



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING**

EEE 306: DIGITAL ELECTRONICS 2

DATE: WEDNESDAY, 11TH APRIL 2012

TIME: 8.00 A.M. – 10.00 A.M.

IMPORTANT: Instructions to Candidates:

1. ANSWER QUESTION 1 and any other two.
2. You should interpret the questions in the context of the course material.

QUESTION 1 (compulsory)

- a. A combinational circuit is to be designed using ROM. The circuit accepts a 3-bit number and generates an output binary number that is equal to the square of the input number.
Derive the truth table for the combinational circuit. (4 marks)
- b. Identify any three areas where Flash memory finds application. (3 marks)
- c. You are asked to design a half adder circuit using logic gates.
 - i. Develop the truth table of a half adder (3 marks)
 - ii. Write the digital equations for the half adder (2 marks)
 - iii. Draw any two ways through which the half adder circuit can be implemented. (6 marks)
 - iv. What are the advantages that come with VLSI technology (2 marks)
- d. Define the following terms
 - i. Nibble
 - ii. CCD memory
 - iii. Auxiliary memory
 - iv. EEPROM
 - v. TCP/IP

QUESTION 2

- A. Discuss the functionality of digital versatile disc. Expound on its four versions. (5 marks)
- B. Discuss the features that were exhibited in the second generation computers (5 marks)
- C. Name any three output devices. (3 marks)
- D. The functional differences between embedded and distributed operating software (4 marks)
- E. Discuss the functionality of the BIOS (3 marks)

QUESTION 3

- a. Draw the NAND logic diagram for each of the following expressions using multiple-level NAND gate circuits:
 - i. $(AB' + CD')E + BC(A + B)$ (10 marks)
 - ii. $(x + y + z) + xyz;$ (4 marks)
- b. Design a half adder circuit using logic gates (2 marks)
- c. What are the types of TTL logic? (4 marks)
- d. State two advantages and two disadvantages of TTL

QUESTION 4

- a. Discuss the following terms
 - i. Micro computers
 - ii. Operating software
 - iii. CCD memory
 - iv. (8 marks)
- b. Discuss the basic difference between operating software and application software. Give examples of each (4 marks)
- c. Discuss any 4 functions of operating software (4 marks)
- d. What is the difference between sequential and random memory access? Give examples of each (4 marks)

QUESTION 5

A. A combinational circuit is defined by the following three Boolean functions. Design the circuit with a decoder and external gates.

i. $F1 = x'y'z' + XZ$

ii. $F2 = xy'z' + x'y$

iii. $F3 = x'y'z + xy$ (9 marks)

B. Design a combinational circuit that generated the 9's complement of a BCD digit.

(6 marks)

C. Design a combinational circuit that compares two 4-bit numbers A and B to check if they are equal. The circuit has one output x, so that $x = 1$ if $A = B$ and $x = 0$ if A is not equal to

B. (5 marks)
