Assignment-3

① Give REs for each of the following language ($\Sigma = \{0,1\}$)

(a) The set of all string containing exactly two 0's

Ans - $(1)^* 00 (1)^*$.

(B) The set of all string that do not end with 01.

Ans $\varepsilon + 0 + 1 + (0+1)^* + (00 + 10 + 11)$

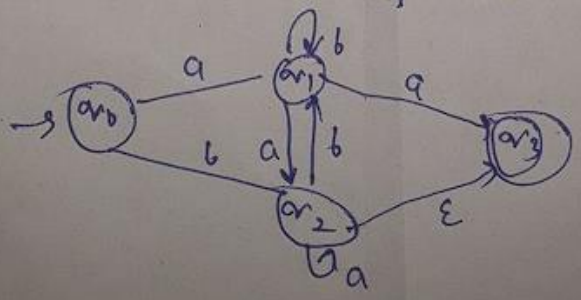
(c) the language of all string in which every 0 is followed immediately by 11.

Ans $(011 + 1)^*$

(d) The language of all string that has at most one pair of consecutive 1's.

Ans $(0+1)^* \; 11 \; (0+1)^*$.

2 - Convert the following FAs to REs.



$q_0 \to \varepsilon$

$q_1 \to q_0 a + q_1 b + q_2 b$

$q_2 \to q_0 b + q_1 a + q_2 a.$

$q_3 \to q_1 a + q_2 \varepsilon.$

$q_1 \to a + q_1 b + q_2 b$

$q_2 \to b + q_1 a + q_2 a.$

$q_3 \to q_1 a + q_2 \varepsilon.$

$q_1 = a + q_1 b + (b + q_1 a + q_2 a)$

$= a + q_1 b + (ba + q_1 aa + q_2 aa).$

$= a + q_1 b + ba + q_1 aa + q_2 aa.$

$= a + q_1 (b + aa) + ba + q_2 aa.$

$q_1 = a + ba + aa + (b + aa)^*$

$q_2 = b + (a + ba + aa + (b + aa)^*) a + q_2 a.$

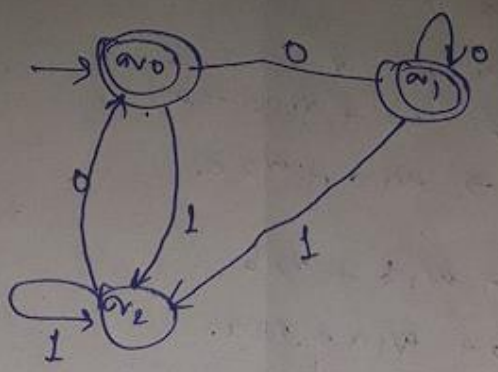
$q_2 = b + (aa + baa + aaa + (ba + aaa)^* + q_2 a.$

$q_2 = b + aa + baa + aaa + (ba + aaa)^* + (a)^*$

$q_3 = (a + ba + aa + (b + aa)^*) a + (b + aa + baa + aaa + (ba + aaa)^* + (a)^*) \varepsilon$

$q_3 = (aa + baa + aaa + (ba + aaa)^*) + (b + aa + baaa + aaa + (ba + aaa)^* + (a)^*)$

(B)



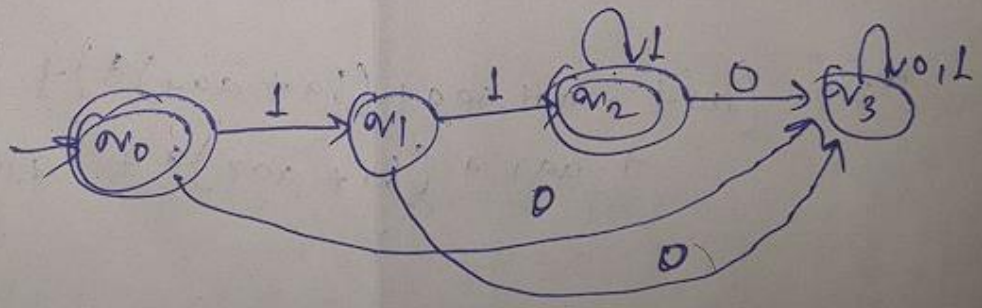
$$q_0 = q_2 0 + \varepsilon$$
$$q_1 = q_0 0 + q_1 0$$
$$q_2 = q_0 1 + q_1 1 + q_2 1$$

$$q_0 = (q_0 1 + q_1 1 + q_2 1)0 + \varepsilon$$
$$q_0 = q_0 10 + q_1 10 + q_2 10 + \varepsilon$$
$$q_0 = (10)^* + 10 + 10 + \varepsilon$$

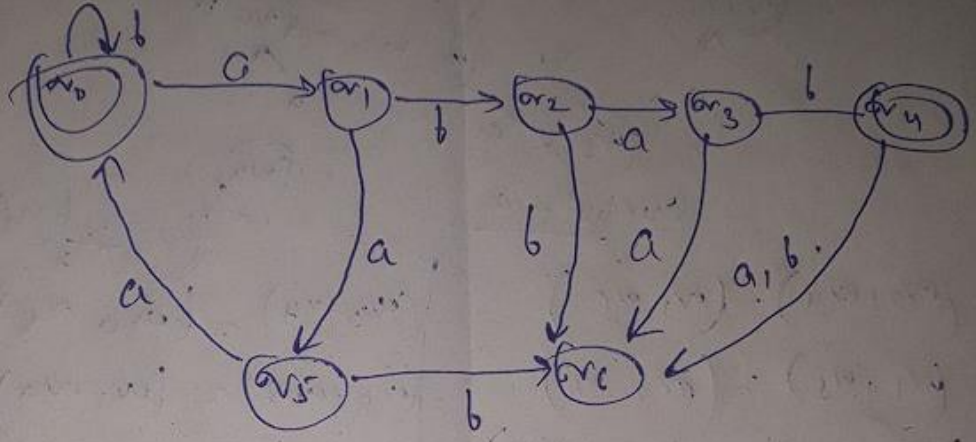
$$q_1 = ((10)^* + 10 + 10 + \varepsilon)0 + q_1 0$$
$$q_1 = (100)^* + 100 + 100 + \varepsilon + (0)^*$$

3) Convert the following REs to DFAs

(a) $(111 + 100)^* 0$



(B) $(ab\,ab)^* + (aaa^* + b)^*$



Section - B

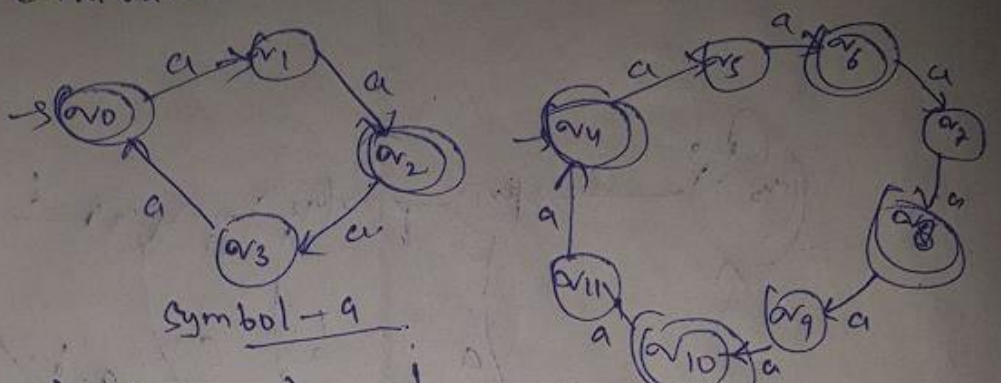
7) Let h be a homomorphism from the alphabet $\{a, b, c\}$ to $\{0, 1\}$. if $h(a) = 01$, $h(b) = 0$ and $h(c) = 10$ give 3. element of $h^{-1}(01001 0)$?

Solve

$h(a) = 01$
$h(b) = 0$
$h(c) = 10$

element of $h^{-1}(01001 0)$ is = abbc

(9) check whether the following FAs are envivalent.



Symbol – a

$(q_0, q_4) = (q_1, q_5)$

$(q_1, q_5) = (q_2, q_6)$

$(q_3, q_{11}) = (q_0, q_4)$

$(q_2, q_6) = (q_3, q_7)$

$(q_3, q_7) = (q_0, q_8)$

$(q_0, q_8) = (q_1, q_9)$

$(q_1, q_9) = (q_2, q_{10})$

$(q_2, q_{10}) = (q_3, q_{11})$

$(q_3, q_{11}) = (q_0, q_4)$

all State transction are envaulence.
So both dfa are envivalence.