J 1237

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

Third Semester

Information Technology

IF 246 – DATA STRUCTURES AND ALGORITHMS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is the 2's compliment representation for –38 expressed in a modulo 32 system?

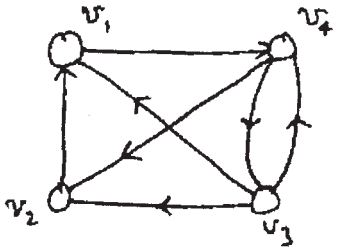
2. What is the BNF grammar for describing a digit?

3. Write down the array representing polynomial $2x^2 + 5xy + y^2$.

4. Define a priority queue.

5. Give a directed tree representation of the formula $(a + b) * (c + d)$.

6. Write down the adjacency matrix of the graph.



7. What are the total number of comparison done by heapsort?

8. What is the worst case search time is a balanced binary tree?

9. Define a buffer.

10. What are the two dynamic hashing techniques?

PART B — (5 × 16 = 80 marks)

11. (i) Construct a parse tree for the expression $2 * x + y$, using the production of the grammar G_5 with description.

G_5 = (V_N, V_T, S, P) where

V_N = (<expr>, <term>, <form>, <primary>)

V_T = (+, –, *, /, i, n)

S = <expr>

P = {1 <expr> : : = <term>

2 <term> : : = <form> | <term> + <form> | <term> – <form>

3 <form> : : = <primary> |<form> * <primary>|<form> | <primary>

4 <primary> : : = i/n} (8)

(ii) Write an algorithm to convert character to numeric values. (8)

12. (a) (i) How do you use stack in solving tower of Hanoi problem and write an algorithm to solve it. (8)

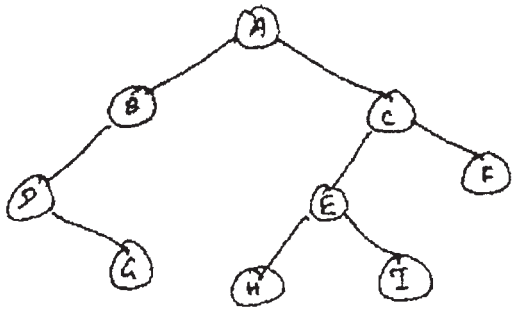
(ii) Write down the insertion and deletion algorithm for a circular queue. (8)

Or

(b) What is a doubly linked list? Write down the detailed algorithm for inserting a mode to the left and deleting a mode from a doubly linked list.

13. (a) (i) Write down an algorithm to perform matrix multiplication with multilinked structures. (8)

(ii) Explain various kinds of traversals in a binary tree and illustrate the same with the following examples. (8)



Or

(b) (i) Write down an algorithm for allocating storage using the buddy system. (8)

(ii) Explain the DFS and RFS traversals in a graph and write the algorithm. (8)

(a) Write down the algorithm for radix sort and using it sort the sequence of numbers 42, 23, 74, 11, 65, 57, 94, 36, 99, 87, 70, 81, 61.

Or

(b) Write down the algorithm for merge sort and using it sort the sequence of numbers 42, 23, 74, 11, 65, 57, 94, 36, 99, 87, 70, 81, 61.

5. (a) Explain a method for retrieving a record from a direct file using chaining with separate lists. Also write down the algorithm.

Or

(b) Discuss in detail the various distribution-dependent hashing functions.
