

Total No. of Questions : 8]

SEAT No. :

P4125

[Total No. of Pages :2

[4860]-328

M.E. (Computer Engineering)/(Computer Networks)

APPLIED ALGORITHMS

(2008 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

**SECTION-I**

**Q1)** a) Prove that [8]

$$1^2 + 2^2 + 3^2 + \dots + n^2 = n(n+1)(2n+1)/6$$

For all positive integers n.

- b) Explain the Bay's theorem and then use this Bay's theorem for the following example:

In the township there are 525 men and 634 women. 3% of men are color blind and 2% of women are color blind. Find the probability that individual is a woman. [8]

**Q2)** a) The Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, 34, ... is defined as

$$F_0 = 0, F_1 = 1, F_i = F_{i-1} + F_{i-2}, i \geq 1.$$

Represent this in the recursive SPARKS procedure. [8]

- b) If  $A(n) = a_m n^m + \dots + a_1 n + a_0$  is a polynomial of degree m then Prove  $A(n) = O(n^m)$ . [8]

**Q3)** a) Write a procedure which finds the mode and frequency of an unsorted array. Analyze its computing time. Is your method better than sorting? [8]

- b) Explain Binary search procedure based on Divide and Conquer strategy. [8]

**P.T.O.**

- Q4)** a) Explain Greedy method. Explain the knapsack problem with appropriate example. [9]
- b) Show that the computing time of algorithm OBST is  $O(n^2)$ . [9]

### **SECTION-II**

- Q5)** a) Write a short note on Absolute approximation. [8]
- b) Write a short note on Epsilon approximation. [8]
- Q6)** a) Devise an algorithm which accepts a number in decimal and produces the equivalent number in binary. [8]
- b) Obtain a nondeterministic algorithm of complexity  $O(n)$  to determine whether or not there is a subset of then numbers  $a_i$  where  $1 \leq i \leq n$  that sums to  $M$ . [8]
- Q7)** a) Compare CRCW and EREW algorithms. [8]
- b) Write short note on PRAM model. Explain with suitable example. [8]
- Q8)** a) State prefix computation problem. Write parallel algorithm for the same. State time complexity of this algorithm. [9]
- b) Explain with suitable example, pointer doubling problem. [9]

