

Registration No. :

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Total number of printed pages – 3

B. Tech  
BE 2106

**Second Semester Regular Examination – 2014**

**DATA STRUCTURE USING C**

**BRANCH(S) : ALL**

**QUESTION CODE : F 458**

**Full Marks – 70**

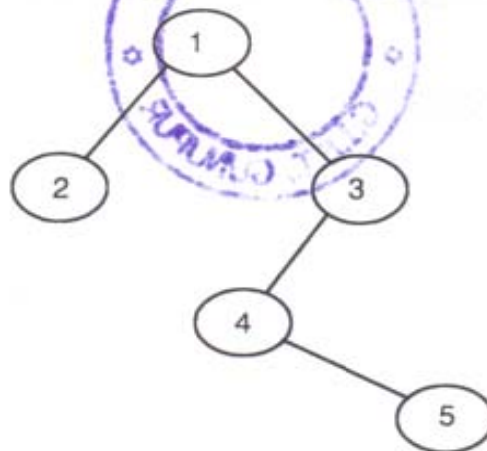
**Time : 3 Hours**

Answer Question No. 1 which is compulsory and any **five** from the rest.  
The figures in the right-hand margin indicate marks.

1. Answer the following questions :

2×10

- (a) Calculate how many interchanges are required to sort 5, 5, 6, 2, 4 in descending order using Bubble sort.
- (b) In the given binary tree using array one can store the node 4 at which location ? Justify your answer.



- (c) If the address of  $A[1][1]$  and  $A[2][1]$  are 1000 and 1010 respectively and each element occupies 2 bytes then calculate the order in which the array has been stored.
- (d) What is the postfix form of the following prefix  $* + ab - cd$  ?

P.T.O.

- (e) Mention an algorithm to find out the height of a binary tree.
- (f) What is the minimum number of nodes in an AVL tree of height  $h$ ?
- (g) What do you mean by linear probing?
- (h) What pointer type is used to implement the heterogeneous linked list in C?
- (i) Can a stack be described as a pointer? Explain.
- (j) What is the maximum number of edges  $m$  that can exist in a DAG with  $n$  vertices?
2. (a) Write a program to create a one dimensional array at run time using a user defined function with user given number of elements into it. Also write separate functions that would allow you to insert and delete elements into/ from this array at any arbitrary location. 5
- (b) Define a queue. Formulate insertion and deletion algorithms for a circular queue. 5
3. (a) Explain the process of conversion from infix expression to postfix expression using stack. 5
- (b) Construct an expression tree for the expression  $(a + b * c) + ((d * e + 1) * g)$ . Give the outputs when you apply pre order, inorder and postorder traversals. 5
4. Write a menu driven program to perform the following operations on a singly linked list : 10
- (a) Create
- (b) Insert
- (c) Delete
- (d) Display
- (e) Exit.
5. (a) Develop an algorithm for a binary search on an ordered list. For the list  $L = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$  undertake search for the elements in the list  $\{3, 18, 1, 25\}$ . Compare the number of key comparisons made during the searches. 5

- (b) Given in-order and pre-order traversal of a binary search tree, build the binary search tree. 5

For example,

In-order traversal is : {10, 12, 20, 30, 37, 40, 45}

Pre-order traversal is : {30, 20, 10, 12, 40, 37, 45}

6. (a) Draw a directed graph with five vertices and seven edges. Exactly one of the edges should be a loop, and do not have any multiple edges. 5
- (b) Consider a hash table that stores integer keys. The keys are 32-bit unsigned values, and are always a power of 2. Give the minimum table size  $t$  and the hash function  $h(x)$  that takes a key  $x$  and produces a number between 1 and  $t$ , such that no collision occurs. 5
7. (a) Sort the given values using Quick Sort. Explain using the procedure. 5  
65, 70, 75, 80, 85, 60, 55, 50, 45
- (b) Draw the B-tree of order 3 created by inserting the following data arriving in sequence : 92 24 6 7 11 8 22 4 5 16 19 20 78. 5
8. Write short notes on any **two** : 5×2
- (a) Double Link List
  - (b) AVL tree
  - (c) Warshall's Algorithm
  - (d) Hashing.

