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BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

Term-End Examination

June, 2018

01675

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 hours *Maximum Marks : 50*

Note : *Question no. 1 is* ***compulsory*** *and carries 20 marks. Answer any* ***three*** *questions from the rest.*

1. (a) Define O (Big-"Oh") notation. By using basic definition of O, show that $(3x^2 + 4x + 1) = O(x^2)$. *4*

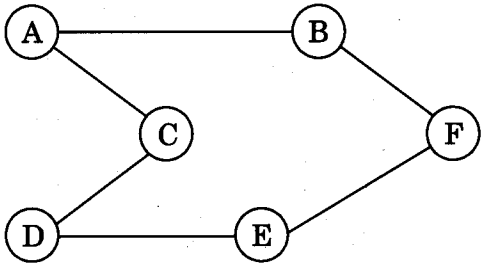
(b) The recurrence relation for Fibonacci sequence is given by $t_n = t_{n-1} + t_{n-2}$, such that $t_0 = 0$ and $t_1 = 1$. Find the solution of this recurrence. *5*

(c) Find the optimal solution to the fractional knapsack instance n = 5, capacity(M) = 10;

$(p_1, p_2, ..., p_5) = (12, 32, 40, 30, 50)$

$(w_1, w_2, ..., w_5) = (4, 8, 2, 6, 1)$ *5*

(d) Write Adjacency list and Adjacency matrix representation for the following graph : 3

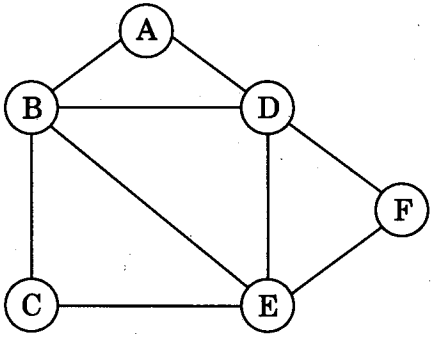


(e) Find time complexity of the following code :

```
for (i = 1; i <= n; i ++)
for (j = 1; j <= n; j = j * 2)
Sum[i] = Sum[i] + i × j.
```

3

2. (a) Differentiate between Depth-First Search (DFS) and Breadth-First Search (BFS) in terms of time and space complexity. Traverse the following graph using (i) DFS, (ii) BFS, the starting node is A. 5



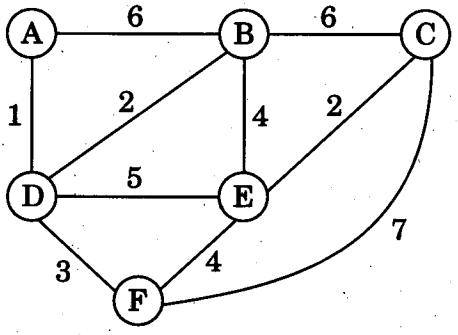
(b) List all the steps to be used to search 30 in the following list using binary search : 5

6 8 10 12 30 32 35

3. (a) Write Quick-sort algorithm and find its time complexity in worst case. *5*

(b) Multiply 10265 × 2573 using Divide and Conquer technique. Apply Karatsuba method. *5*

4. Write any two applications of spanning tree. Write Prim's algorithm and apply it to find the minimum cost spanning tree for the following graph : *10*



5. (a) Write all the (3) cases of Master method for solving Recurrence. Apply Master method to solve the following recurrence : *6*

$$T(n) = 3T\left(\frac{n}{4}\right) + n \log n$$

(b) Write algorithm of bubble sort. *4*