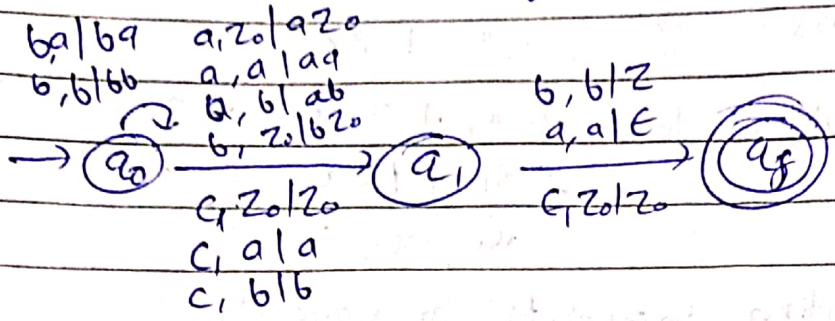
DATE :

Ankit Goyal
Roll No - 17103011

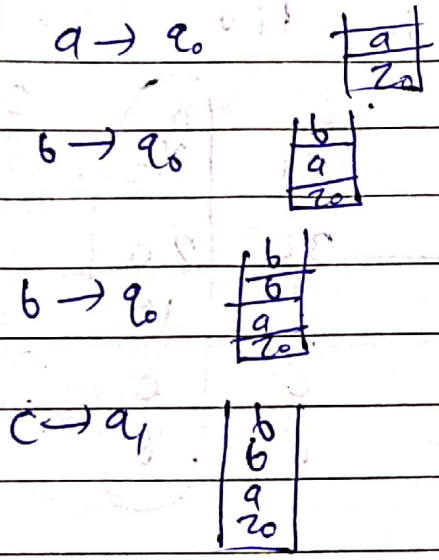
# TOC Assignment - 7

1.

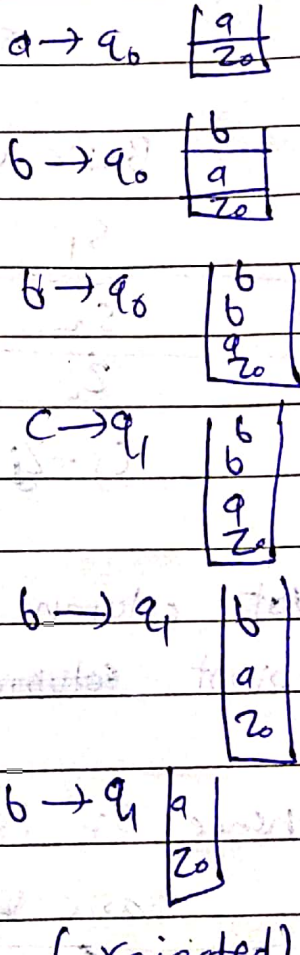



PDA = $\{\{q_0, q_1, q_f\}, \{a,b,c\}, \{a,b\}, \{a\}, q_f, \delta, Z_0\}$

Sequence abbcbba

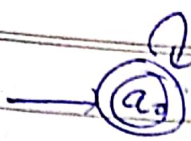



abbcbb




Signature.....

(2)




{, Z0 | {Z0
ε, Z0 | CZ0
{, { | {{
{, C | {C
C, { | C{

C, C | CC
{, { | ε
C, C | ε

PDA = {{q0}, {{, }, C, )}, {{, C}, {{, C}, q0, δ, Z0}

Sequence ⇒ {()({{C})}}

{ → q0 | { / Z0 |

C → q0 | C / { / Z0 |

) → | { / Z0 |

{ → | { / { / Z0 |

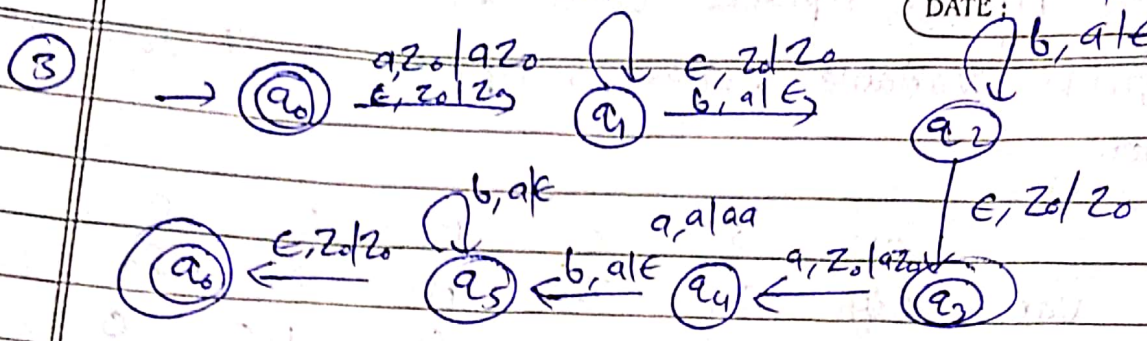
{ → | ε / { / { / Z0 |

C → | C / { / { / { / Z0 |

} → rejected

Signature.....

(3)




PDA = { {q0, q1, q2, q3, q4, q5, q6}, {a, b}, {a}, δ, z0, {q0, q3, q6} }

Accepted strings =)

i) aabb

$a \to q_0 \begin{bmatrix} a \\ z_0 \end{bmatrix}$, $a \to q_1 \begin{bmatrix} a \\ a \\ z_0 \end{bmatrix}$, $b \to q_2 \begin{bmatrix} a \\ z_0 \end{bmatrix}$, $b \to q_2 \begin{bmatrix} z_0 \end{bmatrix}$

$\epsilon \to q_3 \begin{bmatrix} z_0 \end{bmatrix}$

accepted

ii) ab

$a \to q_1 \begin{bmatrix} a \\ z_0 \end{bmatrix}$, $b \to q_2 \begin{bmatrix} z_0 \end{bmatrix}$, $\epsilon \to q_3 \begin{bmatrix} z_0 \end{bmatrix}$

accepted

iii) aaabbb

Path ①

$a \to q_1 \begin{bmatrix} a \\ z_0 \end{bmatrix}$, $a \to q_1 \begin{bmatrix} a \\ a \\ z_0 \end{bmatrix}$, $a \to q_1 \begin{bmatrix} a \\ a \\ a \\ z_0 \end{bmatrix}$

$b \to q_2 \begin{bmatrix} a \\ a \\ z_0 \end{bmatrix}$, $b \to q_2 \begin{bmatrix} a \\ z_0 \end{bmatrix}$, $b \to q_2 \begin{bmatrix} z_0 \end{bmatrix}$, $\epsilon \to q_3 \begin{bmatrix} z_0 \end{bmatrix}$

Signature..... accepted

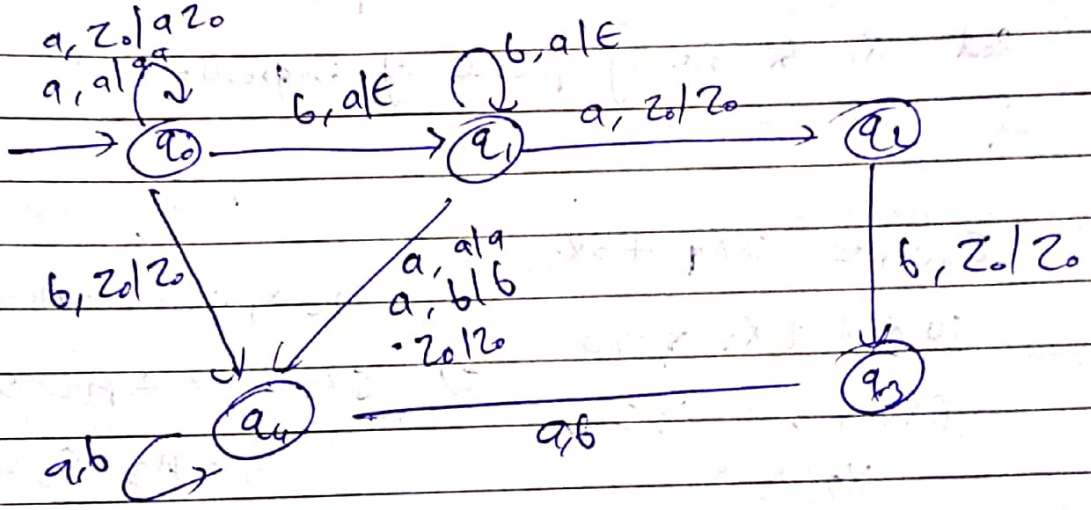
Path 2 $\epsilon \to q_1 \boxed{Z_0}$ , $\epsilon \to q_2 \boxed{Z_0}$ , $\epsilon \to q_3 \boxed{Z_0}$

$a \to q_4 \boxed{a Z_0}$ , $a,a \to q_4 \boxed{a a Z_0}$ , $b \to q_5 \boxed{a a Z_0}$

$b,b \to q_5 \boxed{Z_0}$ , $\epsilon \to q_6 \boxed{Z_0}$

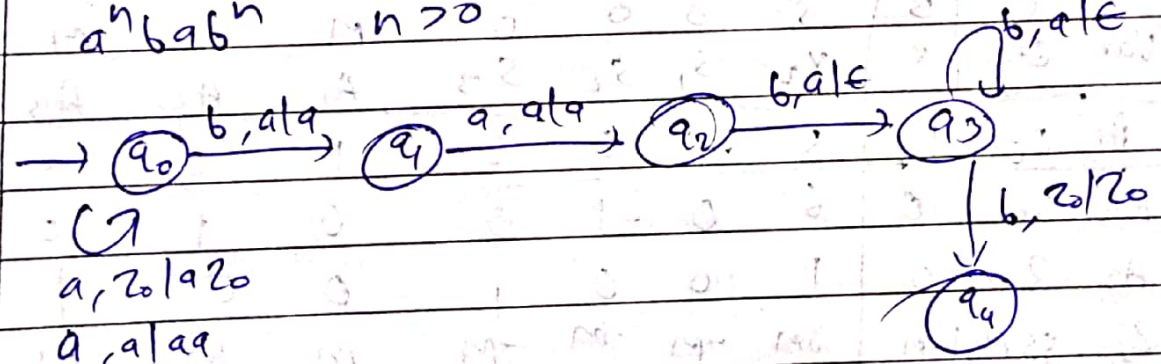
Accepted

(4)




PDA $= \{\{q_0, q_1, q_2, q_3, q_4\}, \{a, b\}, \{a\}, q, \{q_3\}, \delta, Z_0\}$

(5) $a^n b a b^n \quad n > 0$




PDA $= \{\{q_0, q_1, q_2, q_3, q_4\}, \{a, b\}, \{a\}, q, \{q_4\}, \delta, Z_0\}$

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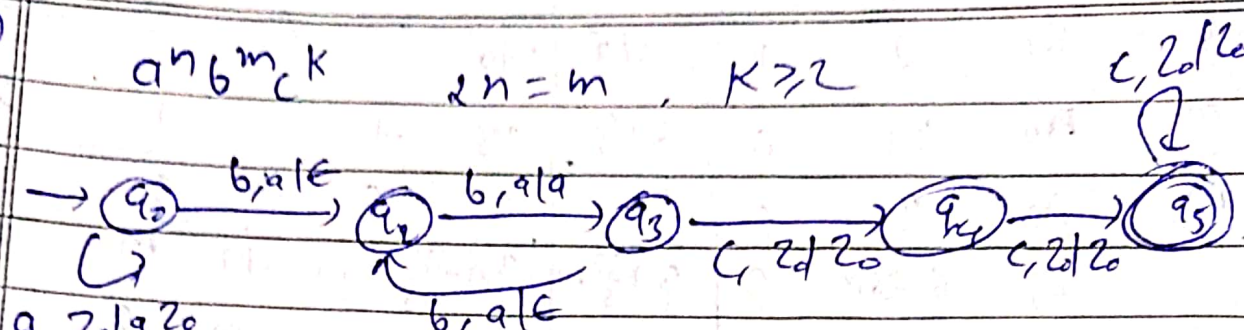
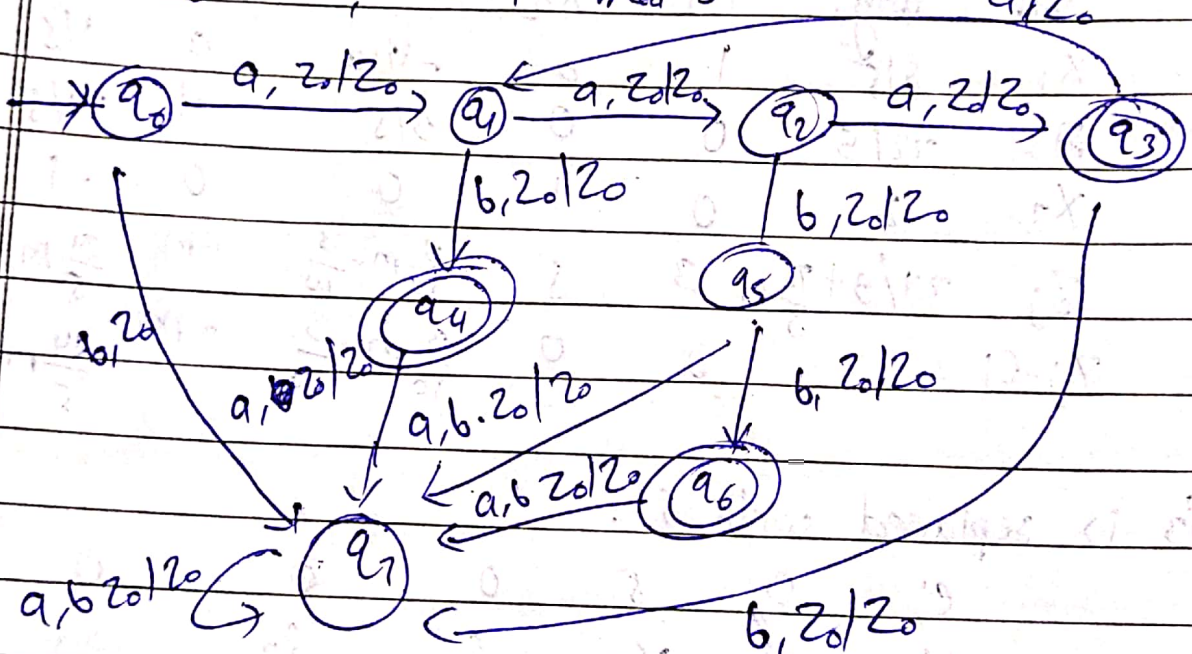
DATE :

(6) $a^n b^m c^k$ , $n = m$ , $k \geq 2$



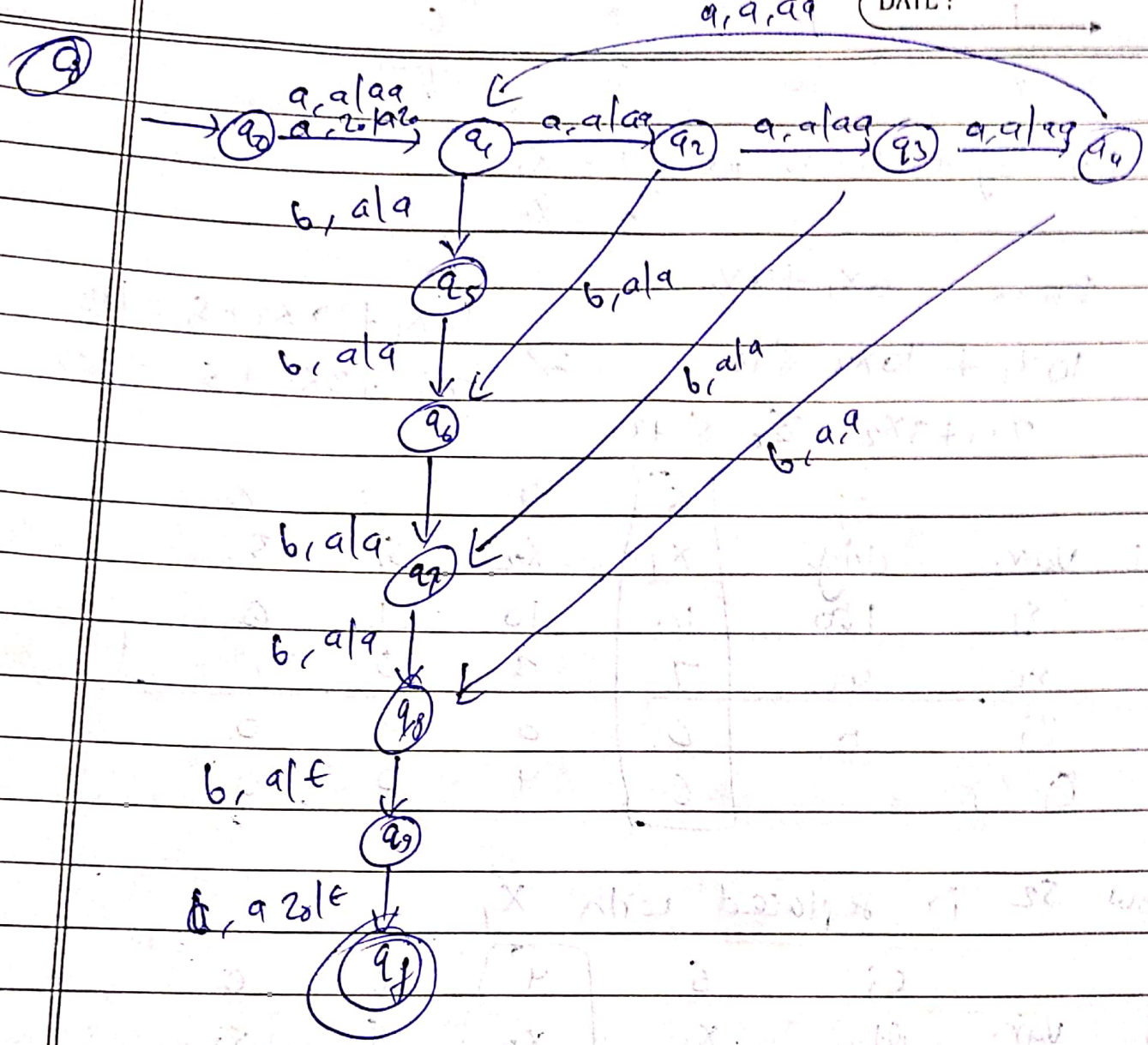

PDA ⇒ $\{\{q_0, q_1, q_2, q_3, q_4, q_5\}, \{a, b, c\}, \{a\}, \delta, \{q_5\}, Z_0\}$

(7) $a^n b^m$ , $m = n \bmod 3$




Size stack memory req. = 1
{to store $Z_0$}

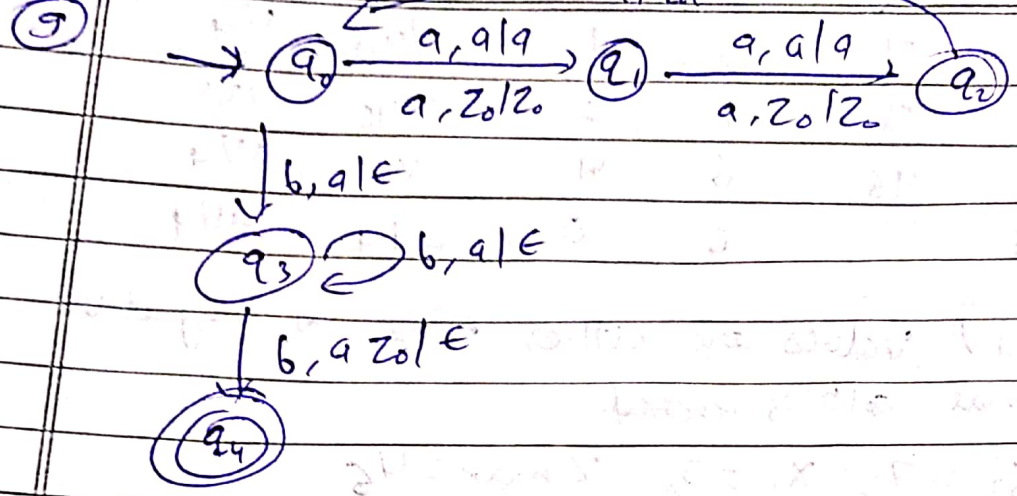
PDA ⇒ $\{\{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7\}, \{a, b\}, \{\Sigma, \Gamma\}, \{q_3, q_4, q_6\}, \delta, Z_0\}$




Size of stack = no. of a's in input

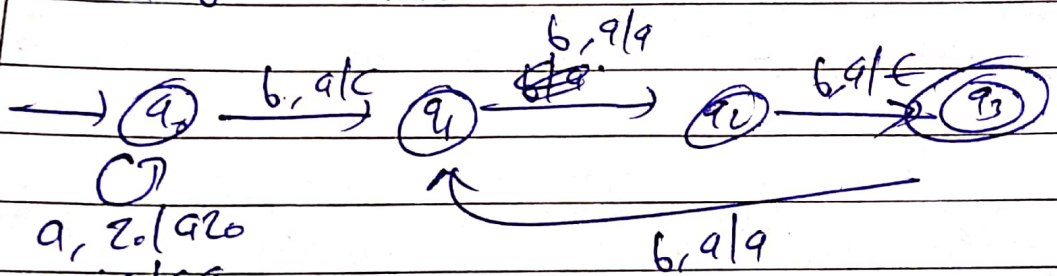
PDA = $\{\{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9, q_f\}, \{a, b\}, \{a\}, q_f, \delta, Z_0\}$

(9)




PDA = { {q0, q1, q2, q3, q4}, {a, b}, a, a, δ, Z0 }

(10) $a^n b^m$ $m = n \times 3$




PDA ⇒ { {q0, q1, q2, q3}, {a, b}, {a}, {a}, q0, δ, Z0 }