

**B.Tech. - VIEP - COMPUTER SCIENCE AND
ENGINEERING (BTCSVI)****Term-End Examination****June, 2017**

00804

**BICS-014 : DESIGN AND ANALYSIS OF
ALGORITHM***Time : 3 hours**Maximum Marks : 70*

Note : Attempt any **seven** questions. All questions carry equal marks.

1. (a) Determine the time complexity of the pseudocode given below, using Big-O notation : 5

```
for j = 2 to length [A] do
```

```
{ key = A[j]
```

```
  i = j - 1
```

```
  while (i > 0) and (A[i] > key) do
```

```
    { A[i + 1] = A[i]
```

```
      i = i - 1
```

```
    A[i + 1] = key
```

```
  }
```

- (b) State Master theorem. The recursive equation of time complexity of an algorithm is given by $T(n) = 4 * T\left(\frac{n}{2}\right) + n$. Use Master theorem to find asymptotic bounds of $T(n)$. 5

2. Write the algorithm for Merge Sort. Illustrate its working by sorting the data :

33 26 35 29 18 10 24

Analyse the performance of Merge Sort. 3+4+3

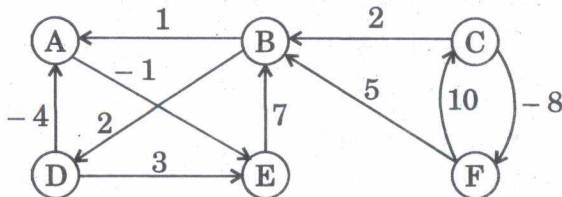
3. (a) What is Amortized Analysis ? What is the amortized cost for the following sequence of push and pop operations :

1 push 1 push 1 push 3 pops 2 push 2 pops
2 push 2 pops

Assume that the cost of push and pop operations is 1. 5

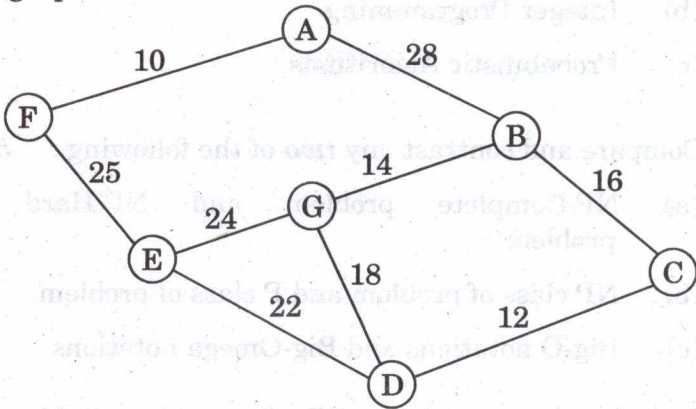
- (b) Explain the term Hashing. Discuss the different methods of hashing. 2+3

4. Write Floyd-Warshall algorithm. Apply it to determine the shortest path for the graph shown below : 4+6



5. Write Prim's algorithm. Apply it to find the minimum cost spanning tree for the following graph :

4+6



6. (a) For a given problem P, two algorithms A_1 and A_2 have respective time complexities $T_1(n)$ and $T_2(n)$, where $T_1(n) = 4n^5 + 3n$ and $T_2(n) = 2500n^3 + 4n$. Find the range for n and the size of an instance of the given problem, for which A_1 is more efficient than A_2 .

5

- (b) Explain Strassen's algorithm, with the help of suitable example.

5

7. What is the Eight Queens problem ? Discuss the randomized solution for Eight Queens problem.

5+5

8. Write short notes on any *two* of the following : 5+5
- (a) Cook's Theorem
 - (b) Integer Programming
 - (c) Probabilistic Algorithms
9. Compare and contrast any *two* of the following : 5+5
- (a) NP-Complete problem and NP-Hard problem
 - (b) NP class of problem and P class of problem
 - (c) Big-O notations and Big-Omega notations
10. Discuss any *two* of the following with suitable examples : 5+5
- (a) Travelling Salesman Problem
 - (b) Monte Carlo Algorithm
 - (c) Greedy Algorithm
 - (d) Branch and Bound Technique
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