ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

DATA STRUCTURES WITH C

SEMESTER - 2

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Worst case time complexity of the heap sort algorithm is

a) $O(N \log_2 N)$ b) $O(N \ln N)$

c) $O(n^2)$ d) $O(n^3)$. ☐

ii) Pick out the invalid statement from the following :

Queue can be used

a) in the printer b) to access to disk storage

c) for function call d) none of these. ☐

iii) In linked list, the logical order of elements

a) is same as their physical arrangement

b) is not necessarily equivalent to their physical arrangement

c) is determined by their physical arrangement

d) none of these. ☐

iv) The method of collision processing requires prime area and overflow area of

a) linked collision processing

b) linear collision processing

c) quadratic collision processing

d) none of these. ☐

v) Which is not representation of a graph ?

a) Adjacency matrix b) Edge list

c) Adjacency list d) All represents a graph. ☐

vi) Which of the following is not a required feature of a good hashing algorithm ? It should

a) be repeatable

b) allow even distribution of records throughout the allocated space

c) minimize synonyms

d) none of these. ☐

vii) A is an array of size $m * n$, stored in the row major order. If the address of the first element in the array is M, the address of the element $A(i, j)$ ($A(0, 0)$) is the first element of the array and each element occupies one location in memory that is

a) $M + (i - j) * m + j - 1$ b) $M + i * m + j$

c) $M + (j - 1) * m + i - 1$ d) $M + (i - 1) * n + j - 1$. ☐

viii) Reference count may be maintained for memory locations used in linked list for the purpose of

a) Copying b) Compaction

c) Reclamation d) Traversal. ☐

ix) The maximum number of nodes in a binary tree of depth 5 is

a) 31 b) 16

c) 32 d) 15. ☐

x) In which collision processing method, it is not required to detect a given list position, if it is occupied or not ?

a) Quadratic b) Linked

c) Rehashing d) None of these. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Is circular queue a non-linear data structure ? Justify your answer. 5

3. Name some non-linear data structures. Critically compare linear and non-linear data structures. 1 + 4

4. Write a *C* function to reverse a linked list physically. (That is change the node positions.)

5. Write the push( ) and pop( ) functions for a stack after describing the Data-Structure clearly. 5

6. What is hashing ? Why is it used ? Explain the chaining method of collision resolution in hashing. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Define B-tree. Construct one B-tree of order 3 with the following data :

50, 40, 60, 30, 70, 20, 80, 10, 90, 9, 99. 8

b) Construct a binary Tree from the following information :

In order : 50, 10, 30, 90, 60, 80, 40, 20, 70

Preorder : 60, 10, 50, 90, 30, 40, 80, 70, 20. 7

8. a) Explain AVL tree. Discuss how to insert an element in an AVL tree (Explain all cases). 8

b) Write an algorithm for deletion of an element from BST. (Include all the cases). 7

9. Explain Heap. What is priority queue ? How will you implement a priority queue using Heap ? Explain with suitable example. 4 + 3 + 8

10. a) In how many ways, can you represent a graph in a computer memory ? Which one is advantageous and why ? 4

b) Write down the DFS algorithm. 6

c) How is random access file different from indexed sequential file ? What is Garbage collection ? 5

11. a) Explain Polish and Reverse polish notations. 5

b) Convert the following : 5 + 5

i) $A + (((B - C) * (D - E) + F) / G) \$ (H - I)$ [POSTFIX]

ii) $ABC - / DEF + * +$ [PREFIX].

END