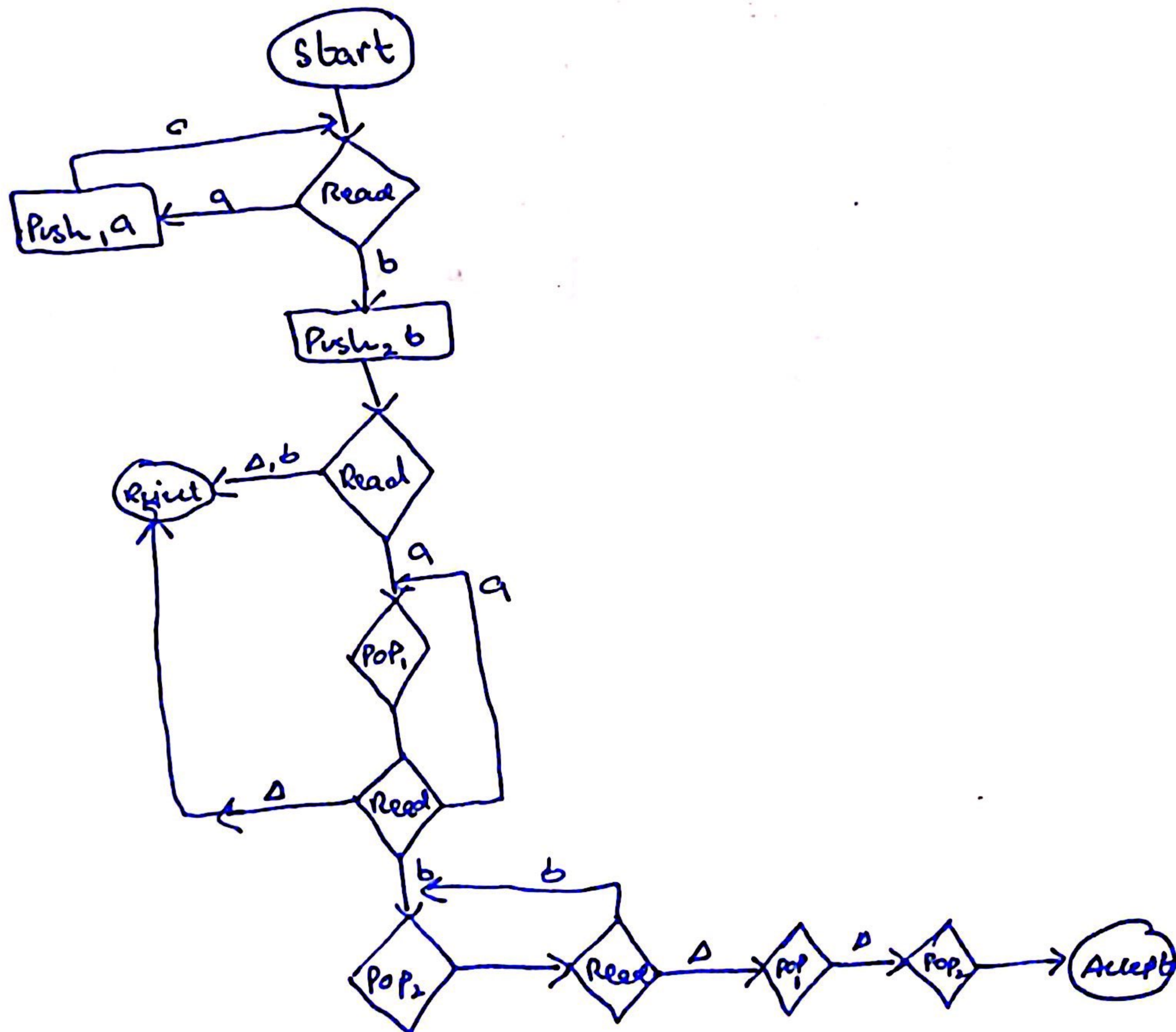# Construct 2PDA

Q.2 a) $a^n b^m a^n b^m$ $n, m \geq 1$
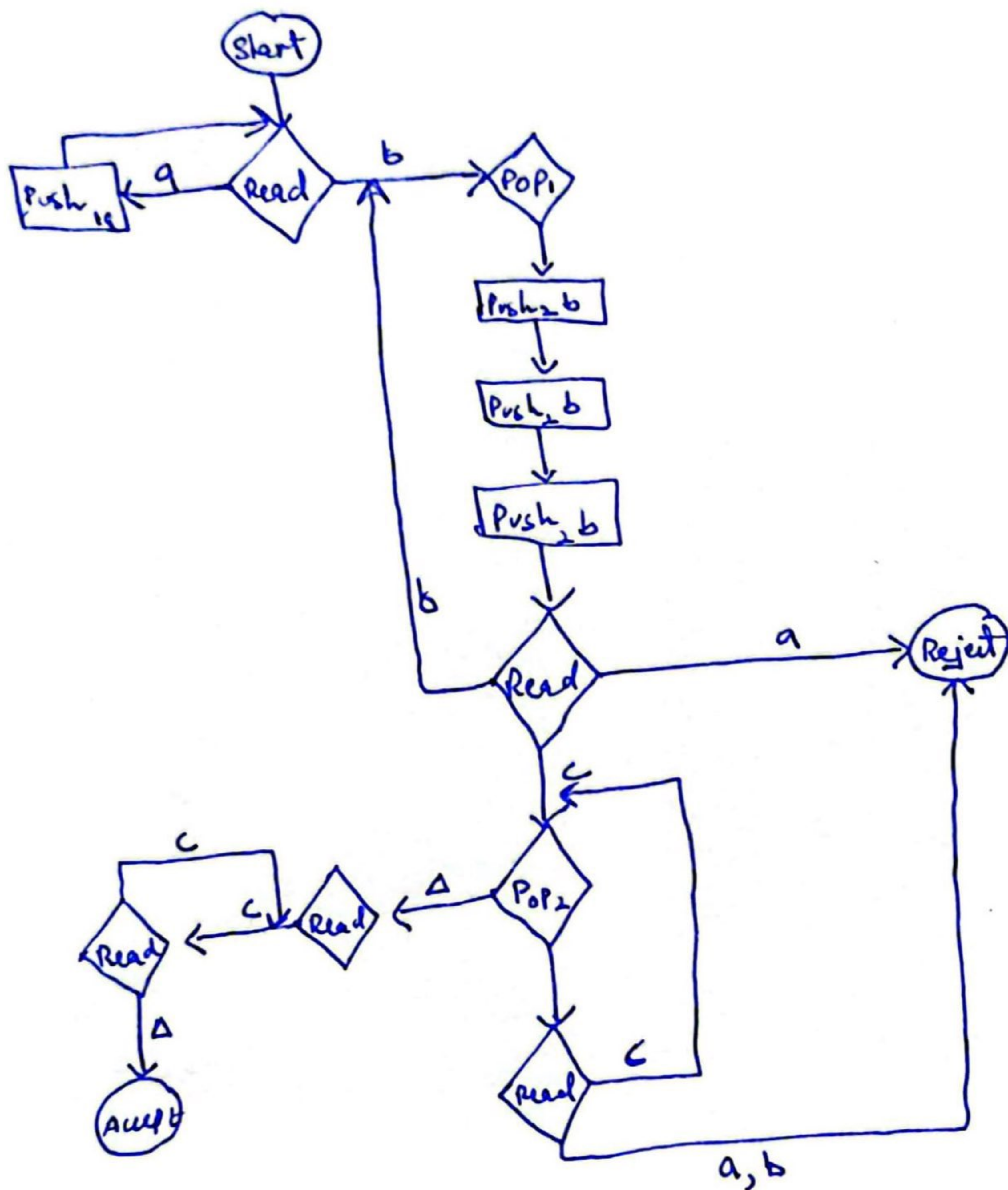
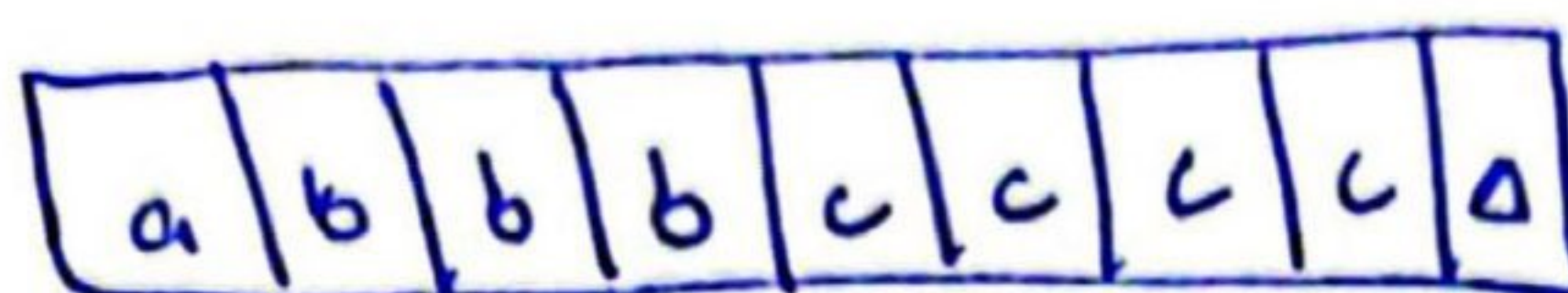| a	a	b	b	a	a	b	b	Δ
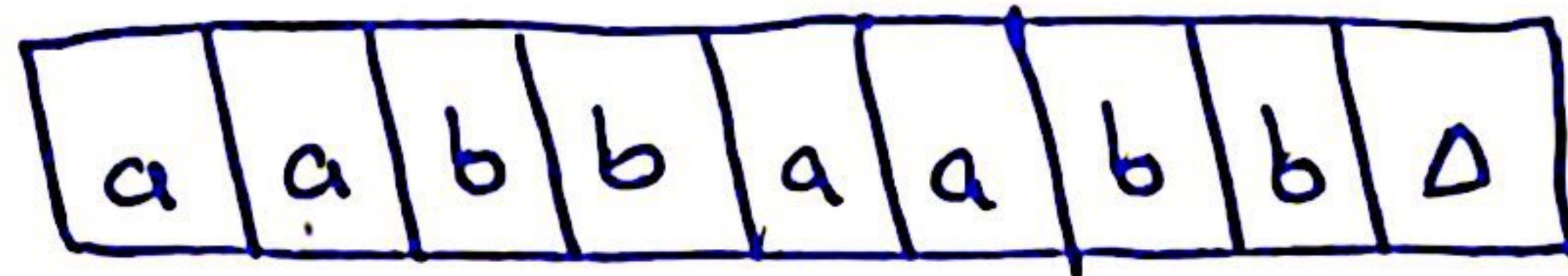
b) $a^{2n} b^n c^{2n}$

a	a	a	a	b	b	c	c	c	c	Δ
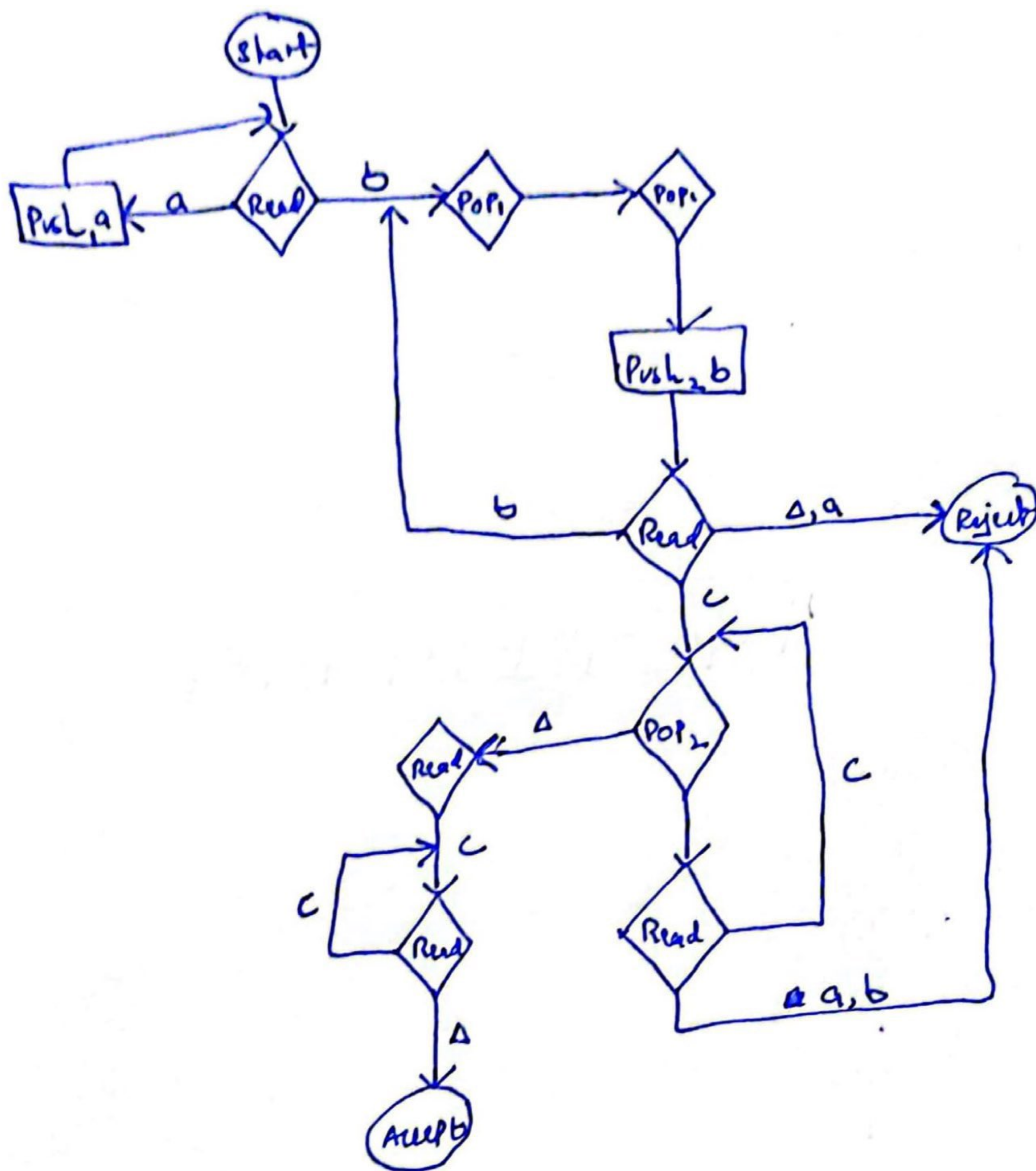
d) $a^n b^{3n} c^{4n}$

Q.1 Construct Turing Machine

a) $a^n b^n c^n d^{n+1}$

a	b	c	d	d	Δ

State transitions (as labeled in diagram):

- Start →(a, A, R)→ state
- state self-loop: q, A, R ; B, B, R
- state →(b, B, R)→ state (self-loop: c, c, R ; b, b, R)
- →(c, C, R)→ state (self-loop: C, C, R)
- →(d, D, L)→ state (self-loop: C, C, L ; c, c, L ; b, b, L ; B, B, L ; a, a, L)
- →(A, A, R)→ back to Start
- Start →(B, B, R)→ state (self-loop: B, B, R ; c, c, R ; D, D, R)
- →(Δ, A, R)→ Halt
- Start →(Δ, Δ, R)→ Halt (curved left edge)

b) 3^n $3' = 000$

c) $2x+y$