TOC - Assignment - 8

① $S \to aSBC$

$S \to aBC$.

$CB \to BC$.

$aB \to ab$.

$bB \to bb$.

$bC \to bc$.

$CC \to CC$

Ans $L(G) = ?$

$S \to (aB)c$

$S \to abc)$

$S \to abc$.

$S \to aSBC$.

$S \to a(aB)CBC$.

$S \to aab B)CC$.

$S \to aabbCC$.

$S \to aabb(CC)$

$S \to aabbCC$.

$\Rightarrow S = \{a^n b^n c^n \mid n > 0\}$

Consider $\delta = uvwxy$ for $S = abc$.

$U = a, \ V = b, \ w = \epsilon, \ x = \epsilon, \ y = c$.

will satisfy $|vwx| \leq n$.

$1 \leq 1 \Rightarrow$ true

It is satisfied when vwx has
only

$a's \longrightarrow$ True,
$a's$ and $b's \rightarrow$ False.
$b's \rightarrow$ True.
$b's$ and $c's \rightarrow$ False.
$c's \rightarrow$ True.

Here, for $n = 1$, 2 rules are
contradicting with Slide 27 of
lecture 18. Because having
$a's$ and $b's$ (or) $b's$ and $c's$ in
vwx will lead to $|vwx| > n$
which should not happen.

(2)(a) $L = \{a^n b^m c^n d^m \mid m > 0, n > 0\}$

for $n = 1$,

$L = abcd$.

This contradicts with one of the five theories of having

$|vwx| \leq 1$ and also having only a's (or) b's and c's (or) only b's (or) a's and b's (or) only c's.

Hence, $a^n b^m c^n d^m$

(b) $L = \{a^n b^{2n} c^{3n}\}$

$L = abbccc$.

This will satisfy the rules when considering $|vwx| \leq n$.

It can also justify rules like only a's, only b's, only c's, a's and b's and b's and c's.

Hence, this language is context free.

© $L_3 = \{a^n b^n c^m d^m \mid m, n > 0\} \cup$
$\{a^n b^m c^n d^m \mid m, n > 0\}$

Union of 2 Content free languages is always Content free

But here One of them is Content free and the other is not. So, L_3 is not Content free.

③ $L = L_1 . L_2 . \ldots . L_n$.

$L_j = CF$ if $j =$ Even.

$L_j =$ Regular if $j =$ odd.

Concatenation of a Content free language and regular language is always Content free.

$\Rightarrow$ if ~~n is od~~ L is a Content free Language.