Malik Zohaib Mustafa
01-134192030
BSCS-4B

Q3

Part a)

$$L = \{0^m 1^n \mid n = 3n\}$$

Proof

- By contradiction, let L be regular
- P/L constant should exist
  → Let N = P/L constant
- consider $w = 0^{3N} 1^n$ s.t. $|w| \geq$
- By pumping lemma, we should be able to break $w = xyz$ such that
  1) $y \neq c$
  2) $|xy| \leq N$
  3) for all $K \geq 0$, the string xy^kz is also in L.
- Now divide the w into 3 parts by the rule
  $x = 0^{2N}$, $y = 0^N$ = $z = 1^N$
- By (3), any string of the form $xy^Kz \in L$ for all $K \geq 0$

$w = xy^k z$

$= x y^0 z$

$= 0^{2N} \cdot (0^N)^0 \, 1^N$

$= 0^{2N} 1^N \notin L$

∴ L is not regular so is a contradiction ~~so~~ then

$L\{0^m 1^n \mid m = 3n)\}$ is not regular language

Q3

Part b

$W = 0^{3N} 1^N$

$|W| = 3N + 1 = $ ~~4N~~

then $|W| > N \Rightarrow 4N > N$

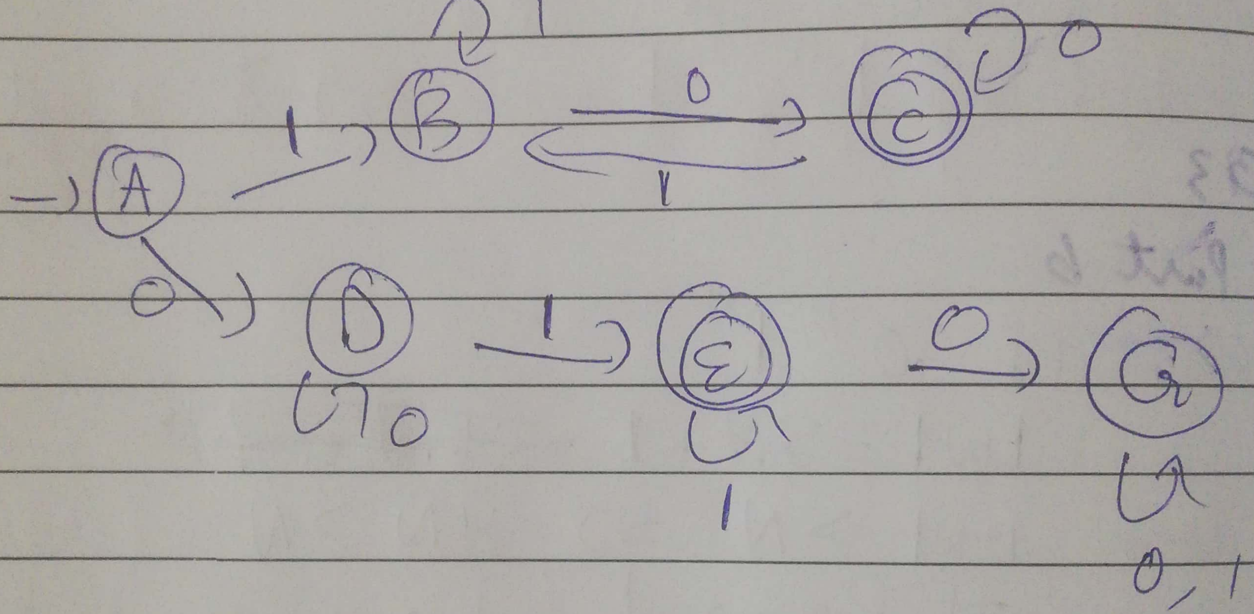
Proved because it is true i.e $|W| > N$ is true

Q2

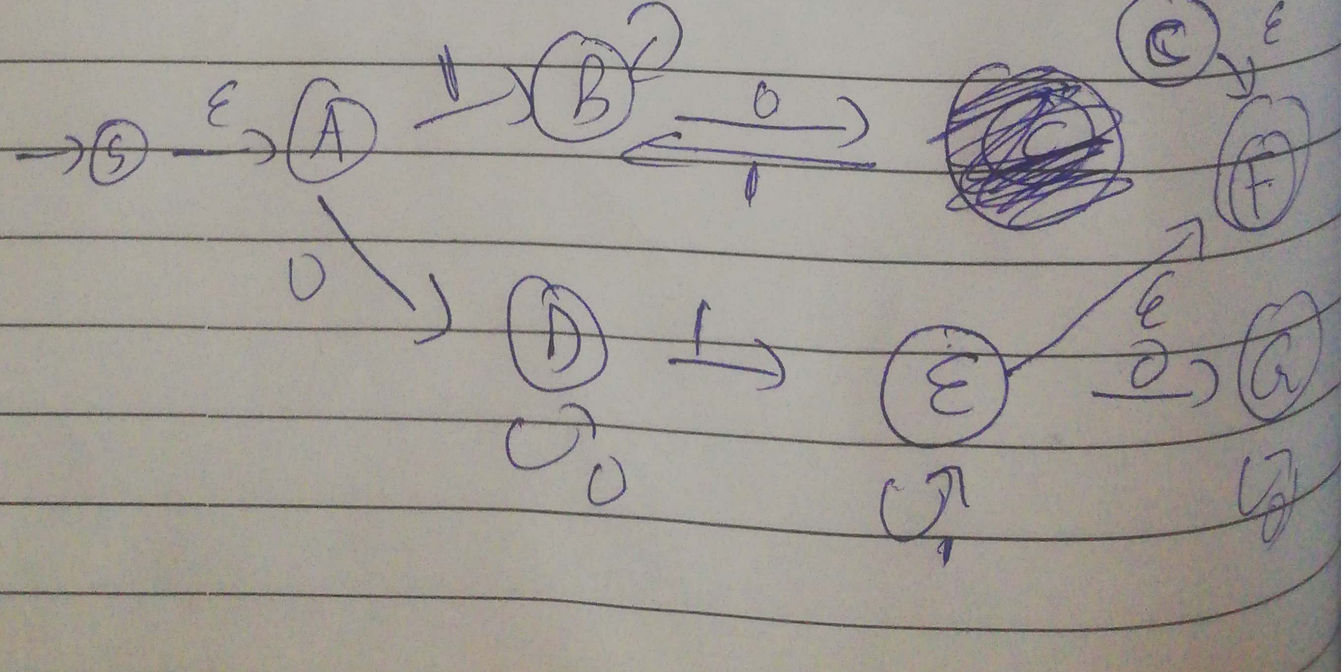
My Enrollment: 01-134192-030

Even

so states will be removed according to the order
E, C, B, D, G, A

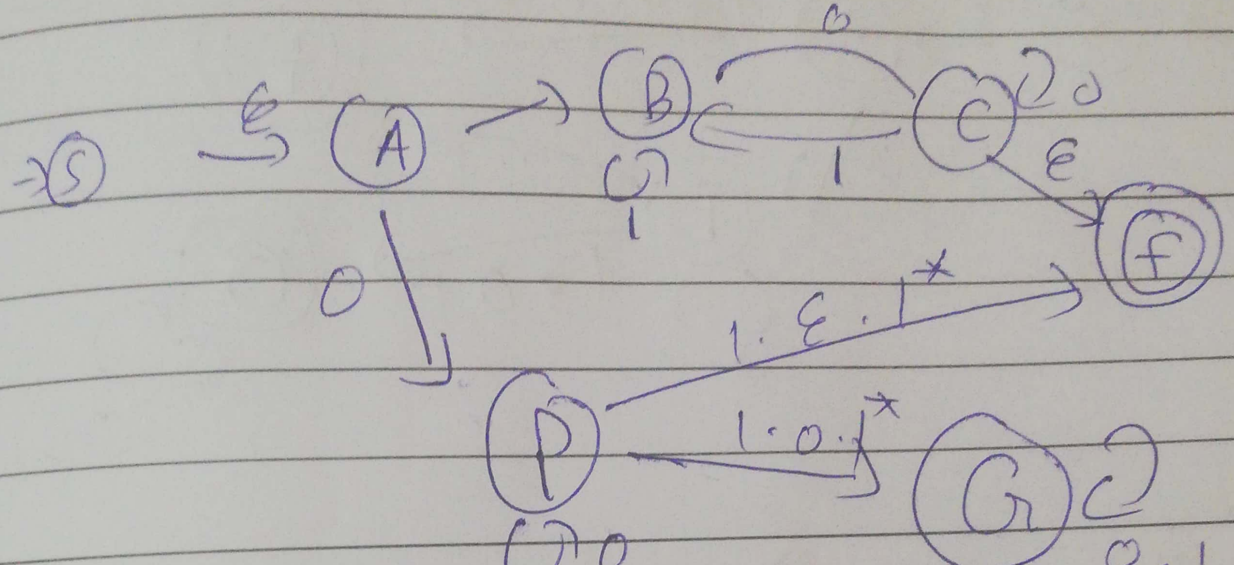


1) First we insert start node S and end node "F"



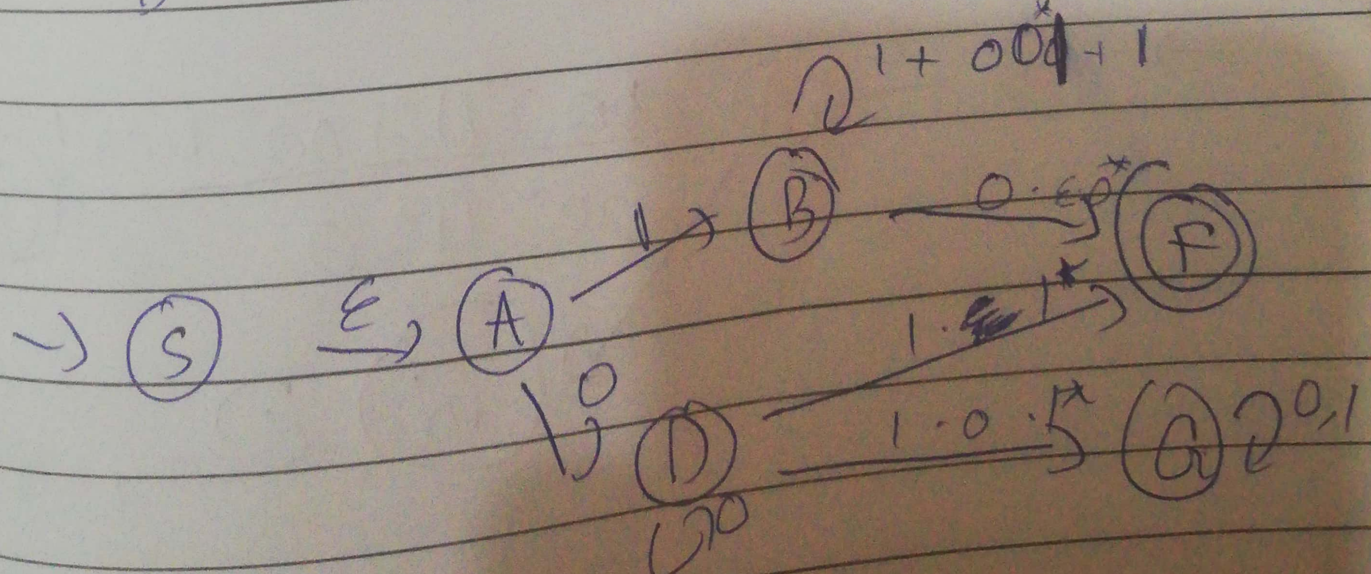
2) Remove E

D·E·G = DG = ϕ + 1.0.1*
D·E·F = DF = ~~ϕ~~ + 0 = ϕ + 1.E.1*



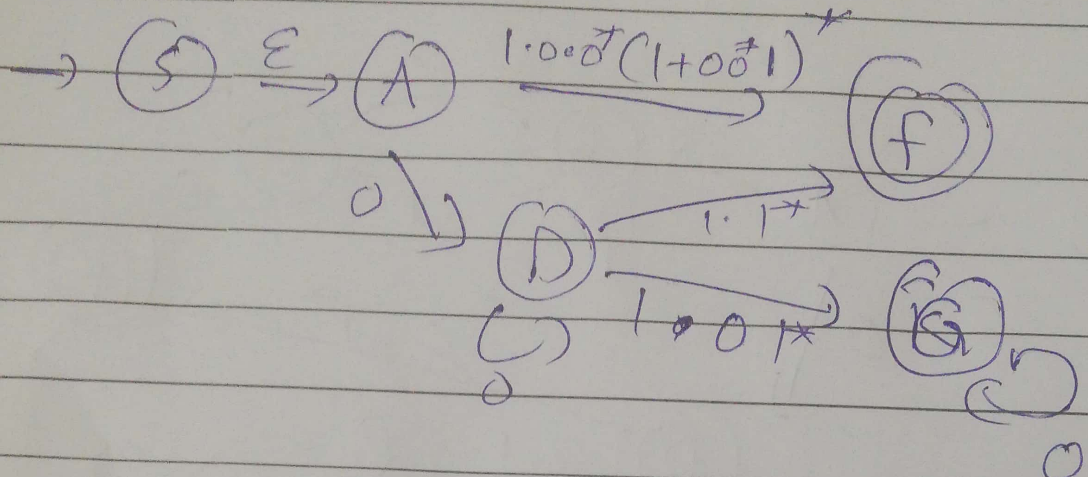
3) Remove C

B C F → BF = ϕ + 0.E.0*
B C B → B·B = 1 + 0.1.0*



4) Remove B

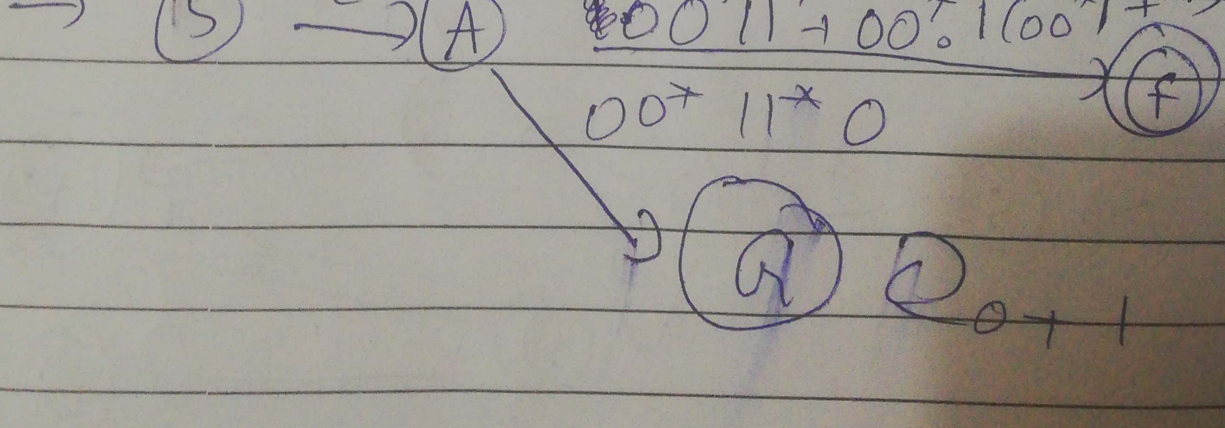
$A \cdot B \cdot f \Rightarrow Af = 4 + 1 \cdot 0 \cdot 0^* (1+00^*1)^*$



5) Remove D

$ADG = AG = \Phi + 0 \cdot 0^* (1 \cdot 01^*)$

$ADf = Af = 1 \cdot 00^* (1 + 00^*1)^* + 00^*1 \cdot 1$



6) <u>Remove a</u>

$$\rightarrow (S) \longrightarrow (A) \xrightarrow{00^{*}\ 11^{*} + 00^{*}1\,(00^{*}1+1)} ((F))$$

$$0 \cdot 0^{*}(1 \cdot \phi^{*} \cdot 0)\,(0+1)^{*}$$

7)

$$\rightarrow (S) \xrightarrow{\varepsilon} (F)$$

$$00^{*}11^{*} + 00^{*}1\,(00^{*}1+1)$$
$$(00^{*}11^{*}0$$
$$(0+\phi)^{*})^{*}$$

Q1 Part b

030

11110

$$(0+1)^* \quad (11110) \quad (0+1)^*$$

Part a