

Total No. of Questions : 7]

SEAT No. :

**P4338**

**[4860]-1306**

[Total No. of Pages : 2

**M.E. (Computer Engineering)**  
**APPLIED ALGORITHMS**  
**(2013 Credit Pattern) (Semester - I)**

*Time :3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Q.No. 1 is compulsory. Solve any 5 from Q.No. 2 to Q.No.7.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat daigrams must be drawn wherever necessary.*
- 4) *Assume Suitable data if necessary.*

- Q1)** a) State whether following equalities are correct or incorrect and prove it.
- i)  $4n^4 - 6n = \Theta(n^2)$
  - ii)  $1000n^3 + 6 = O(n^2)$  **[5]**
- b) Explain in detail Empirical measurement of performance of algorithms. **[5]**
- Q2)** a) Write Prim's minimum spanning tree algorithm and determine its time complexity. **[4]**
- b) Give and explain single source shortest path algorithm and all pair shortest paths in Graph. **[4]**
- Q3)** a) Explain with suitable examples Epsilon approximations. **[4]**
- b) Explain in details probabilistically good algorithms. **[4]**
- Q4)** a) Give divide and conquer algorithm for solving closest pair of points problem. **[4]**
- b) Give and explain Jarvis March Algorithm. **[4]**

**P.T.O.**

**Q5) a)** Solve the given problem by simplex method. **[4]**

$$\text{Max } Z = 107X_1 + X_2 + 2X_3$$

STC

$$14X_1 + X_2 - 6X_3 + 3X_4 = 7$$

$$16X_1 + 1/2X_2 - 6X_3 \leq 5$$

$$16X_1 - 8X_2 - X_3 \leq 0$$

$$X_1, X_2, X_3, X_4 \geq 0$$

b) Explain problem formulation for single source shortest path. Also Write algorithm. **[4]**

**Q6) a)** Obtain the dual problem of the following LPP **[4]**

$$\text{Max } Z = 2X_1 + 5X_2 + 6X_3$$

STC

$$5X_1 + 6X_2 - 4X_3 \leq 3$$

$$-2X_1 + X_2 + 4X_3 \leq 4$$

$$X_1 - 5X_2 + 3X_3 \leq 1$$

$$-3X_1 - 3X_2 + 7X_3 \leq 6$$

$$X_1, X_2, X_3 \geq 0$$

b) Explain problem formulation for vertex cover problem. Also Write algorithm. **[4]**

**Q7) a)** Give and explain inequalities and limit theorems. **[4]**

b) Explain random variable with suitable example. **[4]**

