LAB MANUAL

Registers

Objectives:

- **To learn how to design and implement registers using flip flops**
- **Student should understand how to design a sequential circuit given its specifications in sentence structure or state diagram or state table form.**

EQUIPMENT: Logic trainer, Logic probe

COMPONENTS: ICs 74LS08, 74LS32, 74LS04, 74LS86, 74LS02, 74LS74, 74LS153

REGISTER:

In this lab, we will design a combinational circuit of register. A register is used to store n-bits of information, where n is the number of flip flops. A register consists of a set of flip flops, together with gates that perform data processing tasks. The flip flops hold data, and the gates determine the new or transformed data to be transferred into the flip flops. The registers have two types, one simple register and other register with parallel load. The simple register is discussed above. The register with parallel load is the register in which we can easily store the value of our own choice.

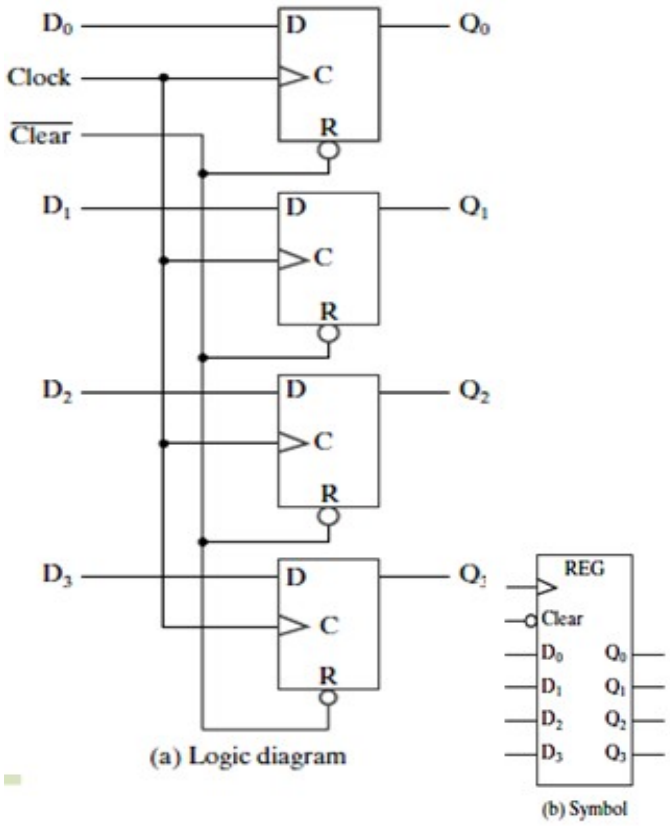
This ability of register is controlled by a control input, if control input is 1 then the data that we want to enter is stored on the register, and when the value is 0 then the data that is already stored in the register remains unchanged. Another type of register is known as shift register.

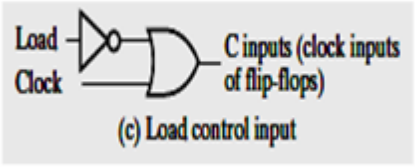
The shift register is capable of shifting its stored bits laterally in one or both direction. The logical configuration of a shift register consists of a chain of flip flops in cascade, with the output of one flip flop connected to the input of the next flip flop. All flip flops receive a common clock pulse, which activates the shift from each stage to the next.

Problems :

Problem 1	

Implement a Four-bit register with parallel load on trainer.





When the Load signal is 1, C inputs= Clock, so the register is clocked normally, and new information is transferred into the register on the positive transitions of the clock.

When the Load signal is 0, C inputs= 1. With this constant input applied, there are no positive transitions on C inputs, so the contents of the register remain unchanged.

Problem 2:

Draw the logic diagram of a shift register with D-FLIP FLOPS with mode selection inputs S1 &S0 and implement the circuit on the breadboard. The shift register is to be operated according to following function table. One stage of this register should contain a 4-to-1-line MUX and a D Type FLIP FLOP. Do it on logic works

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Mode Selection		Register Operation
S1	**S0**	
0	0	No change
0	1	Shift right
1	0	Shift left
1	1	Parallel load data

Problem 3 : Analyze the given sequential circuit. Fill the table given below and mention the following:

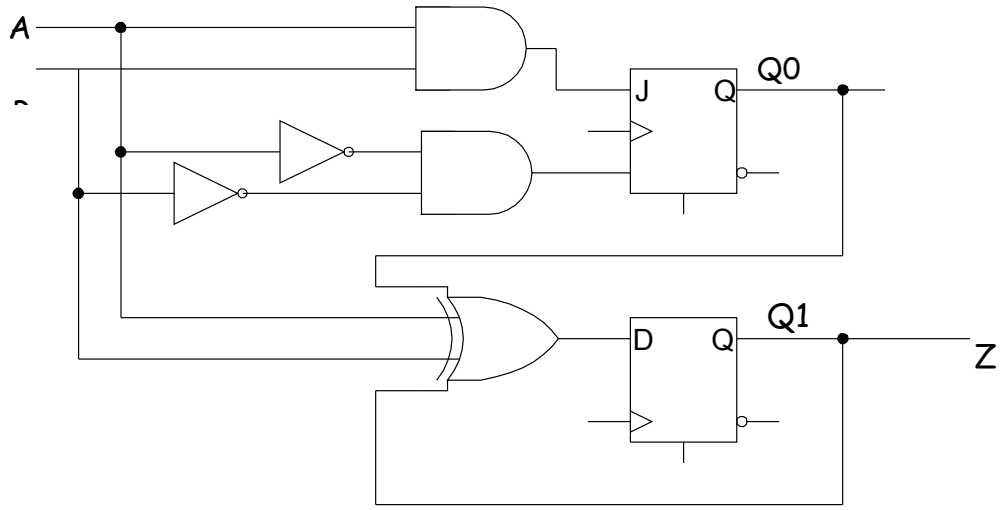
a. Input equations

b. Output equations

c. Excitation equations

d. Next state equations

State diagram



Do it on logic works.

Current States		Inputs		Next States		Output
Q0	Q1	A	B	Q0 (t+1)	Q1 (t+1)	Z

Problem : Design a 4 bit shift right register having serial input and shift control. Logic trainer.