Design and Analysis of Algorithms

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Science Information Technology

FYBSc-IT

Semester 2

University Exam

University of Mumbai

Note: - 1) Question No.1 is compulsory.
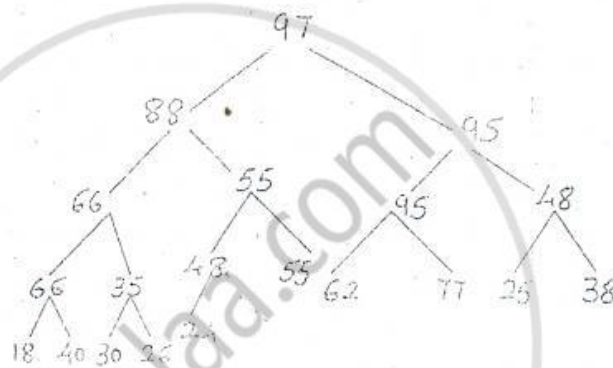2) Attempt any four questions from Q.no. 2 to 7.

Q.1 i)   Write an algorithm for bubble sort in Linear Array.   5Mks

ii) What do you mean by Overflow & Underflow in Linked List ?   4Mks

iii) Suppose following numbers are stored in array A   8Mks
32,51,27,85,66,23,13,57
Apply bubble sort to sort the array A .

iv) Express the following expression in the form of binary tree   3Mks
$E = [a+(b-c)] * [(d-e) / (f+g-h)]$

Q.2 i)   Write an algorithm for PUSH and POP operation of stack   10Mks

ii) Consider the graph G of fig 1 suppose we want to find & print all nodes reachable from node J (including J itself) use Depth-first search of G starting at node J   8Mks

Adjacency lists
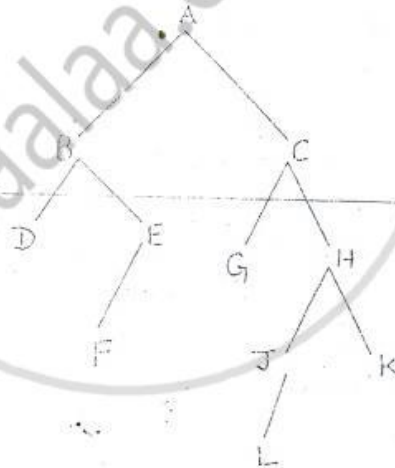A: F,C,B
B: G,C
C: F
D: C
E: D,C,J
F: D
G: C,E
J : D,K
K:E,G

iii) What do you mean by Garbage collection?   2Mks

Q.3   i)   Write an algorithm for Inorder traversing of binary tree.   5Mks

    ii)   Suppose S is following list of 14 alphabetic characters: 10Mks
(D) A T A S T R U C T U R E (S) suppose characters in
S are to be sorted alphabetically use quicksort algorithm
to find final position of first character D.

    iii)   Write an algorithm for traversing a Linked List.   5Mks

Q.4   i)   Write an algorithm for Heap sort.   8Mks

    ii)   Consider the heap H as in **fig 2**. Suppose we want to add   8Mks
ITEM = 70 to heap H. Find appropriate place of 70 in
heap.

    iii)   Explain Complete Binary trees & Extended Binary trees.   4Mks

Q.5   i)   Explain the Operations on Data Structure.   4Mks

    ii)   Consider following queue of characters where QUEUE is   10Mks
a circular array which is allocated six memory cells:
FRONT = 2 REAR = 4
QUEUE := ___, A, C, D, ___, ___ ('___' denotes empty
cell)
Describe queue as following operations take place:
     1) F is added to queue
     2) Two letters are deleted
     3) K,L,M are added to queue
     4) Two letters are deleted
     5) R is added to queue
     6) Two letters are deleted
     7) S is added to queue
     8) Two letters are deleted
     9) One letter is deleted
     10) One letter is deleted

    iii)   Write an algorithm for finding number of elements in a   6Mks
Linked List.

Mks	Q.6	i)	Write an algorithm for Binary search in array.	8Mks
)Mks		ii)	Write short notes on Datastructure Linear Arrays.	8Mks
Mks		iii)	Define the terms: - Complete graph, Weighed graph, Path, Null Graph .	4Mks
Mks	Q.7	i)	Write an algorithm for inserting at beginning of Linked List.	8Mks
Mks		ii)	Give Preorder, Inorder, Postorder traversing of Binary Tree in fig. 3	4Mks

Mks

Mks   iii)   Write an algorithm to perform addition of first twenty   8Mks
                  numbers of an Linear Array.

)Mks