MAASAI MARA UNIVERSITY

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

SCHOOL OF SCIENCE
FOR THE DEGREE OF BACHELOR OF SCIENCE IN PHYSICS

COURSE CODE: PHY430
COURSE TITLE: ELECTRONIC CIRCUITRY AND MICROPROCESSORS

DATE: 20TH APRIL 2018 **TIME: 1100 – 1300HRS**

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.

a) Convert
   (i) 25_{10} to binary
   (ii) 01101_2 to decimal (3 marks)
b) State any two characteristics of clocked R-S flip flop (2 marks)
c) Evaluate the following using binary digits (4 marks)
   (i) 111_2+101_2
   (ii) $10110_2-01011_2$
d) Use 1's complement to carry out 0110_2-1110_2 (2marks)

e) (i) Define the term 'Adders' (1 mark)
   ii) Design half adder using NAND gates and draw its truth table (5 marks)
   iii) State the limitations of half adders (2 marks)
f) (i) define the term' flip flop' (1 mark)
   ii) Draw the logic circuit of a latch flip flop and give its truth table (using NAND gates) (5 marks)
g) i) Define the term computer memory (1 mark)
   ii) State functions of RAM (2 marks)
   iii) State characteristics of ROM (2 marks)

QUESTION TWO

a) (i) State the two main types of RAM (2 marks)
   (ii) Differentiate between the above types (2 marks)
b) (i) Give the unique features of the J-K flip flops (2 marks)
   (ii) Draw the circuit diagram for a J-K flip flop (3 marks)
   (iii) Draw the truth table for J-K flip flop (5 marks)

c) Discuss in details, the working of Full Adder logic circuit and extend your discussion to explain a binary adder, which can be used to add two binary numbers. **(6 marks)**

QUESTION THREE

a) With the help of clocked JK flip flops and waveforms, explain the working of a three bit binary ripple counter. Write truth table for clock transitions. **(14 MARKS)**
b) With relevant diagram explain the working of master-slave JK flip flop. **(6 marks)**

QUESTION FOUR

a) What are the main differences between microprocessors and microcontrollers?(3 marks)
b) Briefly explain the basic structure of a microcontroller. (4 marks)
c) In general, assembly instructions can be classified as falling into four main groups of operation. List them below and provide an example for each group of operation. (7 marks)
d) What are the functions of a memory address register and status register in a microprocessor? (4 marks)
e) What is the difference of the sequential memory and random access memory? (2 marks)

END//