21	18/3/24	design a PDA	
22	18/3/24	design a PDA	
23	18/3/24	convert grammar to PDA	
24	18/3/24	design a Turing machine	
25	18/3/24	design a Turing machine	

18/3/24.

Day - 4

Experiment - 21

21) Design a PDA for $L = \{0^n 1^{2n} \mid n \geq 1\}$.

Aim: To design a PDA for given languag.

Procedure:

1) Seven tuples for PDA is $P = (Q, \Sigma, \Gamma, \delta, q_0, z_0, F)$
$Q = \{q_0, q_1, q_2, q_3\}$, $\Sigma = \{0, 1\}$, $q_0 = q_0$, $F = q_3$.

2) Logical steps:
i) Push all zeroes into the stack
ii) For alternate 1's pop a zero from the stack
iii) When we finish reading the input if we reach the bottom of stack, the input is accepted

3) To implement this in Automation simulator.

4) Get states after opening the s/w

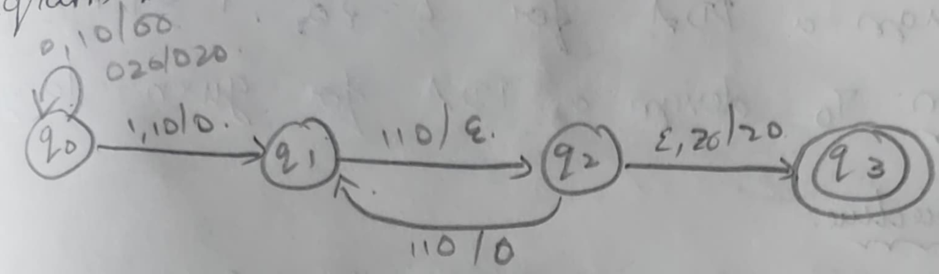
5) Give transitions as shown in diagram.

6) Give i/p string & check whether it goes to destination or not.

7) If it goes to destination that string is accepted

8) Otherwise rejected

Diagram:



where δ is defined as

$\delta(q_0, 0, z_0) = \delta(q_0, 0z_0)$

$\delta(q_0, 0, 0) = \delta(q_0, 00)$

$\delta(q_0, 1, 0) = \delta(q_1, 0)$

$\delta(q_1, 1, 0) = \delta(q_2, \varepsilon)$

$\delta(q_2, 1, 0) = \delta(q_2, 0)$

$\delta(q_2, \varepsilon, z_0) = \delta(q_3, z_0)$.

Result: Thus the PDA for given language is designed successfully.

18/3

Experiment 22.

22) Design a PDA for $L = \{0^n, 1^n \mid n \geq 1\}$.

Aim: To design a PDA for given language.

Procedure:

1) Seven tuples for PDA is $P = \{Q, \Sigma, \Gamma, \delta, q_0, z_0, F\}$

$Q = \{q_0, q_1, q_2\}$ $\Sigma = \{0, 1\}$ $q_0 = q_0$, $F = q_2$

2) Logical steps:

i) Push all zeroes in to the stack

ii) On reading 1 if there is 0 on the top of the stack, POP 0.

iii) When we finish reading the input, if we reach the bottom of the stack, the input is accepted.

3) To implement this in Automation simulator

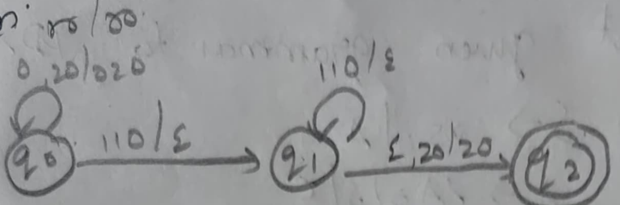
4) Get states after opening the s/w

5) Give transitions as shown in diagram.

6) Give i/p string & check whether it goes to destination or not.

7) If it goes to destination that string is accepted otherwise rejected.

Diagram:



where δ is defined as

$\delta(q0, 0, z_0) = \delta(q0, 0z_0)$

$\delta(q0, 0, 0) = \delta(q0, 00)$

$\delta(q0, 1, 0) = \delta(q1, \varepsilon)$

$\delta(q1, 1, 10) = \delta(q1, \varepsilon)$

$\delta(q_1, \varepsilon, z_0) = \delta(q_2, z_0)$.

Result: Thus, the PDA for given language is designed successfully.

13

Experiment - 23.

23) Convert given grammar to PDA.

$S \rightarrow 0S, 1A$

$A \rightarrow 1A0 | S | \epsilon$

Aim: To convert given grammar to PDA.

Procedure:

1) Eliminate unit productions

$S \rightarrow 0S, | 1S0 | \epsilon$

2) Convert CFG to GNF

3) Introduce productions

$X \rightarrow 1$

$X \rightarrow 0$

4). Rewrite the grammar

$S \rightarrow 0SX | 1SY | \epsilon$

$X \rightarrow 1$

$Y \rightarrow 0$

5) The PDA can be:

R1: $\delta(q, \epsilon, S) = \{(q, 0SX) | (q, 1SY) | (q, \epsilon)\}$.

R_2: $\delta(q, \epsilon, X) = \{(q, 1)\}$.

R3. $\delta(q, \epsilon, Y) = \{(q, 0)\}$.

R4. $\delta(q, 0, 0) = \{(q, \epsilon)\}$

R5: $\delta(q, 1, 1) = \{(q, \epsilon)\}$

6) To implement this in Automation simulator

7) Get states after opening the s/w

8) Give transitions & Give input & then check output.

Result:

Thus, the given grammar is converted to PDA successfully.

28/3

Experiment 24.

24) Design a TM for language

$L = \{0^n 1^n \mid n \geq 1\}$

Aim: To design a turing machine for given language.

Procedure:

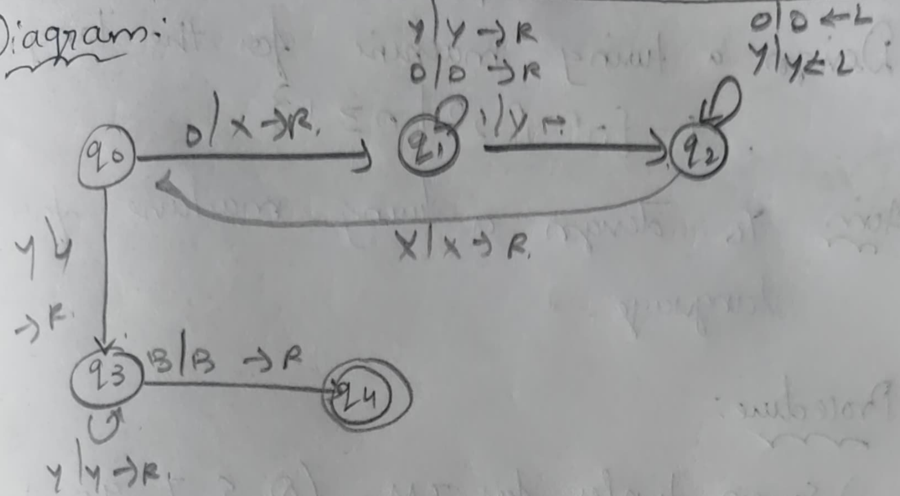
1) Seven tuples for TM = $(Q, \Sigma, T, q_0, F, B, \delta)$

$Q = \{q_0, q_1, q_2, q_3, q_4\}$ $\Sigma = \{0, 1\}$ $q_0 = q_0$ $F = q_4$

logical steps:

2) change 0 to x & move right
3) skip 0's & y's & move right
4) change 1 to y & move left.
5) skip y's & 0's & move left.
6) If there is 0, then move to step 2.
7) otherwise if there is y, skip all y's & then if there is B, accept the input
8) To implement this in sh.
9) Get states & i/p after opening the sh
10) give transition according to diagram
11) Give input & check o/p.

Diagram:



Transition table:

states	0	1	X	Y	B.
q_0	q_1, X, R	-	-	q_3, Y, R	-
q_1	q_1, 0, R	q_2, Y, L	-	q_1, Y, R	-
q_2	q_2, 0, L.	-	q_0, X, R	q_2, Y, L	-
q_3	-	-	-	q_3, Y, R	q_4, B, R
q_4	-	-	-	-	-.

Result: Thus, the turing machine for given language is designed successfully.

14/3

Experiment – 25

25) Design a turing machine for the language $L = \{0^n 1^n 2^n \mid n \geq 1\}$

Aim: To design a turing machine for given language.

Procedure:

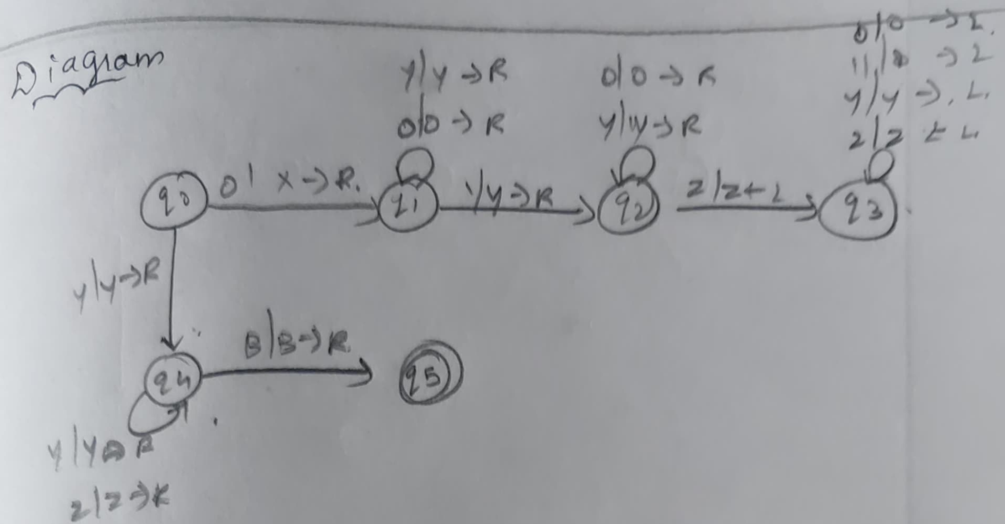
1) Seven tuples for TM = $(Q, \Sigma, T, q_0, F, B, \delta)$

$Q = \{q_0, q_1, q_2, q_3, q_4, q_5\}$, $\Sigma = \{0, 1, 2\}$ $q_0 = q_0$, $F = q_5$

logical steps:

2) Change 0 to X & move right.
3) Skip 0's & Y's & move right.
4) change 1 to Y & move right
5) Skip 1's & 2's move right.
6) change 2 to Z & move left.
7) skip Z's 1's Y's 0's & move left.
8) when you read X move right
9) If there is 0, go to step 2.
10) Otherwise if there is Y, skip all Y's & if there is Z, skip all Z's.
11) If there is B, accept the string.

Diagram



Transition Table:

states	0	1	2	X	Y	Z	B.
q_0	q, X, R	-	-	-	q_4, Y, R	-	-
q_1	q_1, 0, R	q_2, Y, R	-	-	q_1, Y, R	-	-
q_2	q_2, 0R.	-	q_3, Z, L	q_0, X, R	q_2, Y, R	-	-
q_3	q_3, 0, L	q_3, 1, L	-	-	q_3, Y, L	q_3, Z, L	-
q_4	-	-	-	-	q_4, Y, R	q_4, Z, R	q_5, B, R
q_5	-	-	-	-	-	-	-

Result:

Thus the turing machine for given language is designed succesfully.