AKTU

GATEWAY CLASSES

Digital System Design

B.Tech. 3rd Sem

EC & Allied



Exam/Result Oriented Content

- ✓ Recorded Video Lectures
- ✓ Pdf Notes
- ✓ PYQs

DIGITAL SYSTEM DESIGN

UNIT 3 : Sequential logic design

Lec 3

Today's Target

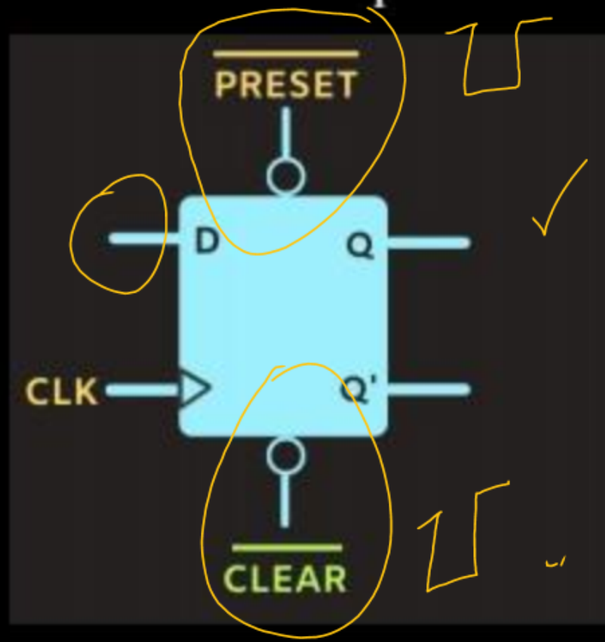
- Preset and Clear inputs of flip flop
- Digital Registers
- Bidirectional Shift Registers
- Universal Shift Register
- University Questions

UNIVERSITY QUESTIONS

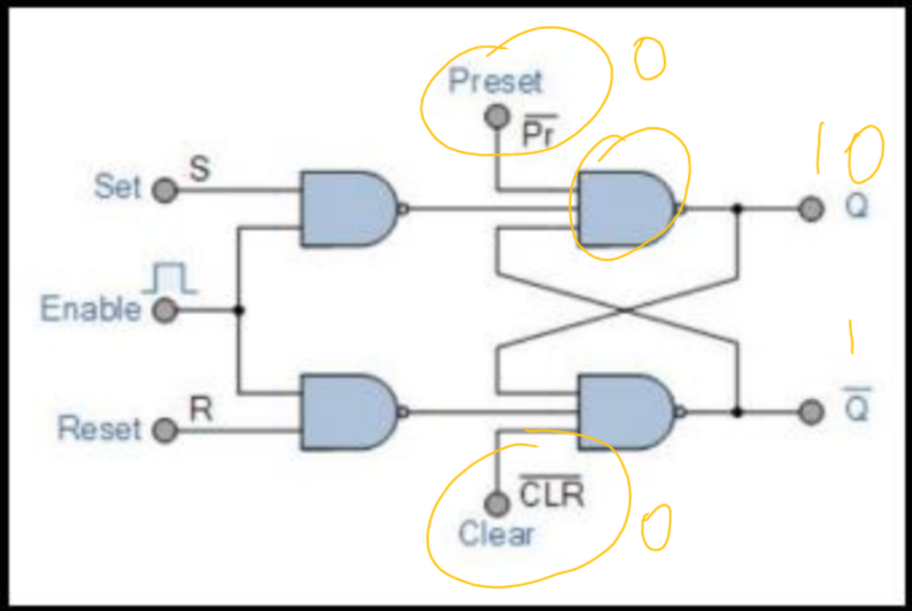
YEAR	QUESTIONS	MARKS
21-22	Distinguish between shifter and barrel shifter?	2 Marks
21-22	What do you mean by shift register? What is the need of shift register? Draw and explain bidirectional shift register.	7 Marks

Preset and Clear inputs of flip flop

- Preset and clear inputs are called **Asynchronous inputs** as they act on the flip flop independent of the clock.
- The preset input is used to set the Flip flop to 1
- The clear input is used to set the Flip flop to 0
- If both preset and clear is low at the same time, the o/p of flip flop states becomes X. (Don't Care)
- If both preset and clear is high at the same time, the o/p of flip flop is controlled by clock and JK inputs



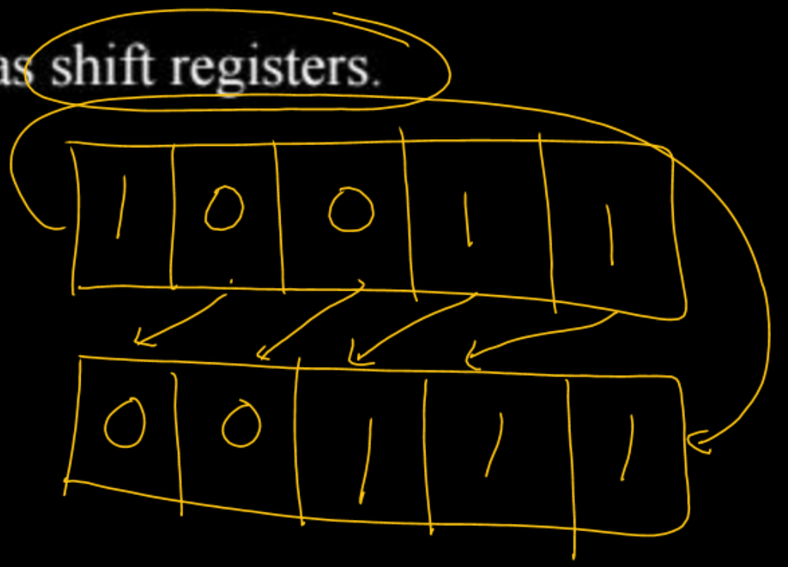
CLK	PRE	CLR	D	Q n+1
X	0	0	X	Invalid
X	0	1	X	1
X	1	0	X	0
0	1	1	X	Q n
↑	1	1	0	0
↑	1	1	1	1

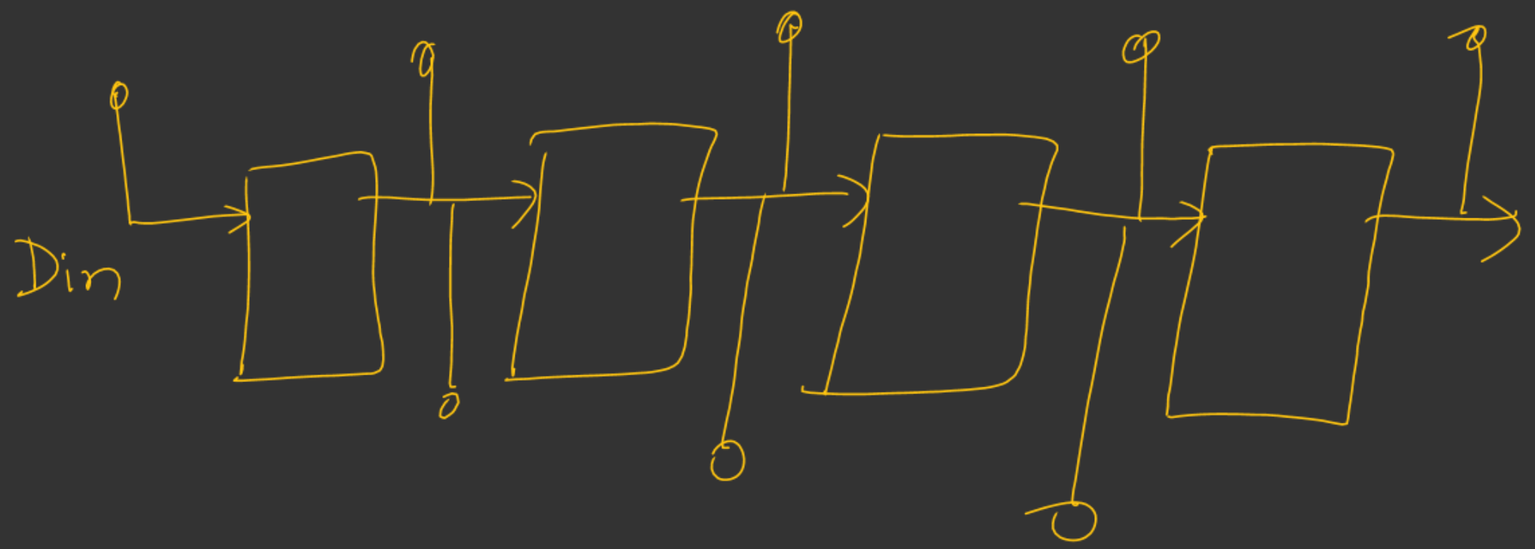


Digital Registers

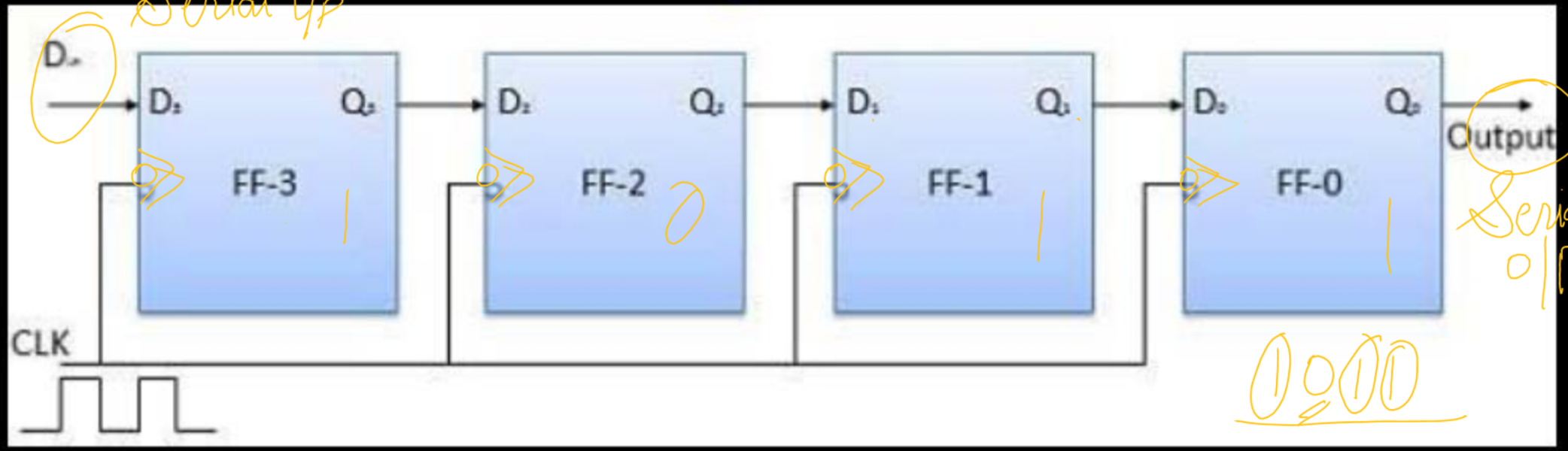
Shift Register

- Flip-flop is a 1 bit memory cell which can be used for storing the digital data.
- To increase the storage capacity in terms of number of bits, we have to use a group of flip-flop. Such a group of flip-flop is known as a Register.
- The n-bit register will consist of n number of flip-flop and it is capable of storing an n-bit word.
- The binary data in a register can be moved within the register from one flip-flop to another.
- The registers that allow such data transfers are called as shift registers.
- There are four mode of operations of a shift register.
- Serial Input Serial Output — SISO
- Serial Input Parallel Output — SIPO
- Parallel Input Serial Output — PISO
- Parallel Input Parallel Output — PIPO



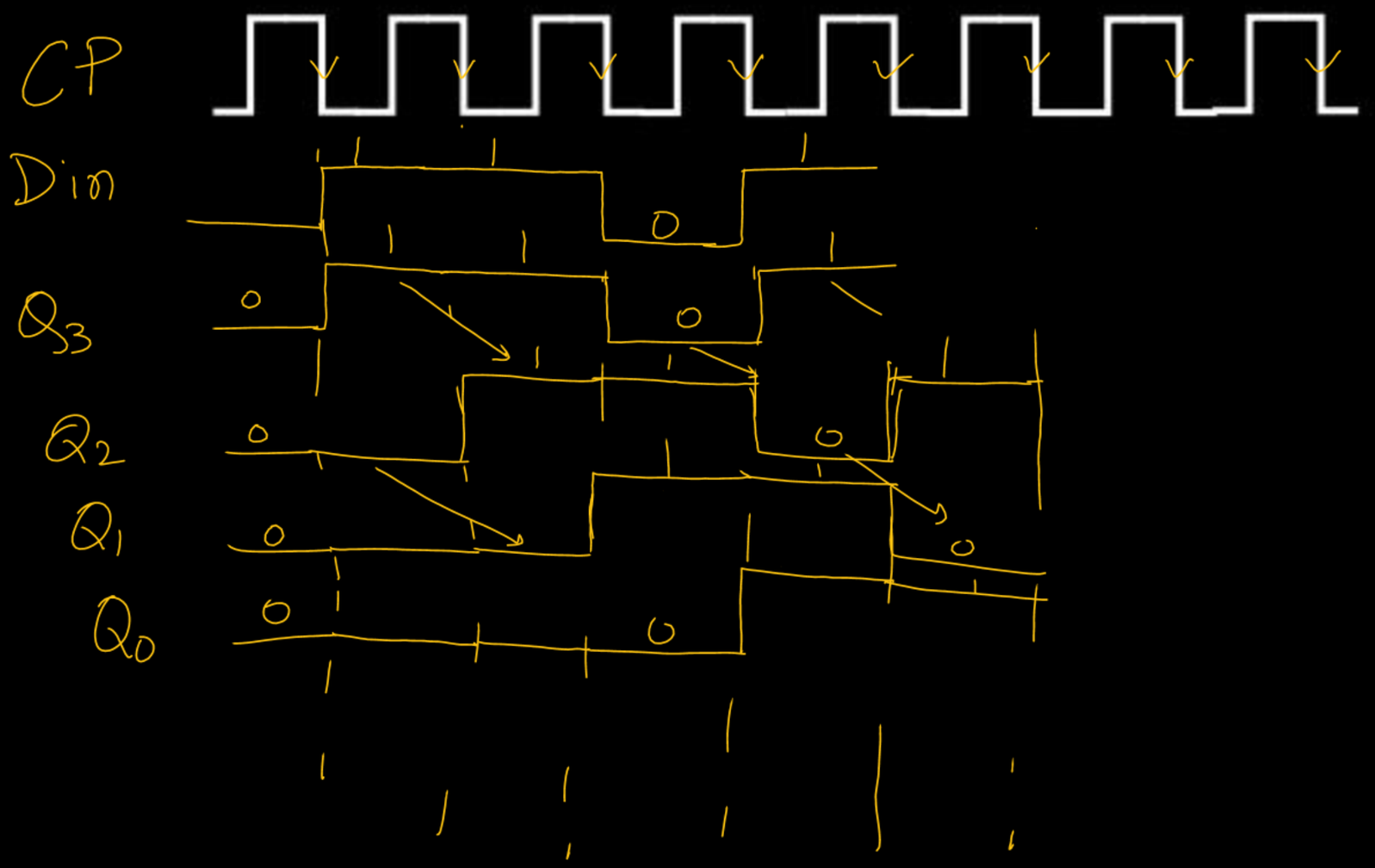

Din

Block Diagram & Truth Table



Initially	CLK	D_{in}	Q_3	Q_2	Q_1	Q_0
			0	0	0	0
(i)	↓	1	1	0	0	0
(ii)	↓	1	1	1	0	0
(iii)	↓	0	0	1	1	0
(iv)	↓	1	1	0	1	1

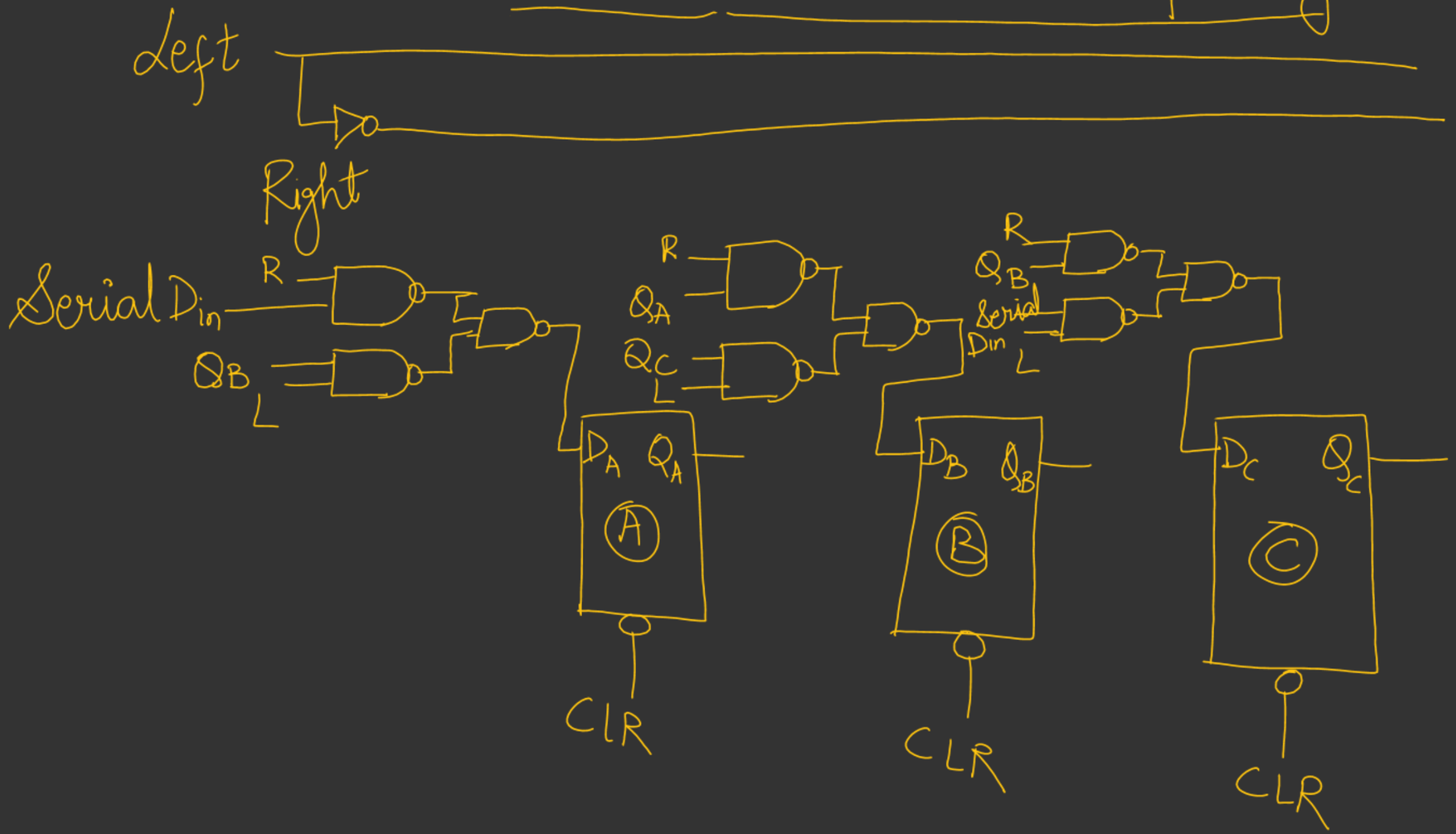
Waveforms



Bidirectional Shift Registers

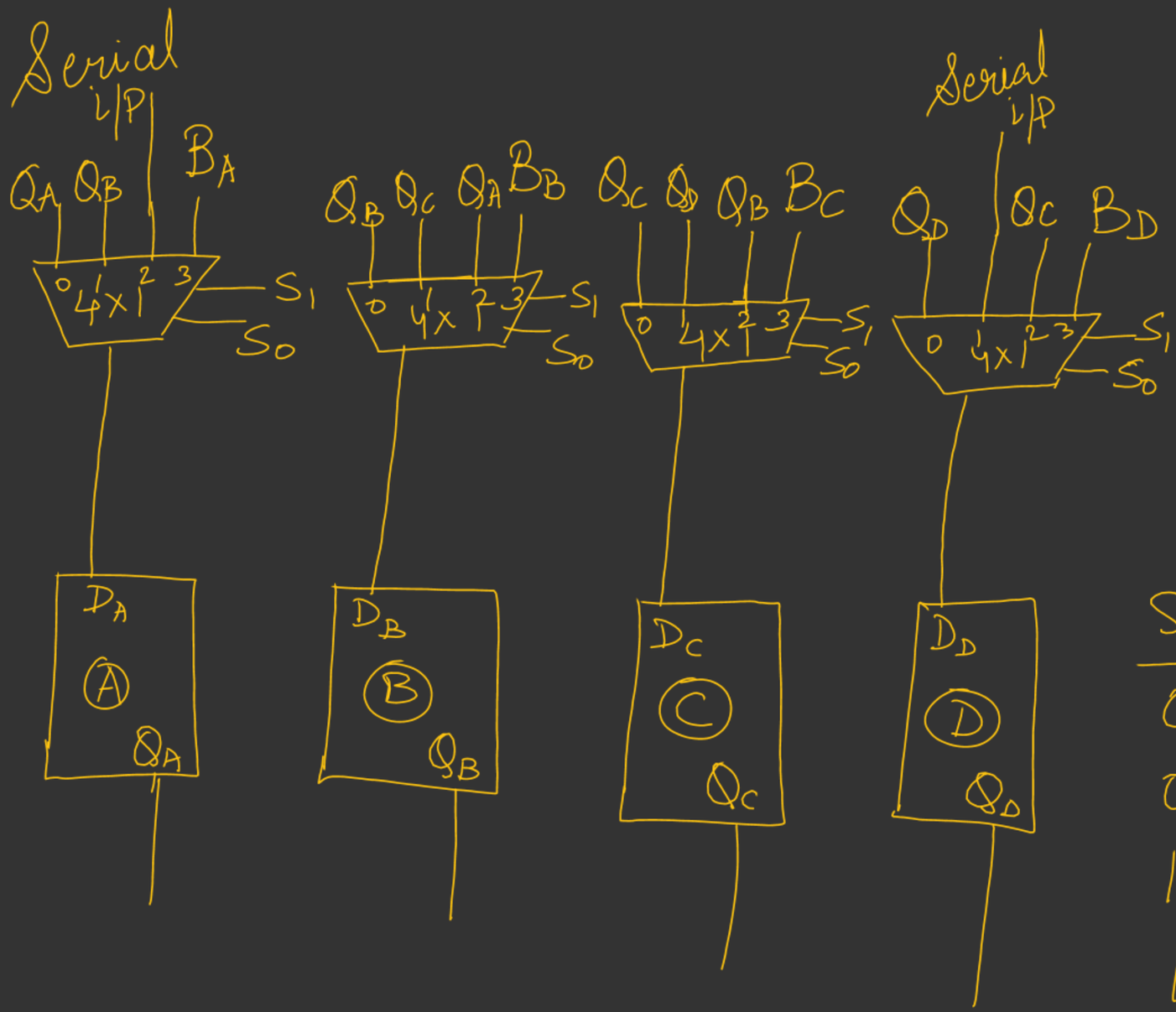
- Shift registers could either perform right or left data shift, or both depending on the kind of shift register and their configuration.
- In right shift operations, the binary data is divided by two.
- If this operation is reversed, the binary data gets multiplied by two.
- With suitable application of combinational logic, a serial shift register can be configured to perform both operation.
- The control line left/write is used to determine the direction to which data is shifted, either right or left.

3 Bit Bidirectional Shift Reg



Universal Shift Register

- A Universal shift register is a register which has both the right shift and left shift with parallel load capabilities.
- Universal shift registers are used as memory elements in computers.



S_1	S_0	Operation
0	0	No change
0	1	Left Shift
1	0	Right Shift
1	1	Parallel Load

GATEWAY CLASSES

AKTU Full Courses (Paid)

Download Gateway Classes Application

From Google Play store

All Subjects

Link in Description

Thank You