

BADRUL ALAM REPORT

by Badrul Alam

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Module	Introduction to Digital Electronics
Module Code	ACDA4016
Assignment Title	Digital Circuit Design
Instructor	Stalin Jacob
Submission Due	May 11,2023



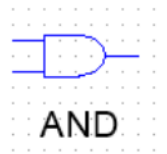
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1. <u>Generate the Logic symbols and truth tables</u>	Error! Bookmark not defined.
2. <u>Design a logic circuit using a software</u>	Error! Bookmark not defined.
3. <u>Determine the Boolean expression for the circuit</u>	Error! Bookmark not defined.
4. <u>Design a 4 bit Synchronous counter circuit using Porteous software</u> ...	Error! Bookmark not defined.
5. <u>Types and Application of Sequential Circuits</u>	7

1. Get the Logic symbols and truth tables for the following

a) An AND gate.

Logical Symbol



Truth Table

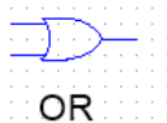
A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

Logical Expression

$$\text{Output} = A \cdot B$$

b) A OR gate.

Logical Symbol



Truth Table

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

Logical Expression

$$\text{Output} = A + B$$

c) A XOR gate.

Logical Symbol



Truth Table

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0

Logical Expression

1	1	0
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$$\text{Output} = A \oplus B$$

d) **A NAND gate.**

Logical Symbol



Truth Table

A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0

Logical Expression

$$\text{Output} = \overline{A \cdot B}$$

e) **A NOR gate.**

Logical Symbol



Truth Table

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

Logical Expression

$$\text{Output} = \overline{A + B}$$

2. Design  5 ic circuit using a software for the following equations

a) $Y = (\overline{A}B)C + \overline{A}B\overline{C} + \overline{A} + \overline{C}$

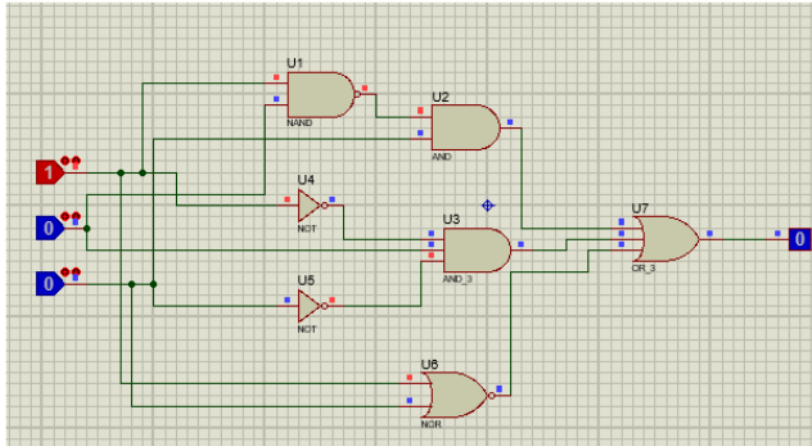


Figure 1: Circuit diagram

b) $Y(A, B, C, D) = \sum_m(0, 1, 5, 6, 9)$

 6

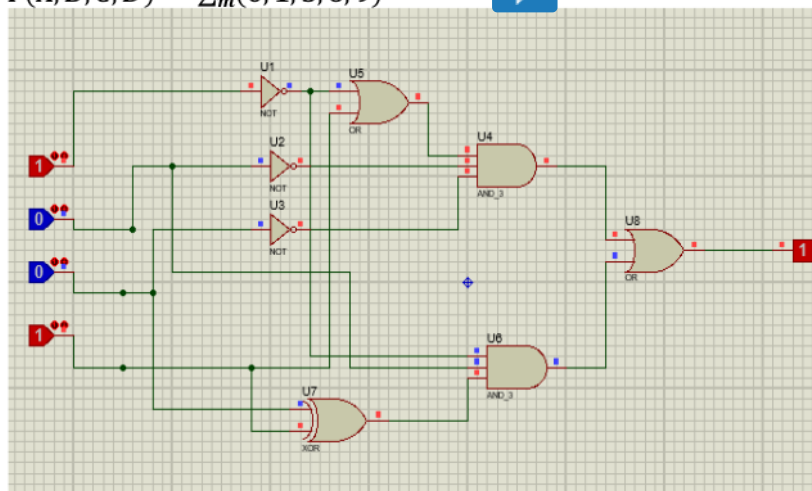


Figure 2: Circuit diagram

3.  7 Determine the Boolean expression for the circuit shown below. Simply the Boolean expression and design circuit for the simplified equation using the software. Draw the truth table for the same.

Logical Expression:

$$Y = (\overline{A'} + \overline{B'}). B.C$$

Modified Logic Expression:

$$Y = A.B.C$$

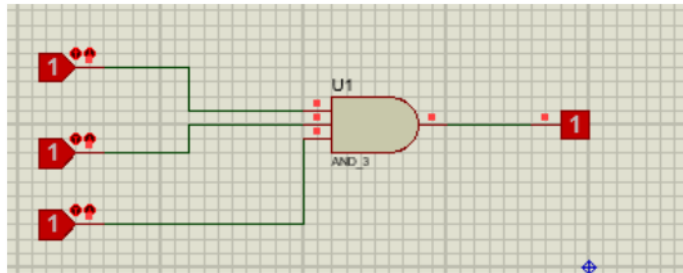


Figure 3: Circuit diagram

Truth Table

A	B	8	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

4. Design a 4 bit Synchronous counter circuit using Porteous software. Draw a truth table for the input and outputs.

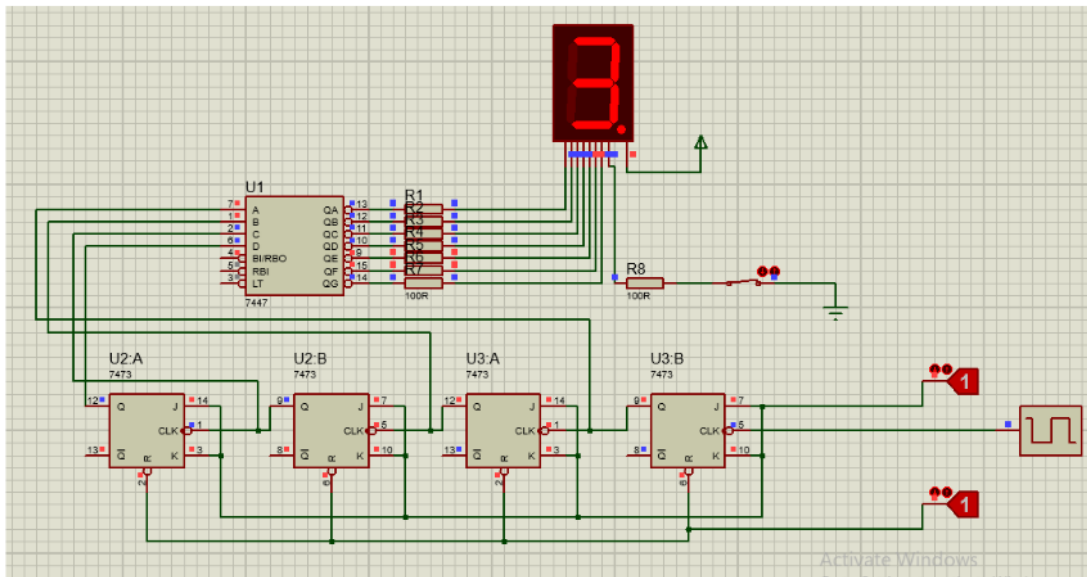


Figure 4: Circuit diagram

Truth Table:

Count	A	B	C	D
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0

15	1	1	1	1
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5. Describe the types and applications of Sequential Circuits.



digital circuits that are able to hold the previous state and their output is dependant on current as well as previous state are known as sequential circuits.

Types.

There two main types of sequential circuits

Synchronous that uses additional clock or level input to drive the circuit functionality.

Asynchronous circuits do not use the additional input clock instead such circuit are being driven by pulses of inputs.

Applications

Applications of Sequential Circuits lies in developing the memory units like

- Registers
- Flip flops
- ADC Converters
- Digital Counters and clocks
- Registers in Microprocessors and Controllers.

BADRUL ALAM REPORT

GRADEMARK REPORT

FINAL GRADE

74/100

GENERAL COMMENTS

Instructor

Engagement with Literature Skills: Marks: 0/0

Knowledge and Understanding Skills: Marks: 19/25

It is evident through task 1 to 5, there is good knowledge and understanding of the basic underlying concepts and principles of the Digital Electronics Module. However, it would have been better if you have described the output functions for each combinations of the input.

Cognitive and Intellectual Skills: Marks: 16/25

Good evaluation of the underlying concepts and principles is evident through the truth tables provided. However, it is better to have a brief evaluation report for each task, which is lacking in task 1 to 4.

Practical Application Skills: Marks : 36/45

A very good understanding and appropriate knowledge to apply the suitable tools in Digital Electronics module is evident. Logic circuits has been designed for set of tasks from 1 to 4. The screenshot of the outputs for various input combinations are not provided for task 1 to 4

Transferable Skills for Life and Professional Practice: Marks : 3/5

Work is properly presented with a continuation in flow of information. Needs improvement in preparing the report, as the report should be well structured and properly aligned to the assignment guidelines.

Total: 74/100



Comment 1

Task 1: 16/20

Task 2: 20/30

Task 3: 16/20

Task 4: 16/20

Task 5: 6/10

Total: 74/100



Comment 2

Good Attempt, the first page or the title page of the report should have the name, student ID, Module Name, Module code, Title of the Coursework, programme of study. Most of these are in the title page, but however few are missing.



Comment 3

Page number to be added correctly



Comment 4

Good Work, Design of various logic gates and the truth table for each gate is good. It would have been better if a brief description is added.

Task 1: 16/20



Comment 5

Good Attempt, the design part is good. It is evident, that you can design circuits using software,. It is better to have outputs in the circuit screen sort and a brief description about the background of the design.

Task 2: 20/30



Comment 6

Good, Name the circuit diagram with different names, (Both the pictures are named as circuit diagram)



Comment 7

The simplified Boolean expression is correct. The truth table for the simplified circuit is correct. It would have been better if a brief description is included

Task 3: 16/20

PAGE 6



Comment 8

It would have been better if the table is number and Named.



Comment 9

The design of circuit diagram is good. The truth table is also correct. However, it is better to include few description

Task 4: 16/20

PAGE 7

PAGE 8



Comment 10

Good Description, The different types of sequential circuits, and the applications of sequential circuits are mentioned. However, it is better to describe with necessary diagrams and references.

Task 5: 610