

## ECE 478 Laboratory Work #5

1) Arbiters are used to manage access to shared resources. An example is depicted in Figure 1, which shows three peripherals (P1 to P3) that use a common bus to access common resources.

Obviously, only one of them can use the bus at a time; for example, if P1 wants to use the bus, it issues a request ( $r_1 = '1'$ ) to the arbiter, which grants ( $g_1 = '1'$ ) access only if the bus is idle at that moment.

The machines can hold the bus at most for  $T_1 = 300, T_2 = 200, T_3 = 100$  clocks and then has to release the bus.

If multiple requests are received by the arbiter, access is granted based on pre-established priorities. Assuming that the priorities are  $P1 > P2 > P3$ , draw a state transition diagram for a machine capable of implementing this arbiter. The machine's input and output are the vectors  $r = r_1 r_2 r_3$  and  $g = g_1 g_2 g_3$ , respectively (besides clock and reset, of course).

Implement the state machine of the arbiter in VHDL.

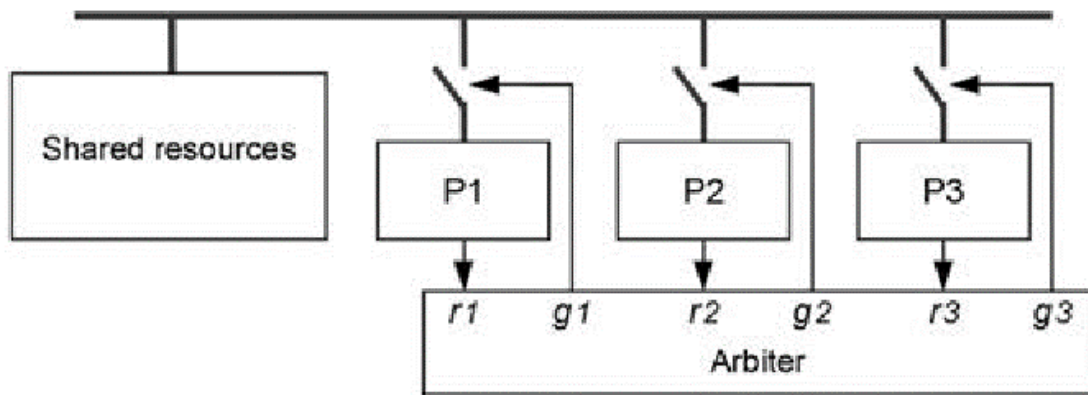


Fig-1