

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: COMP 123

COURSE TITLE: DATA STRUCTURES AND ALGORITHMS

STREAM: SESSION III & IV & V

DAY: THURSDAY

TIME: 9.00 – 11.00 A.M.

DATE: 14/04/2011

INSTRUCTIONS:

Answer **ALL** the questions

PLEASE TURN OVER

SECTION A.

Answer any ALL questions from this section

QUESTION ONE (30 MARKS)

1. Convert the expression $((A + B) * C - (D - E) ^ (F + G))$ to equivalent Prefix and Postfix notations. (4mks)
2. What is the data structure that is used to
 - (a) Perform recursion? (1mk)
 - (b) Give a reason for you answer (1mk)
3. What are the major data structures used in the following areas: RDBMS, Network data model & Hierarchical data model?
 - RDBMS
 - Network data model
 - Hierarchical data model (6mks)
4. List out the areas in which data structures are applied extensively? (2mks)
5. What are some of the properties of a binary tree? (2mks)
6. Name two applications of set data structures? (2mks)
7. List four restrictions that a heap binary tree must satisfy (4mks)
8. In an AVL tree, at what condition is the balancing to be done? (4mks)
9. What is the modulus operator used for with respect to circular queues? (2mks)

SECTION B.

Answer any TWO questions from this section

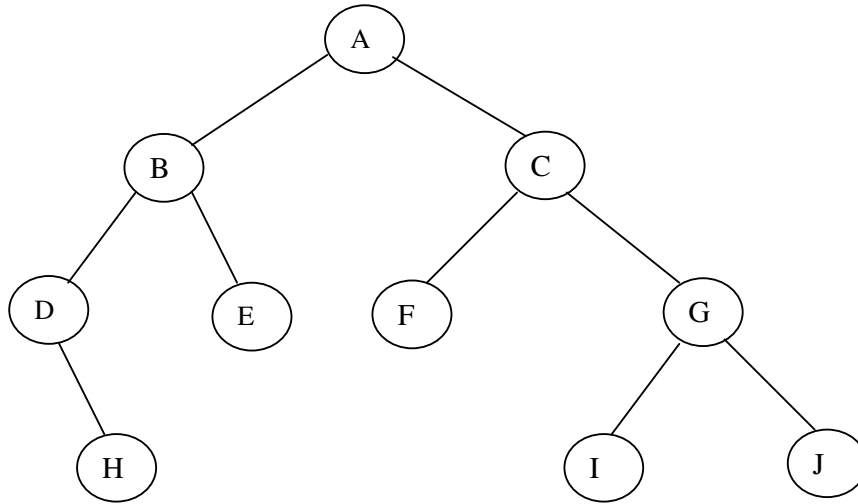
QUESTION TWO (20 MARKS)

10. How do you delete an element from the middle of a linked list? (2mks)
11. If a binary tree is well balanced, approximately how many nodes are in the tree given the depth of the tree? (2mks)
12. With the aid of a diagram, explain the quick sort Algorithm
 - i. Definition (1mk)
 - ii. Diagram (2mks)
 - iii. Algorithm (4mks)
 - iv. Application (1mk)
13. What are some of the applications of stack data structures (2mks)
14. Draw the B-tree of order 4 created by inserting the following data arriving in sequence –
1 5 6 2 8 11 13 18 20 7 9 (6mks)

QUESTION THREE (20 MARKS)

15. Traverse the given tree using Inorder, Preorder and Postorder traversals.

Given tree:



(6mks)

16. Discuss the following asymptotic notations that are used in data structure and algorithms

(a) Big 'Oh' Notation

(c) Define 'Omega'

(d) Define 'theta'

(6mks)

17. Write an algorithm that will explain how binary search method is performed in computer databases.

(5mks)

18. What are the three measures of efficiency that can be applied to most algorithms.

(3mks)