Registration no:

Total Number of Pages: 03

B.TECH
15BE2106

2nd **Semester Regular Examination 2015-16**
DATA STRUCTURE USING 'C'
BRANCH(S):ALL
Time: 3 Hours
Max marks: 100
Q.CODE: W406
Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part-A (Answer all the questions)

Q1   **Answer the following questions:**   (2 x 10)
a) If an array with the name S exists, which of the following statements is incorrect:
i. S++ **ii**. printf("%d",*(S+1)) **iii**. printf("%u",S+1) **iv**. All are correct

b) An array can be categorized as which type of data-structure:
i. dynamic   **ii**. static **iii**. int/char/float **iv**. multi-dimensional

c) An orphaned block is the result of:
i. memory leak **ii**. garbage collection   **iii**. free function **iv**. all of the above

d) Dynamic memory allocation for a node in a linked list is done from:
i. RAM **ii**. ROM **iii**. Hard disk **iv**. Heap

e) Linked list is linear data structure from storage point of view.
i. True   **ii**. False

f) The postfix expression: 3, 16, 2, +, *, 12, 6, /, - when evaluated gives the
following result: **i**. 58 **ii**. 56 **iii**. 52 **iv**. 54

g) Which of the following data-structures are indexed structures:
i. linear arrays **ii**. linked lists **iii**. both of the above **iv**. none of the above

h) The depth of a complete binary tree is given by:
i. n log n **ii**. n log n +1 **iii**. log n **iv**. log n +1

i) All the non-leaf nodes except the root node in a multi-way search tree of order n
have at least: **i**. n-1 children **ii**. n children **iii**. n/2 children **iv**. n*2 children

j) Which of the following sorting procedures is the slowest:
i. Quick sort **ii**. bubble sort **iii**. Shell sort **iv**. insertion sort

Q2   **Answer the following questions in brief:**   (2 x 10)
a) Suppose K[113:299][113:320] be a float array with starting address 5000.Find
the address of K[139][143] using row major ordering.
b) Explain ADT with suitable examples.
c) Write down the main demerit of array implementation of simple queue. How it
can be avoided?
d) Explain self referential structure with a suitable example. Why it is used in
data structure?
**e)** Briefly explain the functions used in dynamic memory management in C.

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f) Define sparse matrix. How linked list can be used to represent it?

g) Explain linked list representation of binary tree in memory.

h) How many distinct binary trees can be formed with n nodes?

i) What do you mean by isolated vertex and pendant vertex?

j) What do you mean by compaction and garbage collection?

Part-B (Answer any four questions)

Q3 **a)** Write a complete C program to create a double linked list and traverse each node of it. **(8)**

b) Briefly explain the matrix representation of graph in memory. **(5)**

c) Explain header linked list with suitable examples. **(2)**

Q4 **a)** Write a complete C program to create a stack using an array and perform the following operations: (i) push (ii) pop **(8)**

b) Convert the given infix expression into prefix expression using appropriate algorithm: (A+B*C*(M*N^P+T)-G+H) **(5)**

c) Briefly explain priority queue. **(2)**

Q5 **a)** Write a complete C program to create a queue and perform the following operations: (i) insert (ii) delete (iii)traverse **(8)**

b) Find the preorder, inorder and postorder traversal of nodes from the following binary tree: **(5)**
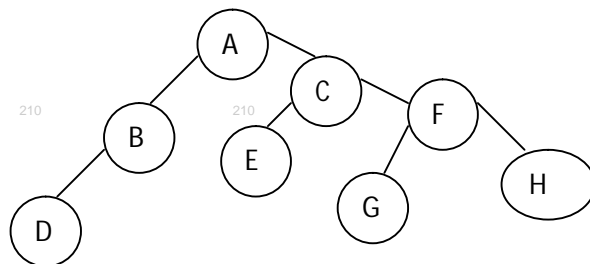
c) Explain AVL tree with an example. **(2)**

Q6 **a)** Write C segments for linked list representation of simple queue for insertion and deletion operations. **(5)**

b) Define BST. Construct a BST using the following node values: 10,12,8,1,4,20,16,3,15,2,-5,0,19 and then show the status of BST after deleting the nodes 20,10,2,1 from it. **(6)**

c) Construct binary tree from the given traversals: **(4)**
(i)preorder-ABDGHKCEF , postorder-GKHDBEFCA
(ii)preorder-ABCDEFG , inorder-BDCAFEG

Q7 **a)** Write C segments to insert a node at the beginning of single circular linked list and delete a node from the end of a single linked list. **(5)**

b) Which data structures are used for BFS and DFS? Apply DFS algorithm in the given graph to find the traversal order of vertices, where M is the starting vertex: **(7)**
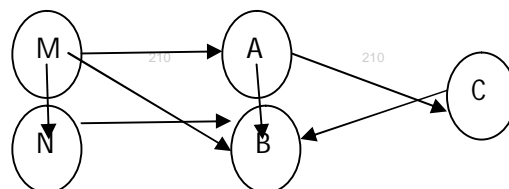
c) Write down the algorithm for topological sorting. **(3)**

Q8 **a)** What do you mean by searching? Write a complete C program to perform the binary search operation for a key value in a given list of integers. **(6)**

b) What do you mean by sorting? Sort the given elements in ascending order using heap sort mechanism: 10,15,3,11,12,2,20,24 **(5)**

c) Explain expression tree with an example. Construct an expression tree from the given prefix expression: *+AB*C+DE **(4)**

Q9 **Write short notes on the following (Any Three):** **(5 x 3)**
  a) D-Queue
  b) Threaded Binary Tree
  c) Warshall's Algorithm
  d) Hashing
  e) B Tree