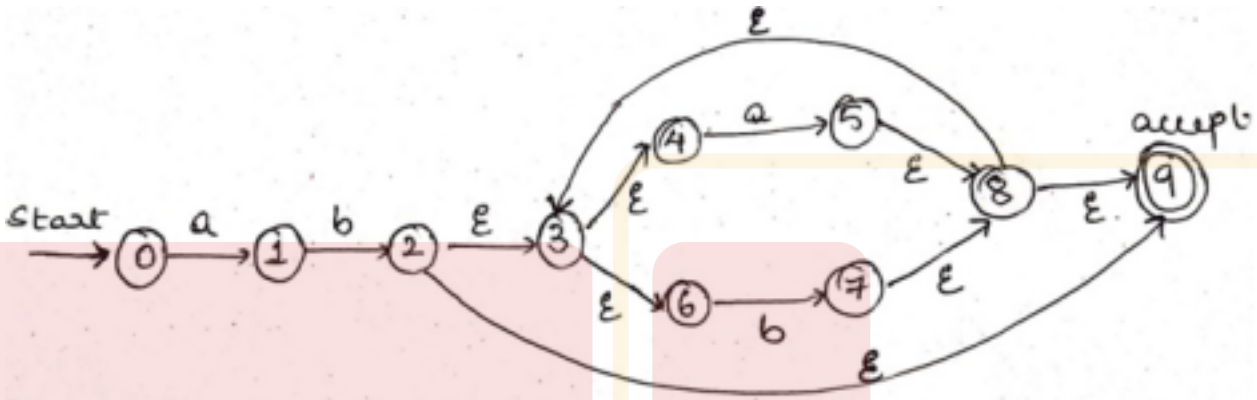
ATCD-SIMP-Problems types - 21S

NFA,DFA, Minimization

Usually Part-A

Type (1). Convert the following NFA to its equivalent DFA.

(a)



(b)

(c)

	ε	a	b	c
→ p	{q, r}	Φ	{q}	{r}
q	Φ	{p}	{r}	{p, q}
*r	Φ	Φ	Φ	Φ

Type (2)- Can be in Part B or A

Draw a DFSM to accept

i) language L = {w: |w| mod 3> |w| mod 2}

. ii) L = {w / w ∈ {a,b}* is the string with even no. of a's and odd no. of b's} iii) L ={w/ w ∈ {a,b}* is the string of a's and b's and end with the sub string abb}

Type(3). Minimize the following DFSM

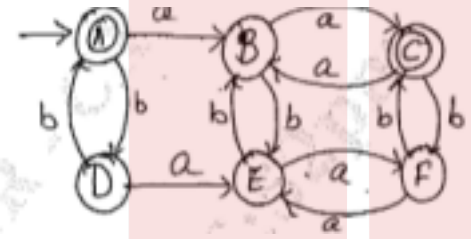
(a)

S	0	1
A	B	A
B	A	C
C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

(b)

	0	1
→A	B	A
B	A	C
C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

Type (3b)Define DFSM? Minimize the following FSM



4. Important Practice Problem

Consider the following ε-NFA

δ	ε	0	1
→p	{r}	{q}	{p,r}
q	∅	{p}	∅
*r	{p,q}	{r}	{p}

i)Compute ε-Closure for each state. ii)Give the set of all strings of length 3 or less accepted by the automaton. iii)Convert automaton to DFA.

5. Design an -NF A that accepts decimal numbers consisting of: An optional or-sign. ii)A string of digits ii))A decimal point iv) Another string of digits: Either

this string of digits, or string (ii) can be empty, but at least one of the two strings of digits must be

non empty and convert the designed e-NFA to DFA

Regular Expressions

Type-1(Part A)

1. Write the Regular Expression for the following language.
   i) {w ∈ {a, b}* with atmost one a}
   ii) {w ∈ {a, b}* does not end with ba}
   iii) {w ∈ {0, 1}* has substring 001}
   iv) {w ∈ {0, 1}* |W| is even}.

2.Define Regular expression. Write RE for the following Languages

i) L = {a 2n b 2m | n>=0, m>=0}

ii) L = {w : |w| mod 3 = 0 where w ∈ {a,b}*}

iii) Language of all strings of 0's and l's that has at least one pair of consecutive 0's

3.
   i) $L=\{a^n b^m \mid m+n \text{ is even}\}$
   ii) $L=\{a^n b^m \mid m \geq 1,\ n \geq 1,\ nm \geq 3\}$
   iii) $L=\{a^{2n} b^{2m} \mid n \geq 0, m \geq 0\}$

4. Prove that the following languages are not regular
   a)$L=\{ww^R \mid w \in (0+1)^*\}$ b)$L=\{a^{n!} \mid n \geq 0\}$

Context Free Grammars, PDA and Turing Machines

Type-a

1. Write the CFG for the following Languages

. i) L={an b n c m: n, m>=0}

ii) L={an b n+2 : n>=0}

iii) L={w ∈ {a,b}*: na(w)=nb(w)}

Consider the following DFA.

δ	0	1
$\rightarrow q_1$	q_2	q_1
q_2	q_2	q_4
q_3	q_4	q_2
$*q_4$	q_4	q_1

1b. Give all the regular expression for $R_{ij}^{(0)}$. $R_{ij}^{(1)}$, $R_{ij}^{(2)}$, $R_{ij}^{(3)}$

Convert the DFA to an equivalent regular expression using State elimination method

2.Write the CFG for the following language

i) $L = \{ w \in \{a, b\}^* \mid n_a(w) = n_b(w) \}$

ii) $L = \{ a^i b^j \mid i = j+1 \}$.

2b,

Design a context free grammar for the following languages.

i)L={ $0^m 1^m 2^n \mid n>=0, m>=0$ } ii) L={ $a^i b^j \mid i \neq j, i>=0, j>=0$ }

iii) L={ $a^n b^{n-3} \mid n>=3$ } iv) Non Palindromes

3. Write an Finite Automata for the Following Regular Expressions

(i) (a-b)*ab(a +b)* (ii) (ab*+a)aa* (a+b*)

4. Consider the grammar G with productions.
S→AbB, A→aA , B→aB/bB/ε
Obtain LMD, RMD, Parse tree for the String aaabab

Type-b

1.Design the PDA to accept L = { WCW^R| W € {a,b}*}

2. Convert the following language from CFG to PDA $L = \{ww^R \mid w \in \{0, 1\}^*\}$.

3. Convert the following Grammar into equivalent PDA

S → aABC
A→ aB|a
B → bA|b
C → a.

4. Construct the LL(1) parsing table for the following grammar:
E→E+T | T
T→T*F | F
F→(E) | id

5. Form the Action/GOTO table for the following grammar:
S→Aa | bAc | Ba | bBa
A→d
B→d Justify whether the grammar is LR (0) or not.

6a+6b.

	Construct the LR(0) parsing table for the following grammar: S →SS+ | SS* | a
	For the following grammar: S→CC C→cC|d Construct the SLR parsing table.
7.	Design Turing machine to accept the language L = {$a^n b^n c^n$ |n>=1}

Note: These are the practice problems for different problem types, TIE review team doesn't guarantee that these exact problems would appear in the Examination, these are for practice purposes only. This PDF is intended to provide you with the type of problems that you are supposed to study. Practising more problems of these types would be the best way to answer any problem of these types.

-TIE review team RNSIT