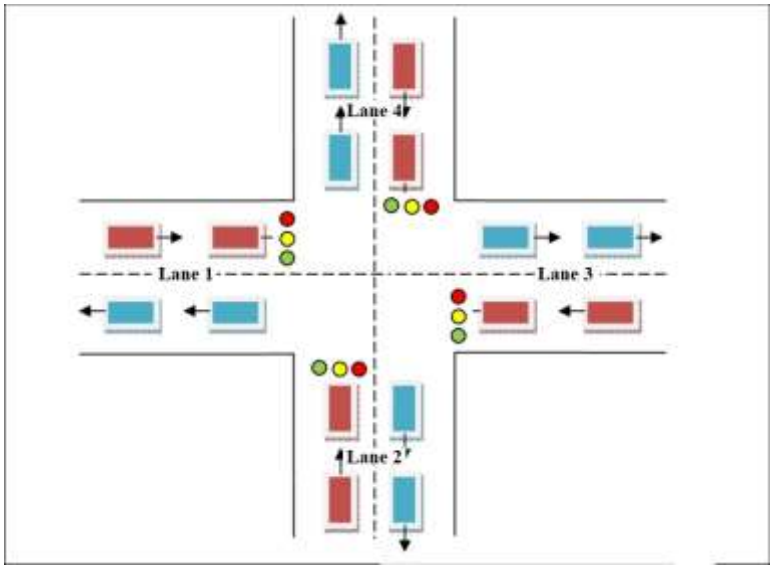
HITEC University, Taxila
Department of Computer Engineering

BS Computer Engineering Program

Course Title:	**EC-341: Digital System Design (3+1)**
Batch / Semester:	Batch 2020 / 6th Semester
Instructor:	Dr Imran Ashraf, Lab Engr. Fasih Ahmad
Target CLOs:	CLO5: Work in a team to build laboratory project and Demonstrate your work. [Psychomotor, P3, Affective, A3]

Lab Project

Traffic Control System



Your task is to design a state machine for a traffic control system for a 4 way road interchange, the state machine should follow the mentioned aspects of the system

1. Transitions must be in sequence, i.e. L1 -> L2 -> L3 -> L4
2. Resetting the system will bring the state machine to its *rst state*, where all the roads will be blocked until reset is released
3. Each Lane must get its **movement time** (*green lights on*)
4. Between each transition, there must be **clearance time** i.e. *red light* must be on for a short amount of time of both lanes
5. Lane 1 and Lane 3 are busy roads (main roads) so they should get larger **movements time**
6. Delay time for each light is given in the following table

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Lane	Movement time (clock cycles)	Stop Time (clock cycles)	Yellow Time (clock cycles)	Clearance Time (clock cycles)
L1 & L3	30	30	5	5
L2 & L4	20	30	5	5

You can get an idea by observing the following table

State	Input	Time Duration (clock cycles)	L1	L2	L3	L4
RST	rst = 1	∞	R1	R2	R3	R4
S0	rst = 0	30	G1	R2	R3	R4
S1	rst = 0	5	Y1	R2	R3	R4
S2	rst = 0	5	R1	R2	R3	R4
S3	rst = 0	30	R1	G2	R3	R4
S4	rst = 0	5	R1	Y2	R3	R4
S5	rst = 0	5	R1	R2	R3	R4
S6	rst = 0	30	R1	R2	G3	R4
S7	rst = 0	5	R1	R2	Y3	R4
S8	rst = 0	5	R1	R2	R3	R4
S9	rst = 0	30	R1	R2	R3	G4
S10	rst = 0	5	R1	R2	R3	Y4
S11	rst = 0	5	R1	R2	R3	R4

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Deliverables

You need to submit the report, presentation and working source-code. Following should at least be the following contents of the deliverable to clearly communicate your analysis, design and implementation.

1. Truth Table
2. State Transition Diagram
3. Verilog Code (to be attached with Report)
4. Simulation Waveform (screenshots to be attached with Report)

Presentation

1. Not more than 10-slides in ppt.
2. Block Diagram
3. Flow Chart
4. Detailed analysis (area estimation) and State Machines
5. Other details, challenges, important things you encountered

Due Date: 8th June, 2023