Tutorial 6
Sequential Circuit

CO 2206 Computer Organization

Task 1

- A sequential circuit with two D flip-flops, A and B; two inputs x and y, and one output z, is described by the following input and output equations:
  - A(t+1) = x'y + xA
  - B(t+1) = x'B + xA
  - z = B

a. Is the design in Mealy or Moore model?

b. Draw the diagram for the circuit.

c. Derive the state table.

d. Derive the state diagram.

Task 2

- For the state table shown in next slide:
  a. Can the circuit be designed with Moore model? Why?
  b. Extend the table for design using JK flip-flops.
  c. Derive the flip-flop input equations and output equation.
  d. Draw the circuit diagram for the above design.

Task 2 (State Table)

Present State		Inputs		Next State		Output
A	B	X	Y	A(t+1)	B(t+1)	Z
0	0	0	0	0	0	0
0	0	0	1	0	1	0
0	0	1	0	1	0	1
0	0	1	1	1	1	1
0	1	0	0	0	1	1
0	1	0	1	1	0	1
0	1	1	0	1	0	0
0	1	1	1	0	0	0
1	0	0	0	1	1	1
1	0	0	1	1	1	0
1	0	1	0	1	1	1
1	0	1	1	1	0	0
1	1	0	0	0	0	0
1	1	0	1	0	0	1
1	1	1	0	0	0	0
1	1	1	1	0	1	1

Task 3

- **Task 3:** Design a sequential circuit with two D flip-flops A and B and one input X. When X = 1, the state of the circuit remains the same. When X = 0, the circuit goes through the state transitions from 00 to 10 to 11 to 01, back to 00, and then repeats.