INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY
DELHI

Department
of
Electronics & Communication Engineering

ECE111|Digital Circuits
Section: B

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21.03.22

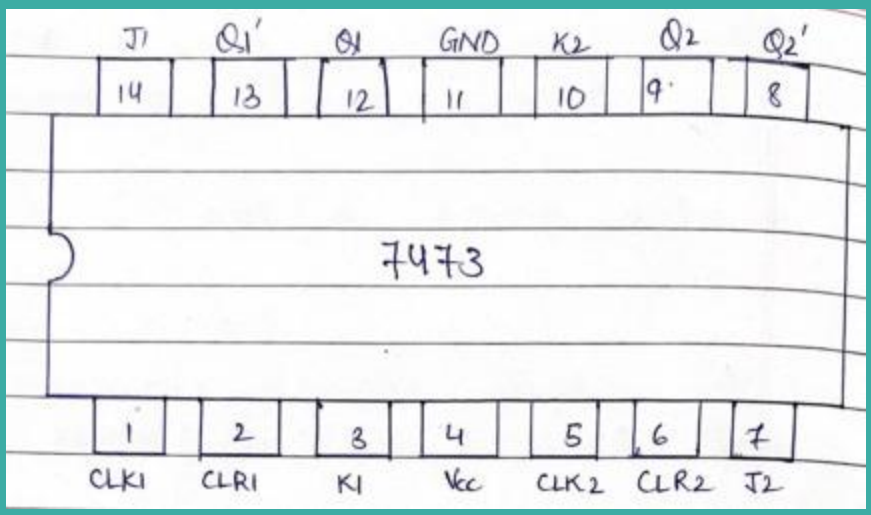
Part A

Aim: To create a JK flip flop and find the output for the given sequence

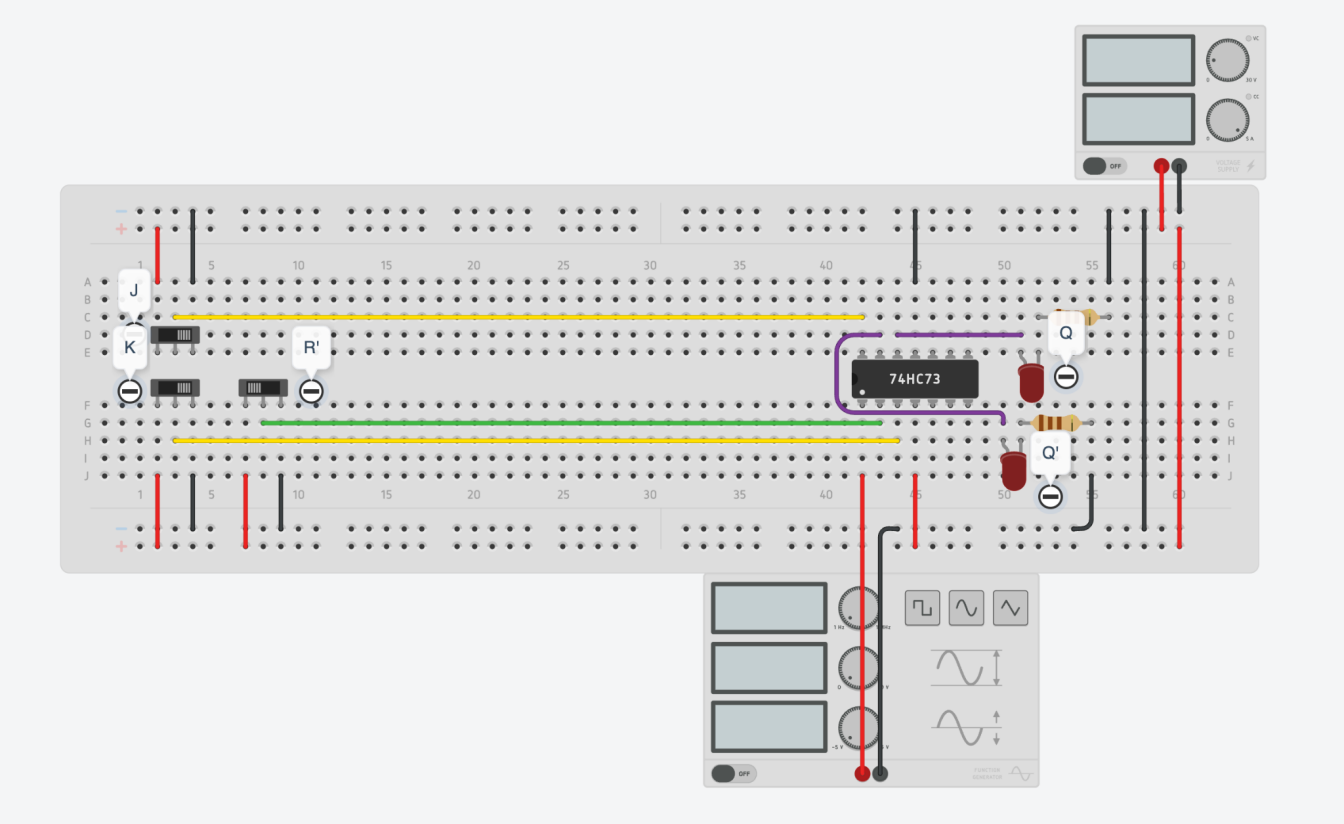
Components/ICs Used: Breadboard, wires, LEDs, resistors, slide switches, power supply, JK Flip Flop, function generator

Link of TINKERCAD Workspace:
https://www.tinkercad.com/things/0UctMx8bk8X-stunning-habbi-jaban/editel?sharecode=iUqnAIXEEhRW4ou0dHtdSSbQ66fy9Ia2eeKoolR4R0Y

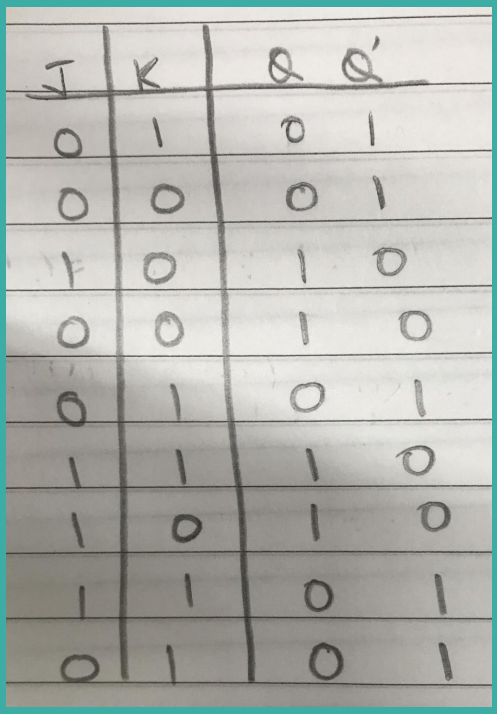
Pin Diagram of the IC:



Circuit Diagram:



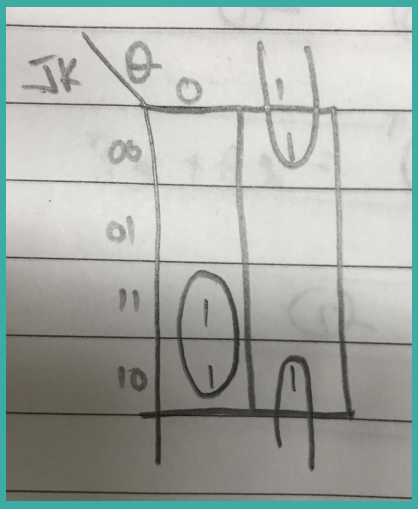
Truth Table:



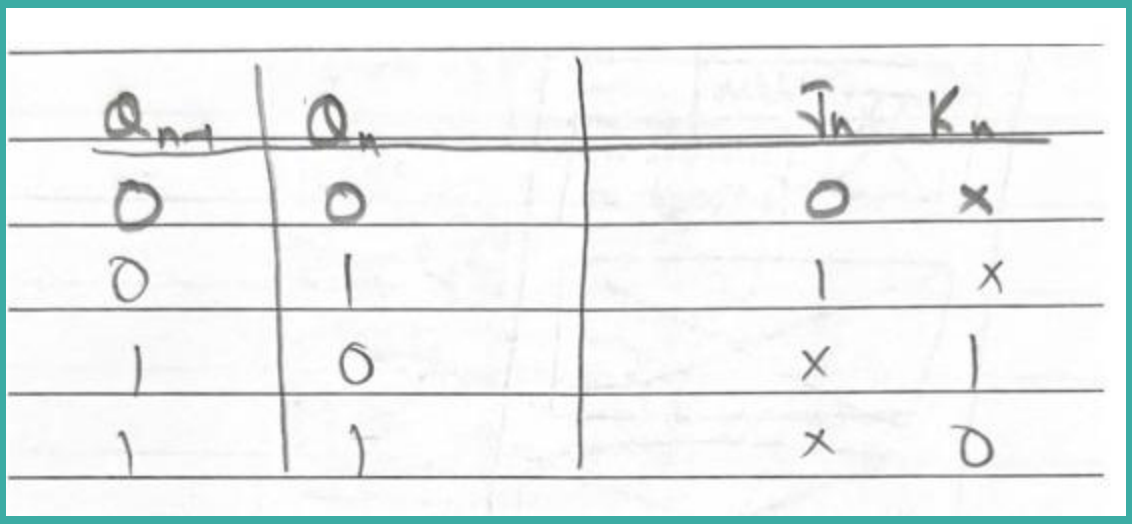
J	K	Q	Q'
0	1	0	1
0	0	0	1
1	0	1	0
0	0	1	0
0	1	0	1
1	1	1	0
1	0	1	0
1	1	0	1
0	1	0	1

Characteristic equation:
$Q_n = JQ_{n-1}' + K'Q_{n-1}$

K maps:



Excitation Table:



Observations/Results: The working of JK flip flop is seen and the output for the given sequence is obtained

Application:

- JK flip flop is used to store a bit of data
- JK flip flop fixes the invalid state of SR flip flop

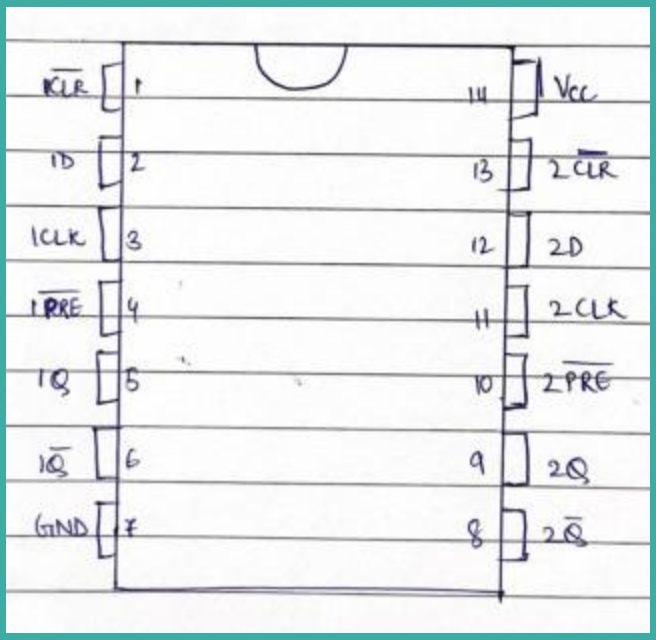
Part B

Aim: To check the outputs of D flip flop

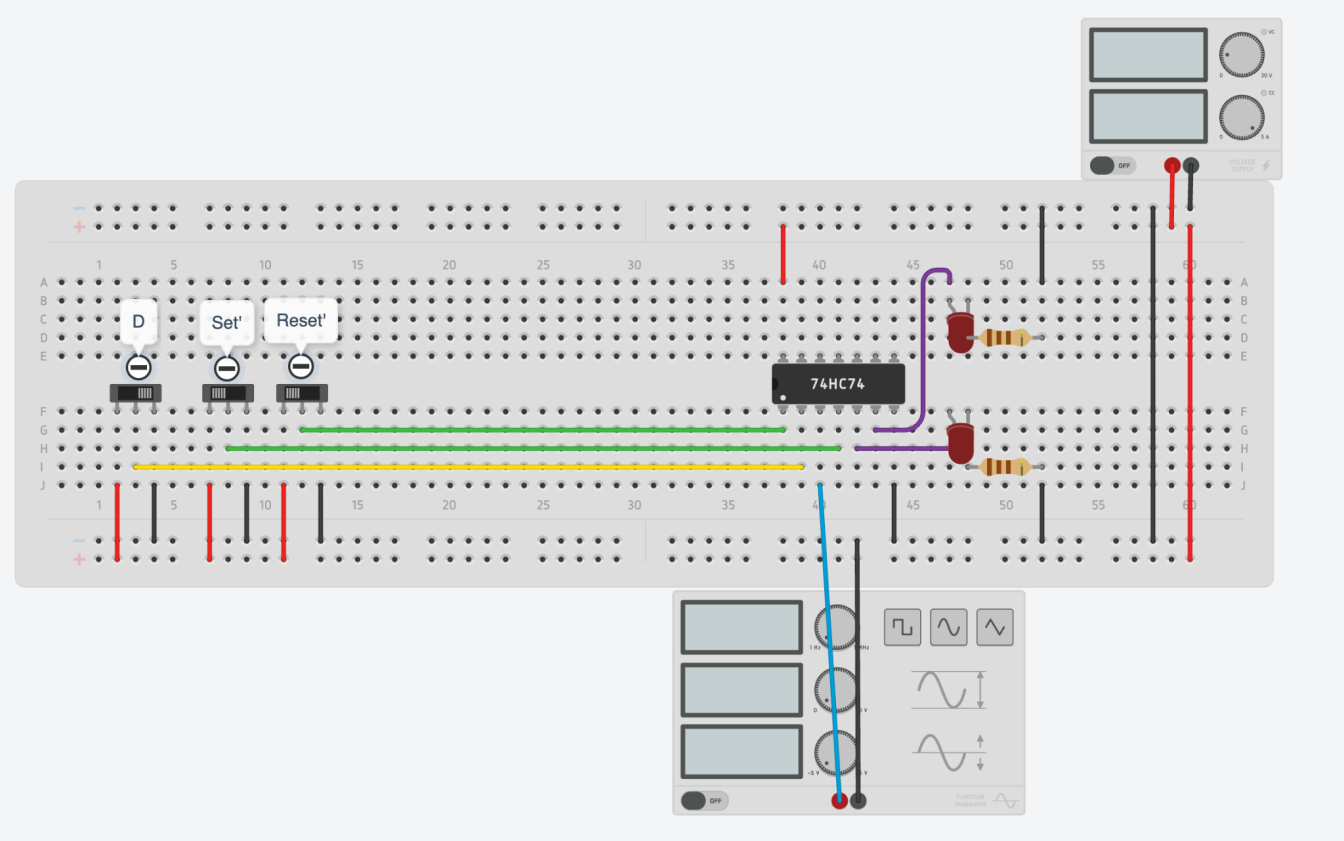
Components/ICs Used: Breadboard, wires, LEDs, resistors, slide switches, power supply, D flip flop, function generator

Link of TINKERCAD Workspace:
https://www.tinkercad.com/things/d4VacHJP32q-exquisite-fyyran/editel?sharecode=FEU0mPDTKKIe48yLwtPq5QNden13q9HwummrRB9Lk-Q

Pin Diagram of the IC:



Circuit Diagram:

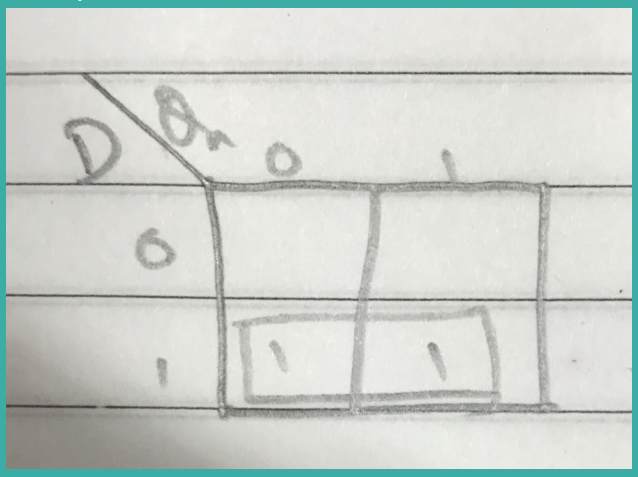


Truth Table:

Set'	Reset'	D	Clk	Q	Q'
0	1	ϕ	ϕ	1	0
1	0	ϕ	ϕ	0	1
0	0	ϕ	ϕ	1	1
1	1	1	↑	1	0
1	1	0	↑	0	1

Characteristic equation:
$Q_n = D$

K maps:



Observations/Results: The working of D flip flop is seen

Application:

- D flip-flop can be used to create delay-lines which are used in digital signal processing systems.
- D flip-flops used as data synchronizers