MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER EXAMINATION

SCHOOL OF SCIENCE AND INFORMATION SCIENCES
UNIVERSITY EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: COM1208
COURSE TITLE: DIGITAL ELECTRONICS

DATE: 3RD MAY 2018 TIME: 8:30AM-10:30AM

INSTRUCTIONS

- Answer Question ONE and any other TWO
- Use of sketch diagrams where necessary and brief illustrations are encouraged.
- Read the instructions on the answer booklet keenly and adhere to them.

This paper consists of 4__ printed pages.

SECTION ONE.

QUESTION ONE: [30 marks]

COMPULSORY

a) Explain the term logic gate. [**1 mark**]

b) Explain the following terms in digital logic.

(i) Canonical form of Boolean Algebra [**2 marks**]

(ii) Literal [**2 marks**]

(iii) MAX term [**2 marks**]

(iv) MIN term **[2 marks]**

c) Represent the function $Z = f(A, B, C) = A\overline{B} + \overline{A}C + \overline{A}\overline{B}C$ in a truth table and simplify it. **[5 marks]**

d) (i) Explain what you understand by term 'Flip-Flop' [**3 marks**]

(ii) Design a Master-Slave Flip-Flop [**5 marks**]

e) Outline <u>two</u> applications of multiplexers in our day to day technological use. [**4 marks**]

f) Minimize the Boolean function $f(A, B, C) = \overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C} + AB\overline{C} = \sum(0, 2, 4, 6)$ using K-map [**4 marks**]

SECTION TWO.

ATTEMPT ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO: [20 marks]

a) Describe briefly a multiplexer **[3marks]**

b) Design a multiplexer with 8 data inputs and explain its working. **[9 marks]**

c) Convert 111011.011_2 into an equivalent hexadecimal number. **[2 marks]**

d) Subtract $(1100)_2$ from $(1001)_2$ using the 1's complement method. **[2 marks]**

e) Convert $(367)_{10}$ into its Excess-3 code. **[2 marks]**

f) Convert $(101011)_2$ into Gray code. **[2 marks]**

QUESTION THREE: [20 marks]

a) What is Boolean Algebra **[3 marks]**

b) For the following truth table, implement the logic function using gates. **[7 marks]**

Truth Table	
X Y Z	
0 0 0	0
0 0 1	1
0 1 0	0
0 1 1	0
1 0 0	1
1 0 1	1
1 1 0	1
1 1 1	1

c) Simplify the expression $F(A,B,C)=\sum(1,4,5,6,7)$ and implement it using NAND and NOR GATES only. **[10 marks]**

QUESTION FOUR: [20 marks]

a) State the de Morgan's theorems [**4 marks]**

b) Implement the expression $\overline{\overline{A+BC}+\overline{A\overline{B}}}$ **[6 marks]**

c) Reduce the expression $\overline{\overline{A+BC}+\overline{A\overline{B}}}$ using the identities, properties, rules, and theorems (DeMorgan's) of Boolean algebra and implement the reduced expression. **[4 marks]**

d) Explain <u>THREE</u> advantages of the reduced expression over the former.
[6 marks]

End and Good Luck.