Department of Computer Science

Admission Test for PhD Program
July 2013

Part II

Time : 1 hour Max Marks: 30

1. Write a recursive function to calculate the height of a binary search tree.

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2. Answer in one line: what does the following routine do? Justify your answer.

```
int routine( int x )
{ int y;
        for( y=x/2; (y*2 == x) ; y /=2 ) x=y ;
        return x ;
}
```

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3. Derive the time complexity of Insertion Sort if binary search is used instead of sequential search to find an appropriate place for the ith element in the ith iteration.

4

4. When is hashing more useful than a binary search tree? Justify with the help of an example.

2

5. Write a "for-loop" in C/C++/Java to insert a node pointed to by 'p' before the node pointed to by 'q' of a linked list L.

2

6. Write the recurrence relation capturing the optimal execution time of the Towers of Hanoi problem with n discs. Explain very briefly how did you arrive at it.

3

7. Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes? Justify your answer.

2

8. Does the Checksum in a frame computed at data link layer detect the bits corrupted in the memory of the sender? Justify your answer. 2

9. When you send a mail to your friend does he/she have to be online at that time? In either case, explain how does your mail travel to your friend. 3

10. A computer has 32-bit instructions and 12-bit addresses. If there are 245 two address instructions, how many one-address instructions can be formulated?

2

11. Discuss the advantages and disadvantages of FCFS policy over shortest job first policy for job scheduling.

3

12. Consider the following page trace :

    1, 2, 3, 4, 1, 2, 5, 2, 1, 3, 4, 5

    Compute the percentage of page faults if LRU (Least Recently Used) page replacement policy is used with 4 frames allowed per job.

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