Techno International New Town

FOURTH SEMESTER, 2021-22
Rajarhat

COMPUTER SCIENCE AND ENGINEERING

Design and Analysis of Algorithms

(submit within due date)

1. Write a program to sort a set of randomly generated integers (criteria's are given below)

   (a) Operation should be performed on different number of inputs (like 2000, 4000, 6000, 8000 and 10000)
   (b) Input should be generated randomly using pseudorandom function,
   (c) Plot a graph for different time consumption with respect to number of inputs.

2. Write a C Program to show the maximum number of scalar multiplications required to multiply a chain of six matrices, dimensions of which will be given in run time. Write down the algorithm behind your program. How did you know that this algorithm would work better than any other alternatives?

3. A tropical fish hobbyist had six different types of fish: Alphas, Betas, Certas, Deltas, Epsalas, and Fetas, which shall henceforth be designated by A, B, C, D, E, and F, respectively. Because of predator-prey relatinships, water conditions, and size, some fish can be kept in the same tank. The following table shows which fish cannot be together:

Type	A	B	C	D	E	F
Cannot be with	B, C	A ,C, E	A, B, D, E	C, F	B, C, F	D, E

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6. Write a backtracking C program to implement N queen problem which will show every possible solution of that problem instance. Value of N will be supplied by the user. Write down the algorithm of your program.

7. A cable TV company wants to lay cable to a new neighborhood to connect some houses. It is constrained to bury the cable only along certain paths. Cost of these cable depends on length and type of streets. Write an algorithm to determine minimum cost.

8. Write a greedy C program to implement Knapsack problem, where some object are allowed to be taken in fractions and some are not. Please take all the in-put regarding this problem dynamically from the user. An instance of your problem might look like following

   Weight of the Knapsack: 415 kgs

Object ID	1	2	3	4	5	6
Object Weight in kgs	100	80	90	110	75	85
Object Price in INR	400	480	630	660	225	850
Allowed To Take As A Fraction	yes	no	yes	no	no	yes

9. In a social networking site like Facebook, treat each user profile as a node on the graph and two nodes are said to be connected if they are each other's friends. Find number of connected profiles of a user, which can be visited using 5 intermediate nodes.

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