

Total No. of Questions—8]

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[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.

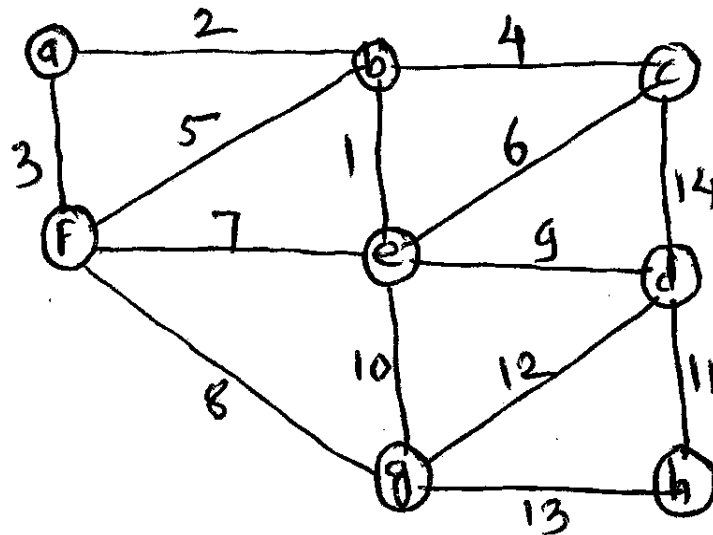
- (c) Prove that if height of a full or complete binary tree is 'h' then number of nodes in the tree equal to $2^{h+1}-1$. [4]

Or

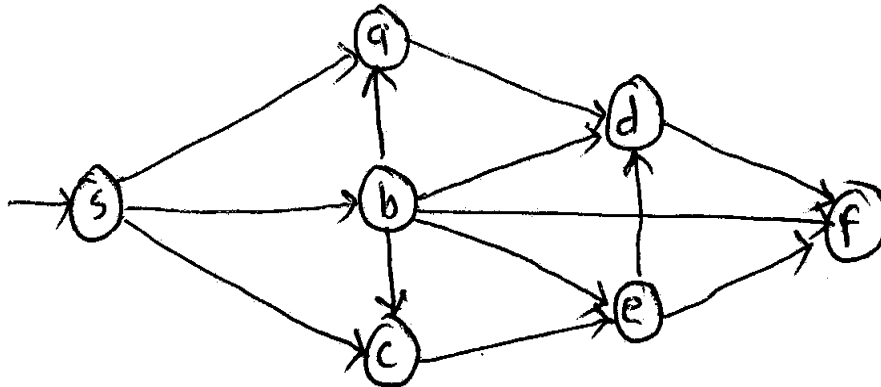
2. (a) Prove that a full binary tree having n nodes, the height is $O(\log_2 n)$. [3]
- (b) Evaluate the following postfix expression using stack. Show all steps. [3]

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 $h(x) = x \% 10$

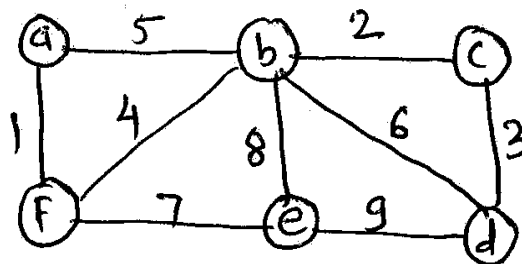
21, 35, 31, 37, 32, 33, 48.

- (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.