

# ECE 561: Digital Circuit Design

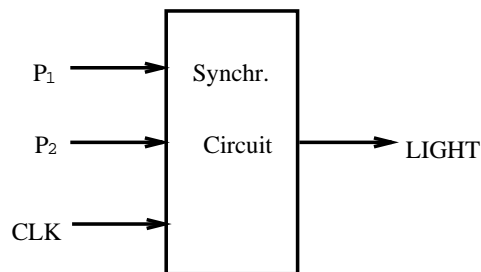
## Homework #7

### Problems:

1. Construct a clocked sequential circuit that will turn on a light (LIGHT) as the first person enters a room, and turn off the light as the last person leaves. Assume that there is a single door fitted with two photocells that generate TTL-compatible outputs. One photocell ( $P_1$ ) is on the inner side of the door and the other ( $P_2$ ) is on the outer side. Light beams shine on each photocell, producing a low output voltage (0) from the cell; a high output voltage (1) is produced by a photocell at any time while the light beam is interrupted.

Assume that once a person starts through the door, he/she completes the process, and that only one person at a time enters or leaves. Furthermore, assume that no more than two persons will ever be in the room at the same time.

Also, assume that the photocells are rather closely spaced so that a person can never get between them.



Assume that CLK is a high frequency clock, that  $P_1$  and  $P_2$  are synchronized to the clock, and that LIGHT should be asserted (1) as long as the light is to be on.

Give an appropriate *state diagram*. No other steps need to be given. Design the state diagram with the fewest states possible.