National Institute Of Technology: Tiruchirappalli-620015

B.Tech. Degree III^{rd} semester, First Test, SEPTEMBER-2021

Sub.Code: CSPC32 Title: Data structures

Date:07-09-2021 Time:10 pm to 11 pm Max.Marks: 15

Answer all questions

1. Covid (n)
   {$a = 1$;
   for(i is 1 to n)
   {
   $if(i <= n/2)$
   { for(j is 1 to i)
   a = a+i;
   }
   else {
   a = a*i;
   } } }
   Find the running time of Covid (n^3). [2]

2. Prove the following:
   (i) $\Omega(n^2) = (1/4)n^2 - 5n$ [2.5]

3. DiUpper-diagonal matrix is a band matrix that has nonzero elements on the main diagonal, the first diagonal above this only. Write the formula to convert given DiUpper-diagonal matrix (2D array) a[i,j] to 1D array b[k]. [2]

4. Suppose Transpose of matrix (n X n) is defined in following way:
   a[i,j] is changed to a[n-i,j].
   Write the algorithm to transpose the sparse matrix. Representation of Sparse matrix is as discussed in class i.e (row, column, value). [2.5]

5. Write a function (in pseudocode) to delete second last node in circular linked list with $n > 2$ nodes (head pointer is given). Also find the time complexity in Big'O' notation. [3]

6. A single array a[0 : MAXSIZE - 1] is used to implement two stacks. The two stacks grow from opposite ends of the array. Variables top1 and top2(top1 ¡ top2) point to the location of the topmost element in each of the stacks if the space is to be used efficiently, what should be the condition for "empty" in stack 1? Also write the algorithm for pop function in stack 1. Also find the time complexity in Big'O' notation. [3]

end