CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN APPLIED COMPUTER SCIENCE

ACSC 271: MATHEMATICS FOR COMPUTER SCIENTISTS

STREAMS: BSC APPLIED COMP SC **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 4/12/2019 **11.30 A.M – 1.30 P.M**

INSTRUCTIONS
Answer question one and any other two questions
Adhere to instructions on the answer booklet

QUESTION ONE

(a) Obtain the domain of the following functions

(i) f(x) = [2 marks]

(ii) f(x) = [2 marks]

(b) Given that f(x) = 2 +, obtain the inverse function of f(x) and (3). [3 marks]

(c) Evaluate the limits of the following functions

(i) [4 marks]

(ii) [2 marks]

(d) Obtain the derivative of the following functions

(i) y = [2 marks]

(ii) f(x) = [2 marks]

(e) Evaluate the following integrals

(i) [2 marks]

(ii) [2 marks]

(f) Show that the differential equation

2xydx+(1 +) dy = 0 is exact hence solve it . [2 marks]

(g) Find the angle between the vectors

=3i +4j +5k

= i +6j +2k [2 marks]

(h) Using row reduction solve the simultaneous equations below by row reduction.

= 7

= 3 [2 marks]

(i) Determine wether the series

is convergent by the ratio test. [2 marks]

QUESTION TWO

(a) Appropriate the integral of

with n =5, using Simpson's rule and obtain the actual error to 4 decimal points.

[8 marks]

(b) Using the root test show that the series

is convergent [3 marks]

(c) Obtain the characteristic equation of the matrix

A =

Hence find by the Cayley Hamilton theorem. [7 marks]

(d) Sketch the graph of the function

f(x) =

Obtain f(2) [2 marks]

QUESTION THREE

(a) Find the volume of the parallellopiped spanned by the vectors.

i+3j+2k , 4i -5j +6k and 3i +5k + 2j. [4 marks]

(b) Discuss the consistency of the following systems of equations by vow reduction hence solve it if found consistent.

x +3y +z = 10

2x - y -2z = -6

4x -2y +5z = 15 [6 marks]

(c) Find the value of t for which the vectors

=2ti + 4j +2k

= i+3k –j [3 marks]

(d) Evaluate the area of the triangle with the following vertices A (1,3,1) , B (4,5,6) and C (3,2,4) [5 marks]

(e) Solve the differential equation

, given that y(0) = 10 [2 marks]

QUESTION FOUR

(a) Evaluate all the eigen values and eigen vectors of the matrix.

A = [13 marks]

(b) Prove that the services

is absolutely convergent by the ratio test. [7 marks]

QUESTION FIVE

(a) Find the domain and range of the function

f(x) = [3 marks]

(b) Evaluate the limits of the following functions

[3 marks]

(ii) [2 marks]

(iii) [2 marks]

(c) Obtain the derivative of the function f(x) = [2 marks]

(d) Evaluate the derivative of the functions f(x) = from first principles. [3 marks]

(e) Find the equation of tangent and normal to the curve

Y= 6-3t -4 - at the point (-2,4) [3 marks]

(f) Find the turning points of the curve.

y= [2 marks]
