

Dr. Annu Kumari

Dept. of Physics

H. D. Jain College, Ara

PG III semester

Unit - 5

Topic — Shift Register

Shift Register

Shift Register: Transfer operation of Flip-flops: -

In digital systems, we frequently need transfer of data from one flip-flop (or group of flip-flops) to another flip-flop (or group of flip-flops). In J-K flip flop, transfer operation is shown in fig (1). The data stored in FF/A

is transferred to FF/B at the falling edge of transfer pulse. It implies that the B output after the pulse occurs will be the same as what the A output was prior to pulse. As clock pulse input performs this transfer operation, this type of transfer operation is called 'Synchronous transfer'.

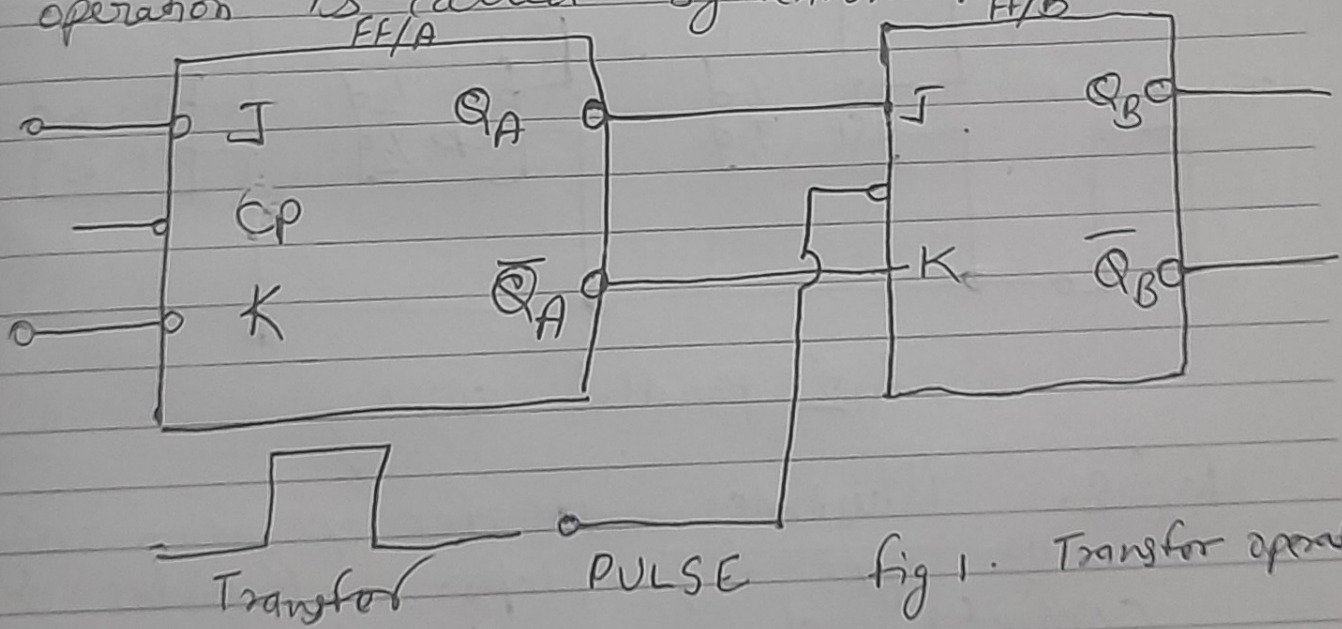


fig 1. Transfer operation

Shift-Register: - Sets of flip-flops that are used to store some particular group of 0's and 1's, i.e. a binary number are called registers. There must be

DATE / /

one flip-flop for each bit in the binary number. For example, a register used to store a 4-bit binary number must have four flip-flops. These flip-flops must be connected such that the binary number can be entered (shifted) into the register and possibly shifted out. A group of flip-flops connected to provide shifting in or out is called a shift register.

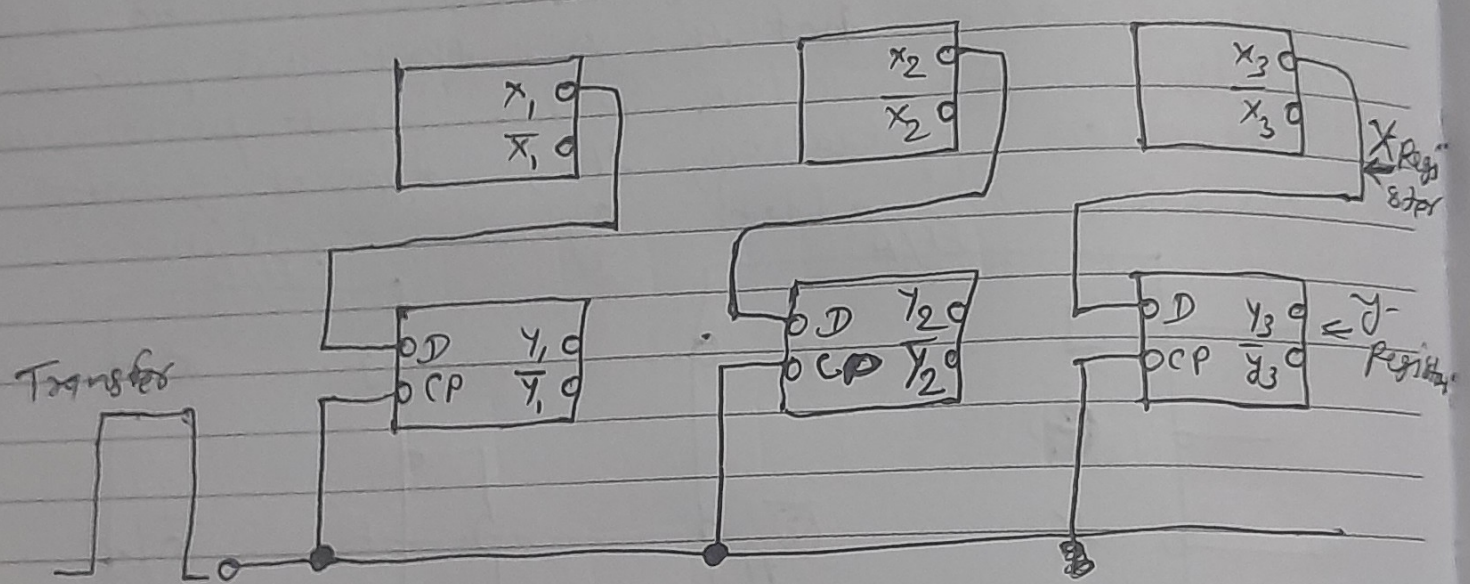


fig 2 Parallel shifting

fig 2. illustrates transfer operation using D type flip-flops. Register X consists of three flip-flops X_1 , X_2 and X_3 . Register Y consists another set of three flip-flops Y_1 , Y_2 and Y_3 . Soon as the transfer pulse is applied, the data stored in X, is transferred

to Y_1 , from X_2 to Y_2 and from X_3 to Y_3 . This data stored in X_1, X_2 and X_3 are

transferred simultaneously into Y_1, Y_2 and Y_3 . This type of shifting is called parallel shifting. There may also be series shifting in which contents of X -register would be transferred to Y -register - one bit at a time, beginning with either the LSB or MSB. Thus there are two ways to shift the data into a register, namely parallel and series, and similarly there are two ways to shift the data out of the register. In this way, there can be following configurations:

- (i) Serial in - serial out, (ii) Serial-in - parallel out
- (iii) parallel in - serial out,
- (iv) Parallel in - parallel out.