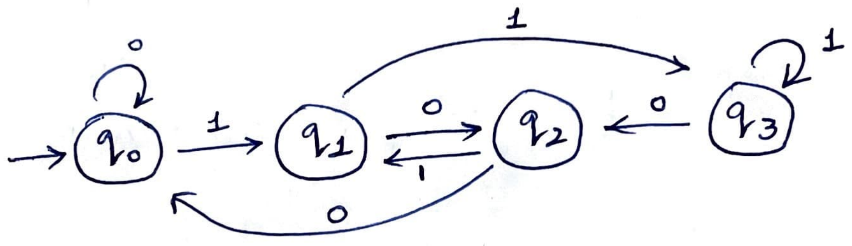
Ques 1

	0	1
q_0	q_0	q_1
q_1	q_2	q_3
q_2	q_0	q_1
q_3	q_2	q_3



$0^n 1^m$ $(n+m)$ is even : $\underbrace{0(00)^* 1(11)^*}_{\text{odd + odd}} + \underbrace{(00)^*(11)^*}_{\text{even + even}}$

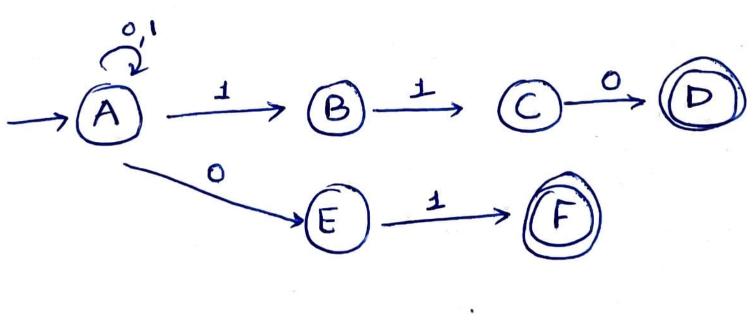
Ques 2

Pumping Lemma for Regular Language :

If A is a regular language then A has a pumping length 'p' such that any string 's' where $|S| \geq P$ may be divided into 3 parts $S = xyz$ such that :

1. $xy^iz \in A$ for every $i \geq 0$
2. $|y| > 0$
3. $|xy| \leq P$

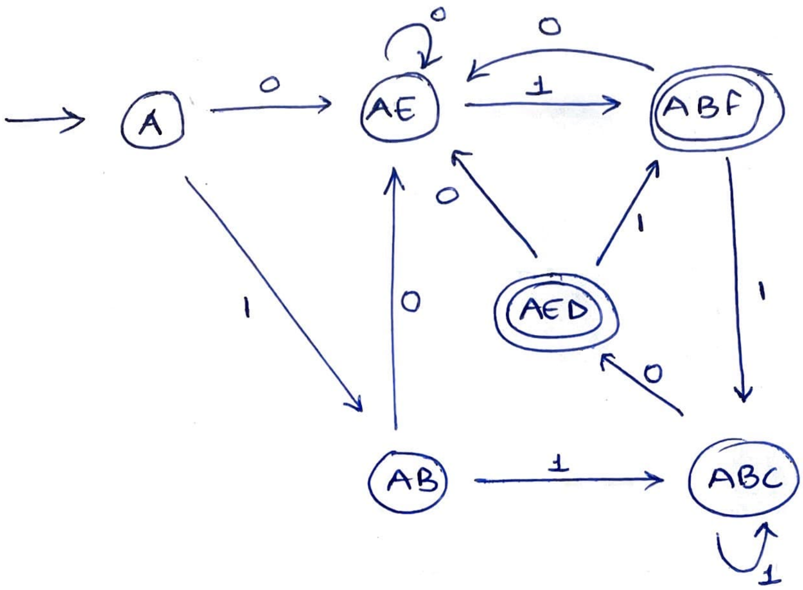
DFA for regular expression $(0+1)^* (110+01)$



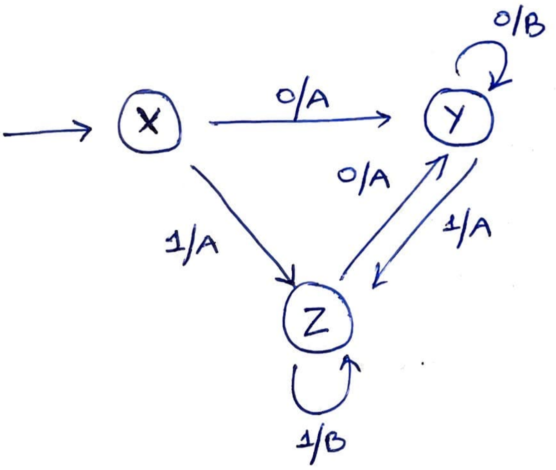
2

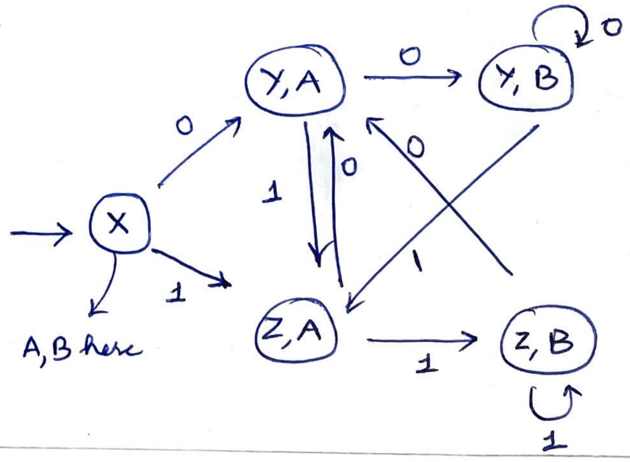
	0	1
→ A	AE	AB
B	φ	C
C	D	φ
* D	φ	φ
E	φ	F
* F	φ	φ

	0	1
→ A	AE	AB
AE	AE	ABF
AB	AE	ABC
* ABF	AE	ABC
ABC	AED	ABC
* AED	AE	ABF



Ques 3





Ques 4

- Unrestricted Grammar (Type 0)
- Context Sensitive Grammar (Type 1)
- Context free Grammar (Type 2)
- Regular Grammar (Type 3)

CFG for $0^i 1^j 0^k \mid j > i+k$

$S \rightarrow ABC$

$A \rightarrow 0A1 \mid \varepsilon$

$B \rightarrow 1B \mid 1$

$C \rightarrow 1C0 \mid \varepsilon$

Ques 5 Ardens Theorem $R = Q + RP \Rightarrow R = QP^*$

$A = Ca + \varepsilon$ —— (1)

$B = Aa + Da$ —— (2)

$C = Da + Eb$ —— (3)

$D = Ab + Eb$ —— (4)

$E = Ca$ —— (5)

Put (5) in (3) and (4)

$A = Ca + \varepsilon$ —— (1)

$B = Aa + Da$ —— (2)

$C = Da + Cab$ —— (6)

$D = Ab + Cab$ —— (7)

Put (7) in (2) and (6)

$A = Ca + \varepsilon$ —— (1)

$B = Aa + Aba + Caba$ —— (8)

$C = Aba + Caba + Cab$ —— (9)

In equation (9)

$$\underbrace{C}_{R} = \underbrace{Aba}_{Q} + \underbrace{C}_{R}\underbrace{(aba+ab)}_{P}$$

$C = Aba(aba+ab)^*$ —— (10)

Put equation (10) in (1)

$$\underbrace{A}_{R} = \underbrace{A}_{R}\underbrace{ba(aba+ab)^* a}_{P} + \underbrace{\varepsilon}_{Q}$$

$A = (ba(aba+ab)^* a)^*$ —— (11)

Put equation (10) in (8)

$B = Aa + Aba + Aba(aba+ab)^* aba$

$B = A(a + ba + ba(aba+ab)^* aba)$

Put eqn 11

$$B = (ba(aba+ab)^* a)^* (a + ba + ba(aba+ab)^* aba)$$