EXPERIMENT 5 : Flip Flop Applications: Register Basics

OBJECTIVES

• In this experiment, some basics concepts of registers will be studied.

APPARATUS

7404	have investor				
/404	nex inverter				
7474	dual positive edge triggered D flip-flops				
7408	quad 2-input AND gate				
7432	quad 2-input OR gate				
74HC14	schmitt-trigger hex inverter				
470 ohm, 10 Kohm Resistors,					
100 nf Capacitor,					
Push Button					
Connection wires or Jumper wires, Wire Stripper / Cutter					

PRELIMINARY WORK

Q1. Design a 2 bit register which performs the following operations. Use D flip flops and multiplexers.

S1 S0	OPERATION
0 0	Hold
0 1	Shift Right
1 0	Shift Left
1 1	Parallel Load

Q2. For the waveforms given in figure 1, draw the outputs of your register that you designed in Q1 (Hint: D1, D0 are parallel inputs).



IC DESCRIPTION

The 7474 IC contains two independent positive-edge-triggered D flip-flops with complementary outputs. The pin assignment is shown in Fig 2. The information on the D input is accepted by the flip-flops on the positive going edge of the clock pulse. A low logic level on the preset or clear inputs will set or reset the outputs regardless of the logic levels of the other inputs. Effects of the mode select inputs are given in table 1.



Table 1

ſ	Inputs				Outputs		
	PR	CLR	CLK	D	Q	Q	
	L	Н	Х	Х	Н	L	
	Н	L	X	X	L	Н	
	L	L	X	X	H (Note 1)	H (Note 1)	
	Н	н		н	н	L	
	Н	н		L	L	Н	
	Н	н	L	x	Q ₀	\overline{Q}_0	

H = HIGH Logic Level

X = Either LOW or HIGH Logic Level

L = LOW Logic Level

↑ = Positive-going Transition

 Q_0 = The output logic level of Q before the indicated input conditions were established.

Note 1: This configuration is nonstable; that is, it will not persist when either the preset and/or clear inputs return to their inactive (HIGH) level.

Figure 2

PROCEDURE

1. Set up the push button circuit given in figure 3 and connect it to a led. Then check whether it is working or not.



Figure 3

2. Build the 2 bit register with gated clock given figure 4. Use the push button you build in procedure 1 as clock signal. Then verify its operation by applying the inputs given in figure 5.



Figure 4



3. Build the 2 bit "Parallel Load - Shift Registers" given figure 6. Use the push button you build in procedure 1 as clock signal. Then verify its operation.



Figure 6