JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF

B.Sc. COMPUTER SECURITY AND FORENSIC

1ST YEAR 1ST SEMESTER 2015/2016 ACADEMIC YEAR

KISUMU LEARNING CENTRE

COURSE CODE: SMA 3114

COURSE TITLE: ANALYTIC METHOD FOR COMPUTING

EXAM VENUE: **STREAM: (BSc. Comp. Forensic)**

DATE: 20/04/16 **EXAM SESSION: 9.00 – 11.00 AM**

TIME: 2.00 HOURS

Instructions:

1. **Answer question 1 (Compulsory) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

a) Define function and describe different types of functions (4mks)

b) Let A and B be matrix defined by;

A = $\begin{pmatrix} 1 & 1 \\ 2 & 1 \end{pmatrix}$ and B = $\begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$, Find AB and BA? Is AB = BA (4mks)

c) What are the quotient and reminder when -11 is divided by 3 (3mks)

d) Describe some properties of algorithms. (3mks)

e) What are some properties of a good algorithm? (3mks)

f) Let f be the function from a set {a,b,c} to {1,2,3}such that $f(a) = 2$, $f(b) = 3$, and $f(c) = 1$. Is f an invertible function, and if it is, what is its' inverse (represent the result diagrammatically) (5mks)

g) Given the matrix;

$$B = \begin{pmatrix} 6 & 7 \\ -4 & -5 \end{pmatrix}$$

Find the determinant of matrix B (3mks)

h) Given the following prime factorization;

$2^3 3^5 7^2$ and $2^4 3^3$. Using the prime factorization algorithm of least common divisor (lcm), what is the lcm of $(2^3 3^5 7^2)$ and $(2^4 3^3)$ (5mks)

QUESTION TWO

a) Given the following set of simultaneous equations;

$7x + 2y + z = 21$

$3y - z = 5$

$-3x + 4y - 2z = -1$,

Solve for x, y and z using matrix method (8mks)

b) Let f be the function from the set of integers to the set of integers such that $f(x) = x + 1$. Is function f invertible and if it is, what is the inverse (5mks)

c) Consider matrix A defined by;

$$A = \begin{pmatrix} 7 & 2 & 1 \\ 0 & 3 & 1 \\ -3 & 4 & -2 \end{pmatrix}$$

Find the inverse of matrix A. (7mks)

QUESTION THREE

a) Let f be the function given by $f(x) = x^2$ and g be the function given by $g(x) = x + 3$.

i. Find the composition of g and f, f and g.

ii. Is composition of g and f and f and g the same? Discuss the answer (5mks)

b) Let f_1 and f_2 be the function from R to R such that $f_1(x) = x^2$ and $f_2(x) = x - x^2$. What is

the function $h(x)$ defined by $f_1 + f_2$ (4msk)

c) Find the gcd of 120 and 500 using prime factorization algorithm (show step by step workings) (8mks)

d) Let f be the function from Z to Z with $f(x) = x^2$. Is f invertible function? (3mks)

QUESTION FOUR

a) What is algorithm (2mks)

b) Write an algorithm for finding the maximum element in a finite sequence of integers (5mks)

c) Describe the time complexity of the following algorithm of finding the maximum element in a set;

Procedure max (a_1, a_2, ..., a_n: integers)

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Max = a1
  for i = 2 to n
    if Max < ai then Max = ai
    { Max is the largest element in the set }
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(10 mks)

d) Describe the structure of an algorithm (3mks)

QUESTION FIVE

a) Find the greatest common divisor of 414 and 662 using the Euclidean algorithm (step by step workings must be shown with valid explanations) (10mks)

b) Expressed the worked algorithm in (a) interns of pseudo code (10mks)