

# FSM design

**You need to be alert to (usually minor) changes that may be made to the assignment statement or to the guidelines after the assignment is first put up. Refresh this frame and re-read the assignment carefully before you make your final submission.**

## Assignments

1. Design a Finite State Machine (FSM) that will take an arbitrary-sized integer as input, one bit at a time (starting from most significant bit), and return the remainder after this integer is divided by 3.
2. A controller for an elevator is to be designed. The elevator can be at one of two floors: Ground or First. There is a pair of buttons in the elevator cabin: Up or Down. Also, there are two lights in the elevator that indicate the current floor: Red for Ground, and Green for First.

At each time step, the controller checks the current floor and current input, changes floors and lights in the obvious way. Assume that the controller checks only one button at a time. However, the button stays pressed long enough to be sampled by the controller before it is released.

Draw the FSM diagram, develop a representation of the states and the alphabet symbols. Form the truth tables for the NS and output functions. Give a complete realisation of the FSM.

3. Build an electronic combination lock with a reset button, two number buttons (0 and 1), and an unlock output. The combination should be 01011.

4. Design the FSM controller for a vending machine. All selections are for Rs 30. The machine makes change (five and ten rupees only.)

Inputs: limit 1 per clock (when output is not active)

- F: Five rupees coin inserted
- X: Ten rupees coin inserted
- T: Twenty rupees coin inserted

Outputs: limit 1 per clock

- DC: dispense can
- DF: dispense five rupees coin
- DX: dispense ten rupees coin

## Marking guidelines

Assignment marking is to be done only **after** the deadline expires, as submissions gets blocked after the assignment is marked. Enter the breakup of marks while marking.

Common to all designs: DFF	
Correctly working circuit	7
Report of design	3
Each design	
Correctly working circuit	10
Report of design	5
<b>Total Marks</b>	<b>70</b>

## Assignment submission

A PDF report, as appropriate, should be submitted. Submit all your files together.

Use electronic submission via the [WBCM link](#)

You should keep submitting your incomplete assignment from time to time after making some progress, as you can submit any number of times before the deadline expires. **You should submit all your files together.**

## Warning

Cases of copying will be dealt with seriously and severely, with recommendation to the Dean to de-register the student from the course.