



MURANGA UNIVERSITY COLLEGE
(A constituent College of Jomo Kenyatta University of Agriculture & Technology)

MAIN CAMPUS

ORDINARY UNIVERSITY EXAMINATIONS

2015/2016 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
Of
BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

COURSE CODE: ICS2105

COURSE TITLE: DATA STRUCTURES AND ALGORITHMS

DATE: 22nd APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer TWO (2) OTHER Questions

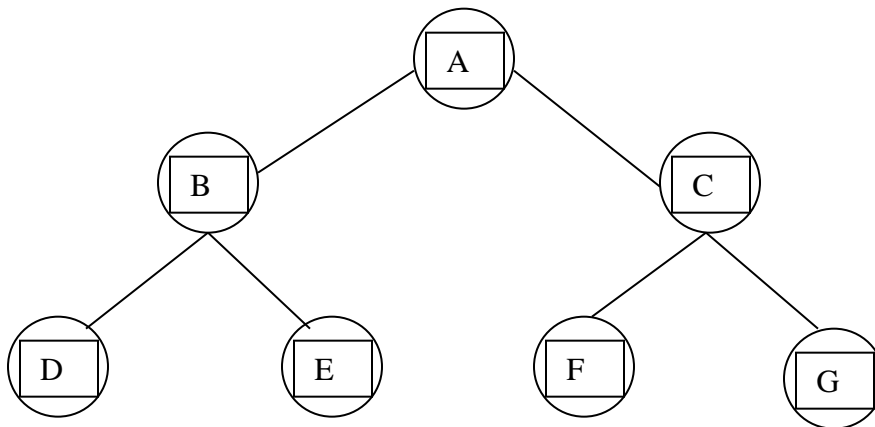
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QUESTION ONE

- ai) Define the term algorithm as used in computing. [1 mark]
 ii) Design an algorithm to add two numbers and display result. [7 marks]
- b) Define the term traversing a tree data structure. [1 mark]
- ci) State the three ways of traversing a tree. [3 marks]
- ii) Write the outcomes of the algorithm and the result after traversing the tree below using each of the three traversals above. [12 marks]



- di) Write two characteristics which differentiate **Divide-and-conquer** algorithms from **greedy algorithms**. [4 marks]
 ii) State an example of **Divide-and-conquer** and of **greedy algorithms**. [2 marks]

QUESTION TWO

- ai) Explain the reason why the list and tail members are included in a linked list data structure. 3 marks
- ii) State two reasons why insertion before the head of a list using NULL for the *element* argument is used only in the singly-linked list implementation but is not necessary for doubly-linked lists. [2 marks]
- b) Not all procedures can be called an algorithm. Write down six characteristics of an algorithm. [6 marks]

c) The way to write arithmetic expression is known as **notation**. An arithmetic expression can be written in three different but equivalent notations and without changing the essence or output of expression. With one example in each case, describe the three arithmetic notations used in algorithms.

[9 marks]

QUESTION THREE

a) Efficiency, abstraction and reusability, are the three reasons for using formal algorithms. In the same context, describe the meaning of efficiency, abstraction and reusability. [9 marks]

b) Differentiate between how to find out the smallest from finding out the largest node in a binary tree search algorithm. [5 marks]

c) Justify why in the implementation of chained hash tables the actual hash code used for accessing the table is the hash code modulo of the table size. [6 marks]

QUESTION FOUR

a) Describe situations which make arrays to be more preferred than linked lists data structures. [6 marks]

b) Compare the operations of linked lists for inserting, removing, and accessing elements with that of arrays. [8 marks]

c) In a database system in which records are to be accessed in a sequential fashion, hash tables are not used. Explain why hash tables are good for random access but not sequential access. [6 marks]