Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[4857]-1072

S.E. (Computer) (First Semester) EXAMINATION, 2015

DATA STRUCTURE AND PROBLEM SOLVING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right side indicate full marks.

(*iv*) Assume suitable data, if necessary.

1. (*a*) Write the frequency count of the following code and derive the time complexity. [4]

```
For(i=n-1;i>0;i --)
  For(j=0;  j<i;  j++)
    If  (a[i]<a[i+1])
        {
          Temp=a[i];
          a[i]=a[i+1];
          a[i+1]=temp;
        }
```

(*b*) Prove the following : [4]

(*i*) if $f(n) = 2n^2 + 2$ then $f(n) \in O(n^2)$

(*ii*) if $f(n) = 5n^3 + 2n^2 + 3$ then $f(n) \in O(n^3)$

P.T.O.

(*c*) Prove that if height of a full or compute binary tree is 'h' then number of nodes in the tree equal to $2^{h+1}-1$. [4]

Or

2. (*a*) Prove that a full binary tree having n nodes, the height is $O(\log_2 n)$. [3]

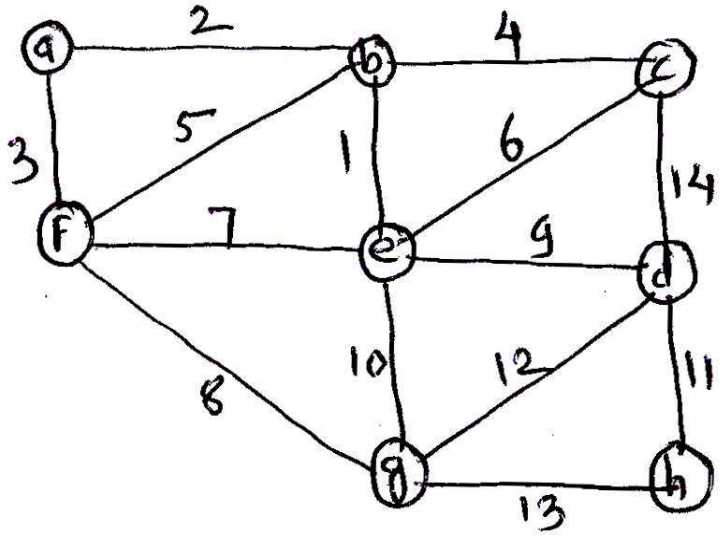
(*b*) Evaluate the following postfix expression using stack. Show all steps. [3]

3,2,4,*,+,5,9,3,/,+,*.

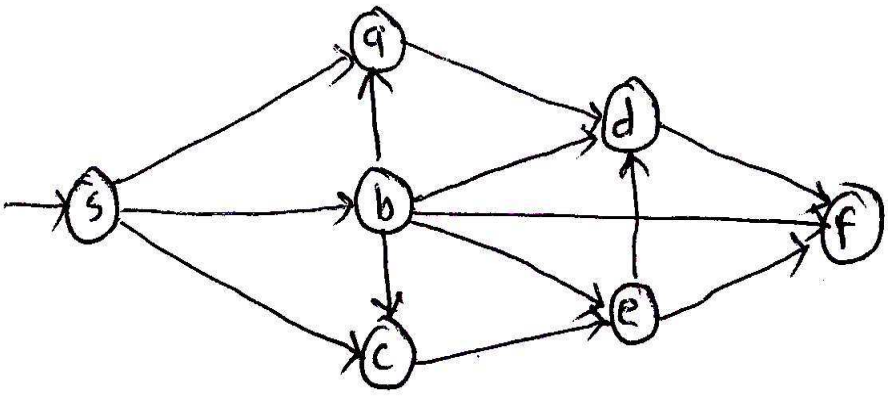
(*c*) Define Big O, Ω and θ. [3]

(*d*) Show analysis of quick sort in worst and best case. [3]

3. (*a*) Find the minimum spanning tree for the following graph using Kruskal's Algorithms. [4]



(*b*) Find the topological ordering of the following graph : [4]



(*c*) Construct the AVL tree for the following data : [4]

5, 4, 7, 1, 3, 2, 15, 20, 10, 12.

Or

4. (*a*) Insert the following data in the hash table of size 10, using linear probing with chaining with replacement. [4]

Here h(x)=x%10

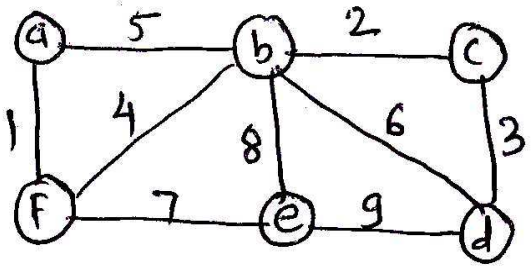
21, 35, 31, 37, 32, 33, 48.

(*b*) Write 'C' code for the following functions w.r.t. AVL Tree : [4]

(*i*) LR Rotation

(*ii*) RL Rotation.

(*c*) Find the minimum spanning tree for the following graph using Prim's Algorithms. [4]



5. (*a*) Construct B tree of order 5 for the following data : [5]

4, 8, 10, 5, 3, 9, 2, 15, 20, 80.

(*b*) Sort the following data in ascending order using heap sort : [4]

10, 5, 3, 8, 9, 4, 2.

(*c*) Explain various operations on sequential files. [4]

Or

6. (*a*) Construct B^+ Tree of the order 5 for the following data : [5]

5, 4, 6, 2, 1, 7, 8, 9, 3, 10.

(*b*) Explain with example different methods of heap creation, also explain which method is better and why ? [4]

(*c*) Write short notes on : [4]

(*i*) Sequential files

(*ii*) Random access files.

7. (*a*) Compute the prefix sum for the following list using list ranking : [4]

5, 3, –2, 7, 6.

(*b*) Explain pointer jumping techniques. [3]

(*c*) Write a note on odd even merge sort. [3]

(*d*) Find the largest number in the following list using parallel algorithmic technique : [3]

5, 3, 7, 8, 2.

Or

8. (*a*) Explain different parallel algorithmic techniques with examples. [6]

(*b*) Explain list ranking problem using pointer jumping techniques. Compute prefix sum of (8, 2, –1, 5) using binary tree techniques. [4]

(*c*) Compute the sum of the following numbers using complete binary tree technique : [3]

5, 4, 3, 2.