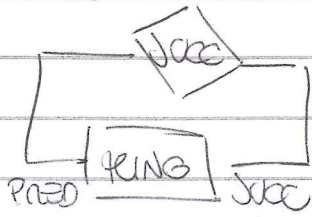


3

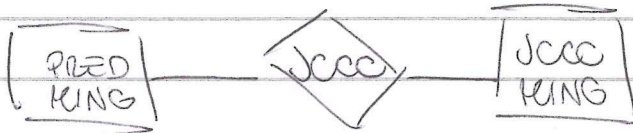
$k_1 \rightarrow k_2 \rightarrow k_3 \rightarrow k_4$



PREO JOCC  
( $k_1, k_2$ )

PREO JOCC  
( $k_2, k_3$ )

PREO JOCC  
( $k_3, k_4$ )



$\{k_1, k_2, k_3\}$

NOT EQUIVALENT  $\{k_2, k_3, k_4\}$

NOT EQUIVALENT

PREO JOCC  
( $k_1, k_1$ )



( $k_1, k_2$ )

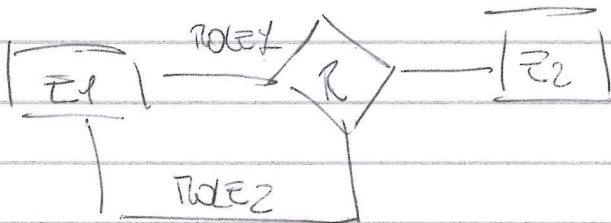
EXT. CONSTRAINT  
REQUIRED

( $k_2, k_1$ )

EXT. CONSTRAINT.

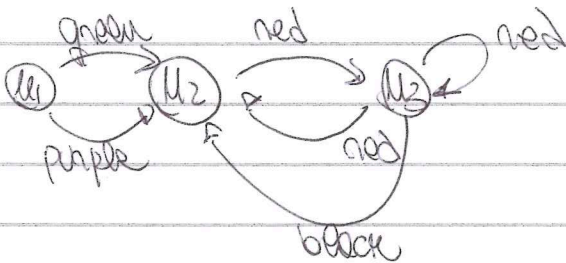
$k_1 \leftarrow k_2$

REQUIRED



CAN WE DO IT? YES

( $e_1, e_2, e_2$ )  
red red



( $m_2, m_1, green$ )

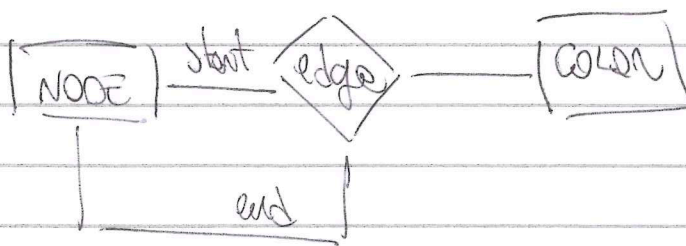
( $m_3, m_2, black$ )

( $m_2, m_3, red$ )

( $m_3, m_3, red$ )

( $m_1, m_2, purple$ )

( $m_3, m_2, red$ )



MULTI GRAPHS CAN BE  
MODELED THROUGH ETL  
SCHEMA