International University - VNUHCM
School of Electrical Engineering

Final Examination

Date: 26 January 2024; Duration:120 minutes

Only lecture notes and student notes are allowed during the exam.

SUBJECT: Digital Logic Design (EE053IU)	
Approval by the School of Electrical Engineering Signature Full name: Vo Tan Phuoc, Ph. D	Lecturer: Signature Full name: Vuong Quoc Bao, Ph. D
Proctor 1 Signature Full name:	Proctor 2 Signature Full name:
STUDENT INFO	
Student name: Nguyễn Anh Ngọc Huy	
Student ID: EEEEIU20	

INSTRUCTIONS: the total of point is 100 (equivalent to 40% of the course)

1. *Purpose:*
   - Analyze typical designs of digital system: combinational logic circuit and sequential logic circuit (G2.1).
   - Derive the state-machine analysis or synthesis to design sequential logic circuits (G3.1).
2. *Requirement:*
   - Students are allowed to use only lecture notes and personal notes.
   - The usage of any electronic devices (laptop, electronic dictionary, cell phones…) is strictly PROHIBITED.

International University – VNUHCM
School of Electrical Engineering

Student Name: Ng... A... Ng... Hg
Student ID: E.E.E.E.I.U.17020

QUESTIONS

Question 1. [20 marks]

Implement the following Boolean expression with a 8-1 Multiplexer:

a) $F = \Pi\,(1,3,4,6,8,9,10,11,12,15)$

b) $F = \sum(0,1,2,4,5,6,8,9,10,11,13,14,15)$

Question 2. [20 marks]

a) What are the basic differences between D Flip-flop and J-K Flip-flop?

b) Draw the truth tables and the operation diagrams of D Flip-flop and J-K Flip-flop.

Question 3. [20 marks]

Design ***an asynchronous counter*** using J-K-Flip Flop that have **M = 8** and can count **UP/DOWN** (using 1 control buttton to control UP/DOWN). Show the way to make it (step by step).

Question 4. [15 marks]

Design ***an asynchronous counter*** using J-K-Flip Flop that have **M = 13** (0->1->2...11->12 and repeat). Show the way to make it (step by step).

Question 5. [25 marks]

a) Convert a J-K Flip Flop into a D - Flip Flop.

b) Design ***a synchronous counter*** using J-K-Flip Flop that can count from **0->1->3->2->6->7->5->4** ->0
1 2 3 4 5 6 7 8
and repeat. Show the way to make it (step by step).