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MAIN EXAMINATION

MAY – JULY 2018 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER AND LIBRARY SCIENCE

REGULAR PROGRAMME

CMT 304: DATA STRUCURES AND ALGORITHMS

Date: JULY 2018	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any other TWO Questions	

Q1. a) Define the following terms:

i) Algorithm **(2 marks)**
ii) Flow chart **(2 marks)**
iii) Program **(2 marks)**

b) Why is there need for software engineers to study about data structures and algorithms? Give any TWO needs. **(2 marks)**

c) Explain any four advantages of linked structures over linear structures. **(8 marks)**

d) Consider a double linked list with the elements u, v, w, y and z appearing in the same order. Provide the following.

i) Algorithm to insert a node with x after w. **(4 marks)**
ii) Flow chart to achieve the same task. **(10 marks)**

Q2. a) Provide the following:

i) Algorithm to delete data from a queue. **(4 marks)**
ii) Flow chart to delete data from a queue. **(4 marks)**

b) Write a flow chart to insert a new node with y in the D field in a singly linked list before the node with x in the D field. **(10 marks)**

c) Give any two differences between a binary tree and a general tree **(2 marks)**

Q3. a) Distinguish between the following.

i) Sorting and searching **(2 marks)**

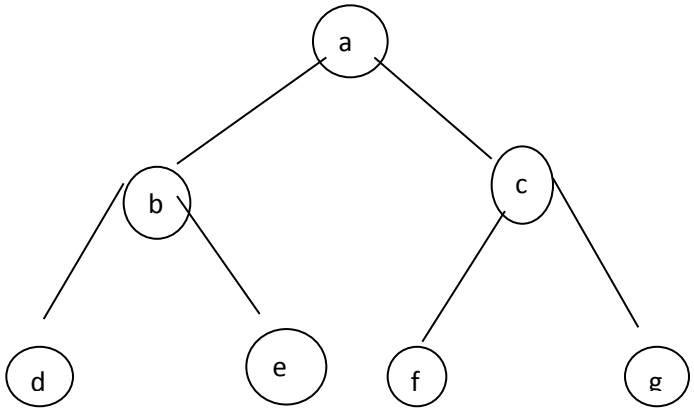
ii) Non-circular single linked list and the circular single linked list **(2 marks)**

b) Give a diagrammatic illustration of a double linked list. What makes it better than a single linked list? **(4 marks)**

c) Using the concept of abstraction, describe the following data structures:

i) General tree **(2 marks)**
ii) Undirected graph **(2 marks)**
iii) Linked list **(2 marks)**

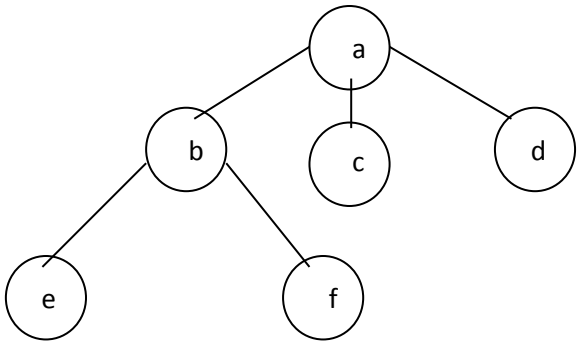
d) Perform six traversals on the following binary tree. **(6 marks)**



Q4. a) Define the following in regard to trees.

i) Degree of a node **(2 marks)**
ii) Degree of a tree **(2 marks)**
iii) Sibling **(2 marks)**

b) Transform the following general tree into binary form.



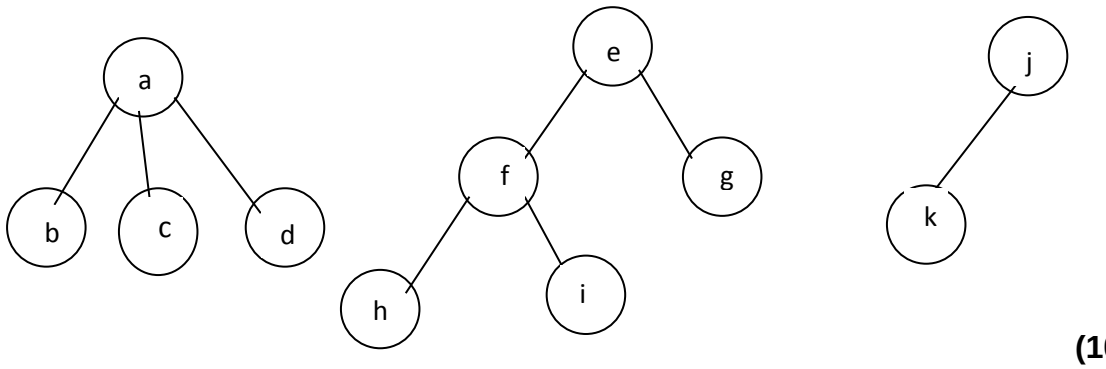
(4 marks)

c) Write down the algorithm for linear or sequential search. **(7 marks)**

d) List any three sorting techniques you know of. **(3 marks)**

Q5. a) Give the three steps to be followed in transforming a forest into a binary tree. **(3 marks)**

b) Using the above procedure transform following forest into a binary tree.



(10 marks)

c) With the help of c language, write a program for the Binary search technique. **(7 marks)**

END