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CS5000 – Assignment – 5.

① CFG for String of balanced Paranthesis :-

$S \rightarrow (S)$
$S \rightarrow SS$
$S \rightarrow \epsilon$

i.e $S \rightarrow (S) \mid SS \mid \epsilon$

Stack machine :-

Read.	Pop.	Push.
ϵ	S	(S)
ϵ	S	SS
ϵ	S	ϵ
(	(	ϵ
)	)	ϵ

② CFG for palindromes over {a, b}

$S \to 0$
$S \to 1$
$S \to 0S0$
$S \to 1S1$
$S \to \epsilon$

$\Rightarrow S \to 0|1|0S0|1S1|\epsilon$

Stack machine

Read.	Pop	Push
ϵ	S	0
ϵ	S	1
ϵ	S	0S0
ϵ	S	1S1
ϵ	S	ϵ
0	0	ϵ
1	1	ϵ

(3). Given grammar,

S → 0B | 1A.
A → 0 | 0S | 1AA.
B → 1 | 1S | 0BB.

If, S → 0B → 01
S → 0B → 01S. → 010B → 0101
→ 011A → 0110
S → 0B → 00BB → 0011
→ 0011S. → 001101
→ 001110.

⇒ This grammar leads to a language with equal number of 0's and 1's in any sequence.