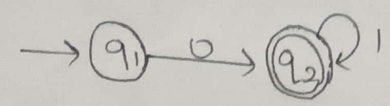
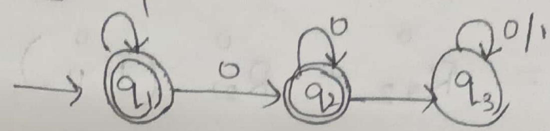
Assignment -4

23-8-24

1. Construct R.E for following finite automata



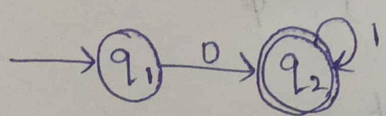
2. Arden's Theorem



Arden's Theore

Answers :-

1.



initial state = q_1

final state = q_2

No.of states = 2

$R_{11}^{0} = \epsilon$

$R_{12}^{0} = 0$

$R_{21}^{0} = \phi$

$R_{22}^{0} = \epsilon + 1$

i = initial state base

j = final state base

k = no.of states.

$$R_{ij}^{k} = R_{ij}^{k-1} + R_{ik}^{k-1} (R_{kk}^{k-1})^* R_{kj}^{k-1}$$

i=1, j=2, k=2

$$R_{12}^{2} = R_{12}^{1} + R_{12}^{1} (R_{22}^{1})^* R_{22}^{1}$$

$$= ((1+\epsilon) + (1+\epsilon).(0)^*.0$$

$$= (1+\epsilon) + (1+\epsilon).\epsilon.0$$

$$= (1+\epsilon) + (1+\epsilon).0.)x$$

$$\Rightarrow \boxed{(0+0) + (0+0)(1+\epsilon)^*(1+\epsilon)}$$

$$R_{12}^{1} = R_{12}^{0} + R_{11}^{0} (R_{11}^{0})^* (R_{12}^{0})$$

i=1, j=2, k=1

$$= 0 + \epsilon(\epsilon)^*.\phi$$

$$= 0 + \epsilon.\epsilon.\phi$$

$= 0 + \epsilon \cdot \phi$

$= 0 + \phi$

$= 0 + 0$

$R_{22}^{1} = R_{22}^{0} + R_{21}^{0} (R_{11}^{0})^* R_{21}^{0}$

$i=2, j=2, k=1$

$= \varepsilon + 1 + \phi (\varepsilon)^* \phi$

$= \varepsilon + 1 + \phi \cdot \epsilon \cdot \phi$

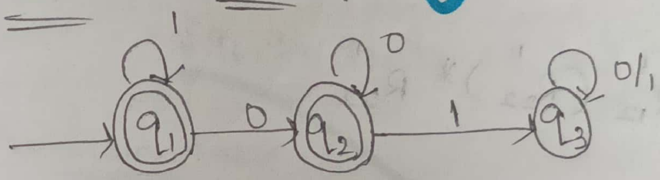
$= \varepsilon + 1 + \phi \cdot \phi$

$= \epsilon + 1 + \phi$

$= 1 + \epsilon + \phi$

$= 1 + \epsilon$

2. Arden's Theorem :-



$q_1 = q_1 \cdot 1 + \varepsilon \rightarrow ①$

$R = Q + RP$

$R = Q \cdot P^*$

$q_2 = q_1 \cdot 0 + q_2 \cdot 0 \rightarrow ②$

$q_3 = q_2 \cdot 1 + q_3 \cdot 0 + q_3 \cdot 1 \rightarrow ③$

taking eq ①

$\overset{R}{q_1} = \underset{R}{q_1} \cdot \underset{P}{1} + \underset{Q}{\varepsilon}$

$z \ \varepsilon \ ◆ \ 1^*$

$= 1^*$

Take eq (2)

$q_2 = q_1 \cdot 0 + q_2 \cdot 0$

$= 1^* \cdot 0 + q_2 \cdot 0$

$= 1^* \cdot 0 \cdot 0^*$

$q_1 + q_2 = 1^* + 1^* \cdot 0 \cdot 0^*$