JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION AND COMMUNICATION TECHNOLOGY 2RDYEAR 1ST SEMESTER

2017/2019 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: ICT 3216

COURSE TITLE: DATA STRUCTURES AND ALGORITHM

EXAM VENUE: **STREAM: ICT**

DATE: DECEMBER 2018 **EXAM SESSION:**

TIME: 2.00 HOURS

INSTRUCTIONS; ANSWER QUESTION 1(30 MARKS) AND ANY OTHER 2

QUESTION 1(30 MARKS)

QUESTION ONE (30 MARKS)

a) Write algorithm for inserting data item into and deleting data item from queue data structure (8 Marks)

b) Consider the following numbers: **5, 2, 6, 3, 7**

i) Apply quick-sort algorithm to sort the data set above (8 marks)

ii) Demonstrate how a binary search technique would be used to sort the above data (8 marks)

c)

i) Using the pseudo code, write the algorithm for inserting the data in between the linked list. (4 Marks)

ii) Give reasons why stack is referred to as an Abstract data type. (2 marks)

QUESTION TWO (20 MARKS)

a) Write the pseudo code that would implement all the operations on the stack data structure (11 Marks)

b) By constructing a binary tree from the letters: A, B, C, D, E, F, G, H, illustrate the pre-order, post-order and in-order traversals (9 Marks)

QUESTION THREE (20 MARKS)

a) Using the following elements 8,7,2 and 9, illustrate how the element would be inserted into the following data structures. (9 Marks)

i) Stack

ii) Linked list

iii) Queue

b) Using data elements of your choice, demonstrate the process of heap-sort algorithm (11 marks)

QUESTION FOUR (20 MARKS)

a) i) Construct a tree diagram from the expression: $-b + \sqrt{(b^2 - 4ac)/2a}$ (6 Marks)

ii) Write the algorithm for the linear search (6 Marks)

i) Using flow charts illustrate the algorithm for comparing three numbers (8 Marks)

QUESTION FIVE (20 MARKS)

a) Write a program that would implement the algorithm for computing factorial of positive numbers using recursive functions (10 marks)

b) With clear example, state the algorithm for binary search. (10 marks)