



Faculty of Computers & Artificial Intelligence

2<sup>nd</sup> Term (2019-2020) Final Exam

Medical Informatics Program - 1<sup>st</sup> Year

Course Code: MCS121

Course name: Logic Design

Research submission: From 31 May to 7 June 2020



Benha University

Final Date: 7 / 6 / 2020

Total Marks: Pass / Fail

Examiner(s): Prof. Hala Helmy Zayed

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**Write a research project with the following specifications:**

Logic gates and circuits are used in many applications everywhere around us. In this project, it is required from you to search and think of some applications which should give a sense of how number systems and codes, combinational circuits and sequential circuits are used in the digital world.

You are required to choose **only four** of the following fields to give **one simple** digital application **for each** field (a total of **four applications**):

1. A control system which could be used in a hospital.
2. A factory safety system.
3. An elevator control.
4. A digital clock.
5. An automobile parking control.
6. A traffic light controller.
7. A digital game
8. A system that can help to combat coronavirus pandemic.

In each of the **four applications**, you should:

1. Draw a **clear diagram** of the application (**copied** diagrams are **not** allowed and will have no credit).
2. Illustrate in your own words how it works.
3. Give the function table or truth table of the application and its main components.
4. Illustrate the type of input and output.
5. If your design includes a block diagram of a combinational circuit (e.g., decoder, encoder, multiplexer, adder, ....) or a sequential circuit (e.g., flip-flop, counter, ....), you should give and explain its function table and role in the suggested application.

The **four applications should cover together** and use the following elements:

1. A number system or digital code.
  2. One or more of the basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR).
  3. One or more of the following combinational circuits (decoder, encoder, multiplexer, demultiplexer).
  4. One or more of the following arithmetic circuits (adder, subtractor, comparator, parity circuit).
  5. A flip-flop or latch.
  6. A counter circuit (synchronous or asynchronous).
- The research project report should be of minimum **6** pages and maximum **12** pages.

**GOOD LUCK,**

**Examiner(s)**  
**Prof. Hala Helmy Zayed**

**Program Coordinator**  
**Prof. Tarek Sheshtawy**