P. Pages : 2 Time : Three Hours

Notes : 1. Solve any five questions.

- 2. All questions carry equal marks.
- 3. Due credit will be given to neatness and adequate dimensions.
- 4. Assume suitable data wherever necessary.
- **1.** a) Solve following recurrence relation using master method. Also find the values of constants.

 $T(n) = T(n/4) + \sqrt{n} + 4$ for $n \ge 4$ and T(1) = 4

- b) What is amortized analysis ? State it's types and explain any one of them.
- 2. a) What is topological sort ? Write algorithm for it and using example show how DAG can 5 be sorted topologically ?
 - b) Run Bellman Ford algorithm on following directed graph using vertex z as a source. In each pass relax edges & show the d & π values after each pass. Now change the weight of edge (z, x) to 4 & again run algorithm using s as the source.



- **3.** a) What is linear programming ? Explain it's various application.
 - b) Convert the following linear program to slack form Maximize

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2x_1 - 6x_3
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Subject to

$$x_{1} + x_{2} - x_{3} \le 7$$

$$3x_{1} - x_{2} \ge 8$$

$$-x_{1} + 2x_{2} + 2x_{3} \ge 0$$

$$x_{1}, x_{2}, x_{3} \ge 0$$

What are the basic and non basic variables.

GUG/W/16/3942

Max. Marks: 70

7

7

6 8

- **4.** a) Write recursive FFT algorithm.
 - b) Write insert, delete and adjust algorithm used in heap sort. Also explain complexity of **6** heap sort.
- 5. Show the execution of GRAHAM SCAN on the set of Q of following fig.



- 6. Explain Chinese remainder theorem. Give it's proof. Also apply Chinese remainder 14 theorem to the following equations & find out solution $a \equiv 2 \pmod{5}$ $a \equiv 3 \pmod{13}$
- 7. a)Explain approximation algorithm. Write an algorithm for vertex cover problem using
approximation principle.7
 - b) Explain the Miller Rabin randomized primality test.
- 8. a) Explain various types of information retrieval system.
 - b) What is data compression ? Explain compression and reconstruction with the help of 9 block diagram.

14

7

5