



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/MCA / SEM-2 / MCA-203 / 2011  
2011  
DATA STRUCTURE WITH C**

Time Allotted : 3 Hours

Full Marks : 70

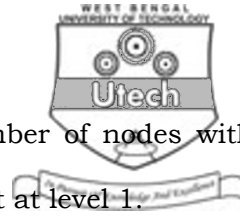
*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) Consider  $A$ ,  $B$  and  $C$  will be pushed into stack in the same order as given. Which of the following options is not possible outcome after pop operations ?
    - a)  $A, B, C$
    - b)  $B, A, C$
    - c)  $C, B, A$
    - d)  $C, A, B.$



ii) What is the maximum possible number of nodes with level  $n$  of a binary tree ? Consider root at level 1.

- a)  $2^{n+1} - 1$
- b)  $2^n - 1$
- c)  $2^n + 1$
- d)  $2^n$ .

iii) The complexity of binary search algorithm is

- a)  $O(n)$
- b)  $O(n \log_2 n)$
- c)  $O(n^2)$
- d)  $O(\log_2 n)$ .

iv) Return type of function main ( ) returns value to the

- a) Operating system
- b) Compiler
- c) Linker
- d) Loader.

v) What kind of data structure do you prefer for implementation of polynomial ?

- a) Array
- b) Linear Linked List
- c) Tree
- d) Graph.

vi) Compaction reduces ..... fragmentation.

- a) external
- b) internal
- c) both (a) and (b)
- d) neither (a) nor (b).



- vii) Adelson Velski and Landies tree is a ..... tree.
- a) Unbalanced binary
  - b) balanced binary
  - c) binary search
  - d) balanced binary search.
- viii) Recharging your mobile balance is a ..... policy.
- a) LIFO
  - b) priority based
  - c) FIFO
  - d) none of these.
- ix) What is the time complexity of the binary search ?
- a)  $O(n)$
  - b)  $O(n^2)$
  - c)  $\log(n)$
  - d)  $n \log(n)$ .
- x) The order of nodes in a linear linked list is maintained by
- a) value within the node
  - b) addresses of nodes
  - c) compiler
  - d) pointer of the node.

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**GROUP – B**

**( Short Answer Type Questions )**

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

2. Define circular queue. Indicate the advantages of circular queue over linear queue. Define priority queue.  $1 + 3 + 1$

3. What is hashing ? What is chaining ? What are the characteristics of hash function ? What is re-hashing ?

$1 + 1 + 2 + 1$

4. What is collision ? Discuss linear probing method to resolve collision.  $1 + 4$

5. What is tail recursion ? How is it different from ordinary recursion ? What are the differences between iteration and recursion ?  $1 + 2 + 2$

6. Given preorder and postorder traversal, justify if it is possible to find out the corresponding in order traversal.  $5$

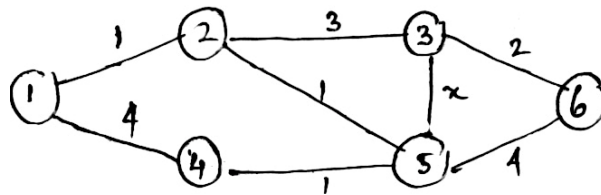


**GROUP - C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Determine the admissible value of  $x$  in the following figure so that there is a unique shortest path from node 1 to node 6 :



Is there any other choice of  $x$ , which would result in another shortest path between node pair 1 and 6 ? If so, find all such combination of  $x$  values indicating the corresponding shortest path.

- b) Indicate how a binary tree may be converted into a linear data structure. 10 + 5



8. a) What is *B*-tree ? Insert the following keys into a *B*-tree of order 5 :

20, 80, 55, 15, 116, 39, 76, 124, 103, 48, 200, 98, 175, 235, 28, 114, 132, 164.

b) Insert the following numbers into Max heap and Min heap :

39, 89, 12, 67, 56, 43, 54, 98, 6, 60, 95, 26.      10 + 5

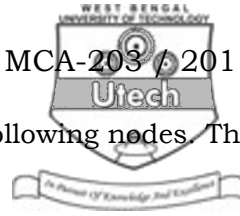
9. Draw a digraph corresponding to each of the following relations on the integers ranging over 1 to 12 :

i)  $x$  is related to  $y$  if  $x - y$  is eventually divisible by 3.

ii)  $x$  is related to  $y$  if  $x + 10 y < xy$

iii)  $x$  is related to  $y$  if the remainder on division of  $x$  by  $y$  is 2.      15

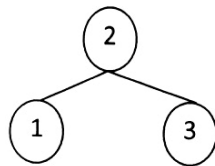
10. Write an algorithm or function to insert an intermediate node in a doubly linked list. Explain the advantage of threaded binary tree. Distinguish between depth and height of a binary tree with the help of an example.      9 + 3 + 3



11. Construct a Binary Search Tree with the following nodes. The order of insertion is same as it appears :

JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC.

Specify the difference between general tree and binary tree considering the following tree :



Construct an AVL tree with the following nodes. The order of the nodes is same as it appears.

BIN, FEM, IND, NEE, LAL, PRI, JIM, AMI, HEM, DIN.      6 + 2 + 7

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