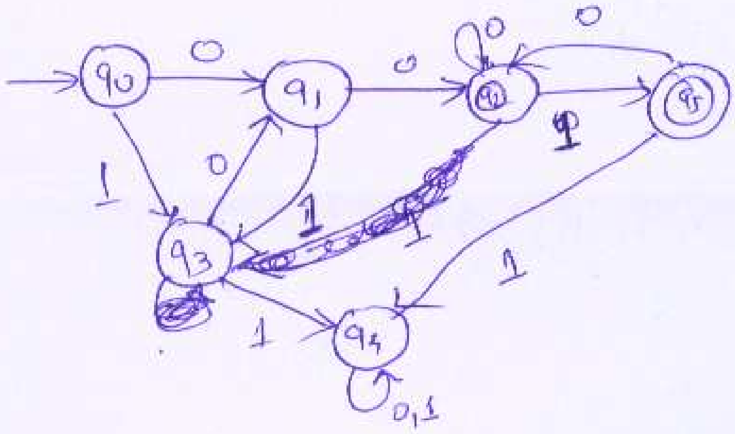
Set B TE/Insem-152

Q. 1 a)



Q. 1 b) ϵ-closure A = A, B, D

B = B

C = C

D = D

E = E

$\delta(A, 0) = \epsilon\text{-closure}(\delta(\epsilon\text{-closure}(A, 0)))$

$= \epsilon\text{-closure}\ \delta((A, B, D), 0)$

$= \epsilon\text{-clo}\ \delta(A, 0) \cup \delta(B, 0) \cup \delta(D, 0)$

$= \epsilon\text{-closure}\ (A \cup \phi \cup E)$

$= \underline{A, B, D, E}$

$\delta(A, 1) = \delta(A, B, D, 1)$

$= \phi \cup C \cup \phi$

$= \underline{C}$

$\delta(B, 0) = \epsilon\text{-clo}(\delta(B, 0))$

$= \epsilon\text{-clo}\ (\phi)$

$= \phi$

$\delta(B, 1) = \epsilon\text{-clo}\ (\epsilon\text{-clo}\ (B, 1))$

$= \epsilon\text{-clo}\ (C)$

$= \underline{C}$

$\delta(C, 0) = \epsilon\text{-closure}(\delta(\epsilon\text{-clo}\delta(C), 0))$

$= \epsilon\text{-clo}(\delta(C, 0) = B$

$= \epsilon\text{-closure}\ (B) = \underline{B}$

$\delta(C, 1) = \epsilon\text{-clo}\ (\phi)$

$= \phi$

$\delta(D, 0) = \epsilon\text{-clo}\ (D, 0)$

$= E$

$\delta(D, 1) = \phi$

$\delta(E, 0) = \epsilon\text{-clo}\ (\delta(\epsilon\text{-clo}(E), 0)$

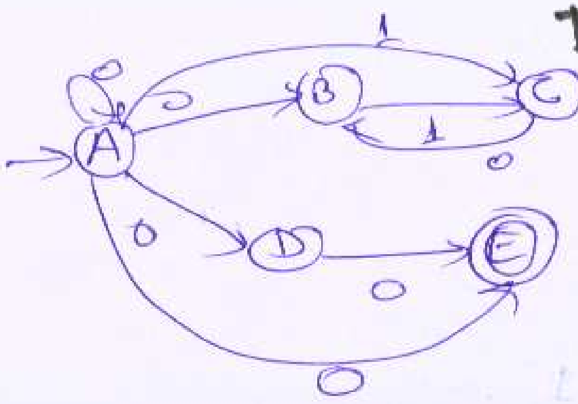
$= \epsilon\text{-clo}\ \delta((E, 0)$

$= \phi$

$\delta(E, 1) = \epsilon\text{-clo}\ (E, 1)$

$= \phi$.

TE1 insem. 152



Q. 2 a) $\{s_0, s_1, s_2, s_3\}, \{s_4\}$

$\delta(s_0, x) = s_1$

$\delta(s_1, x) = s_2$

$\delta(s_2; x) = s_1$

$\delta(s_3; x) = s_3$

states are equivalent

$\delta(s_0, y) = s_3$

$\delta(s_1, y) = s_4$

$\delta(s_2, y) = s_4$

$\delta(s_3, y) = s_4$

So s_1, s_2, s_3 are equivalent

$\{s_0\}, \{s_1, s_2, s_3\}, \{s_4\}$

$\delta(s_1, x) = s_2$ $\delta(s_1, y) = s_4$

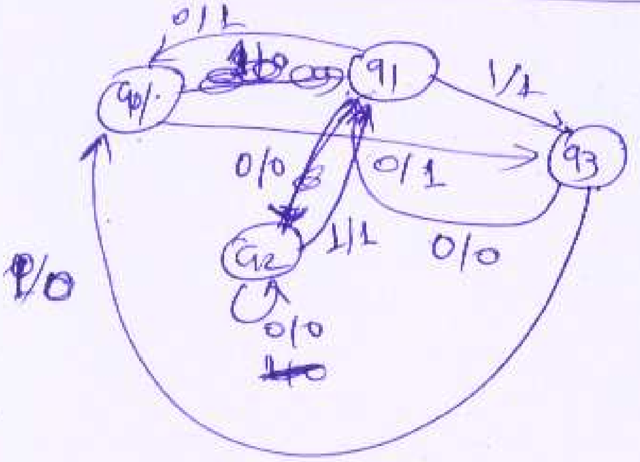
$\delta(s_2, x) = s_1$ $\delta(s_2, y) = s_4$

$\delta(s_3, x) = s_3$ $\delta(s_3, y) = s_4$

So minimized FA is

Q. 2 b)

	a=0	Δ	a=1	Δ
q_0	q_3	1	q_1	0
q_1	q_2	0	q_3	1
q_2	q_2	0	q_1	1
q_3	q_1	0	q_0	1



Q. 3 a) → 1) $(0+00+\epsilon)(1)^*(100+10+1)^*1^*$

2) $1^*(01^*01^*)^*1^*$

Q. 3 b) → pumping lemma to prove langu

Q. 4 a)

$q_0 = q_0a + q_0b + q_1a$

$q_1 = q_1a + q_0a.$

$q_2 = q_1b$

$q_3 = q_1a$

$q_0 = \cancel{(a+b)}\ q_1a(a+b)^*$

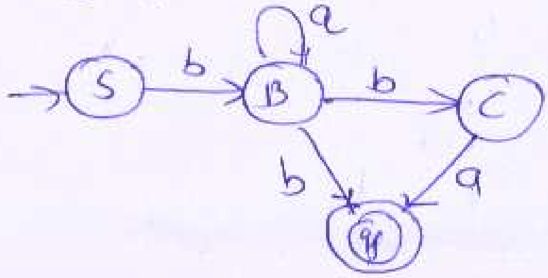
$= q_1a + q_1a(a+b)^*a$

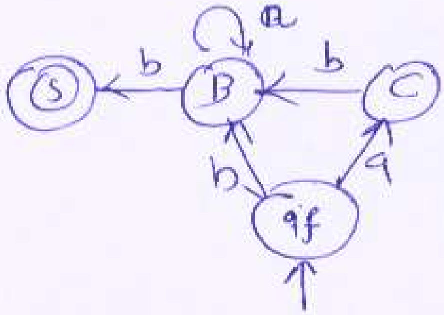
$= (a+a(a+b)^*a)^*$

$q_2 = (a+a(a+b)^*a)b$

Q. 4 (b) → TE Insem-152

S ⟹





$q_f \to Ca / Bb$

$C \to Bb$

$B \to Sb / Ba$

$S \to \epsilon$

Q. 5 (a) → $S \to 01XY$

$X \to 1XY / \epsilon$

$Y \to YX0 / X / \epsilon$

simplify →

remove null production

$S \to 01XY / 01X / 01Y / 01$

$X \to 1XY / 1X / 1Y / 1$

$Y \to YX0 / Y0 / X0 / X$

remove unit production

$Y \to YX0 / Y0 / X0 / 1XY / 1X / 1Y / 1$

remove non reachable or useless symbol

no useless or non reachable symbol

convert into CNF.

$\cancel{A \rightarrow}$ $A_1 \rightarrow 0$

$A_2 \rightarrow 1$

$A_3 \rightarrow A_1 A_2$

$A_4 \rightarrow \cancel{X} Y$

$\cancel{A_5 \rightarrow A_3 A_4}$

$S \rightarrow A_3 A_4 / A_3 X / A_3 Y / A_1 A_2.$

$X \rightarrow A_2 A_4 / A_2 X / A_2 Y / 1$

$\cancel{Y \rightarrow}$

$A_5 \rightarrow Y X$

$Y \rightarrow A_5 A_1 / Y A_1 / X A_1 / A_2 A_4 / A_2 X / A_2 Y / 1$

Q. 5 (b) → context free grammar is defined as set of productions to generate language having 4 tupples

$G = (V, T, P, S)$

where V is set of non terminal

T is set of terminal

P is set of productions

S is start symbol

where p is having products like

$V \rightarrow (V \cup T)^*$.

TE/II sem-152

Q. 6 (a) →

1) $L = \{a^m b^n c^p \mid m+n=p\}$

$S \to aAc \mid B$

$A \to aAc \mid B$

$B \to bBc \mid \epsilon$

2) $(a+b)\, b\, (a+b)^* \, b\, (a+b)$

$S \to AbBbA$

$A \to a \mid b$

$B \to aB \mid bB \mid \epsilon$

Q. 6) Chomsky hierarchy

Type 0 – RG

Type 1 → CFG

Type 2 → CSG

Type 3 → UG.