General Sir John Kotelawala Defense University
Faculty of Computing
Department of Computer Engineering

2.3

BSc (Hons) in Computer Engineering
Laboratory Practical
ET1102- Basic Electronics

Experiment #3 Combinational and Sequential Logic Circuit

Name:

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Index No

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Intake

………………………………………………………………………………………

Date

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Instructor Name and Signature:

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Comments   ……………………………………………………………..

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Grade

Objectives:

After successfully completing this experiment you would be able to;
   (a) Get familiar with Logic Gates and Flip Flops in commercially available ICs.
   (b) Identify the pin connections of ICs using data sheets.
   (c) Build simple combinational and sequential circuits.
   (d) Use logic probe to check the logic level in digital circuits.
   (e) Use logic Pulser to apply clock pulses.

Equipment required: **Components required:**

+5V Dc power supply	IC 7400
Waveform Generator	IC 7486
Logic Probe	IC 7473 (2 nos)
Protoboard	LEDs (6 nos)
Logic Pulser	1.2K resistor

Procedure :

a) **Full Adder**

Full Adder has 3 inputs and 2 outputs. A_i and B_i are the two binary bits to be added and C_{i-1} is the Carry coming from the i-1th bit. Two outputs are Sum and Carry for the ith bit.
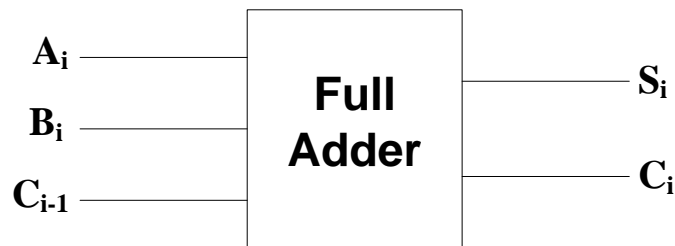
➢ Draw the Truth Table for the full adder and obtain expressions for S_i and C_i.

| A_i	B_i	C_{i-1}	S_i	C_i

S_i =

C_i =

➢ Build a full adder using XOR gates and NAND gates. You may use the data sheets provided to find the pin connections of the ICs.

➢ Verify the Truth Table for the full adder by giving inputs and measuring the output with the logic probe.

b) Sequential Circuits with a moving band of lights.

➢ Connect the following circuit using JK Flip Flops. You may use the data sheets provided to find the pin connections of the ICs.
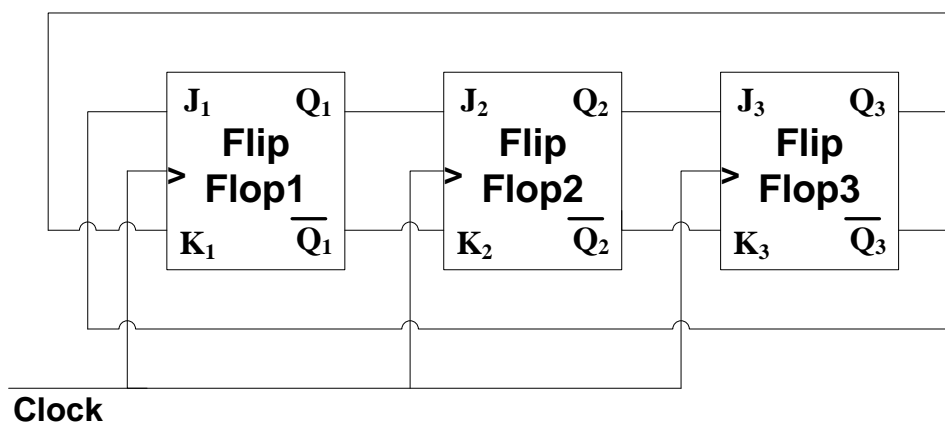
➢ Connect the 6 LEDs to Q_1, Q_2, Q_3, $\overline{Q_1}$, $\overline{Q_2}$, $\overline{Q_3}$ pins respectively. The negative pins of LEDs should be connected together and then connected to ground through the 1.2K resistor.

➢ Connect the clear pins of the flip-flops to ground momentarily and then keep it permanently connected to +5 V.

➢ Apply clock pulses to the clock input of flip-flops using the Logic Pulsar (set the pulsar frequency to 0.5 Hz) and find the sequence of the ON LEDs.

Clock Pulse	LEDs					
	1	2	3	4	5	6

> Apply a pulse train of + 5V amplitude and 10 Hz frequency to the clock input of flip flops and observe the effect of moving band of lights.

Performance Evaluation

Experiment: Combinational and Sequential Logic Circuit

	Evaluation Aspect	Marks
1	Preparation	
2	Neatness of Work	
3	Familiarity with Lab Equipment	
4	Completion of Work	
5	Capability	
6	Accuracy of Readings/ Observations	
7	Answers given to Questions	
8	Discipline	
	Total	

Marks are awarded on a 0-10 scale for each aspect

Excellent	Very Good	Good	Fair	Poor	Very Poor
10	9 – 8	7 – 6	5 – 4	3 – 2	1 – 0

Name of the Instructor: ……………………………………………………………………

Signature: ………………………………………………………………………………………….

Date: ………………………………………………………………………………………….