quiz 6

grammar:
$S \to AB \mid BC$
$A \to BA \mid a$
$B \to CC \mid b$
$C \to AB \mid a$

$w_1=a,\ w_2=b,\ w_3=a,\ w_4=b,\ w_5=a$

$\Rightarrow X_{11}=\{A,C\},\ X_{22}=\{B\},\ X_{33}=\{A,C\},\ X_{44}=\{B\},\ X_{55}=\{A,C\}$

$\Rightarrow X_{12} \to \{A,C\}\{B\}=\{AB,BC\}=\{S,C\}$

$X_{23} \to \{B\}\{A,C\}=\{BA,BC\}=\{S,A\}$

$X_{3,4} \to \{A,C\}\{B\}=\{S,C\}$

$X_{4,5} \to \{B\}\{A,C\}=\{BA,BC\}=\{S,A\}$

$\Rightarrow X_{1,3} \to \{A,C\}\{S,A\} \cup \{S,C\}\{A,C\}=\{AS,AA,CS,CA,SA,SC\}=\{B\}$

$X_{2,4} \to \{B\}\{S\} \cup \{S,A\}\{B\}=\{BS,SB,AB\}=\{C\}$

$X_{3,5} \to \{A,C\}\{S,A\} \cup \{S,C\}\{A,C\}=\{AS,AA,CS,CA,SA,SC\}=\{B\}$

$\Rightarrow X_{1,4} \to \{A,C\}\{C\} \cup \{S\}\{S\} \cup \{B\}\{B\}=\{AC,CC,SS\}=\{B\}$

$X_{2,5} \to \{B\}\{B\} \cup \{S,A\}\{S,A\} \cup \{C\}\{A,C\}=\{SS,SA,AC,AA\} \cup \{CA,CC\}=\{B\}$

$\Rightarrow X_{1,5} \to \{A,C\}\{B\} \cup \{S,C\}\{B\} \cup \{B\}\{S,A\} \cup \{B\}\{A,C\}=\{AB,CB,BA,BC\}=\{S,A,C\}$

$\Rightarrow$

$\{S,A,C\}$				
$\{B\}$	$\{B\}$			
$\{B\}$	$\{C\}$	$\{B\}$		
$\{S,C\}$	$\{S,A\}$	$\{S,C\}$	$\{S,A\}$	
$\{A,C\}$	$\{B\}$	$\{A,C\}$	$\{B\}$	$\{A,C\}$
a	b	a	b	a

$\therefore$ ababa $\in L(G)$