CLASS: M.Tech.   SEMESTER : II
BRANCH: CS+IT+IS   SESSION : SP/22

SUBJECT: CS 509 Advanced Computer Algorithm
TIME: 2 Hrs   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. All questions are compulsory.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1 (a) Assuming a problem P, which is to be solved by Divide-and-Conquer [5] paradigm, what would be your approach in terms of 3 important steps that you would focus upon? List the 3 criteria that mainly affects the running-time of a Divide-and-Conquer algorithm.

Q.1 (b) Discuss Greedy approach of solving a problem. Why does this approach fail [5] in producing an optimal solution? List the similarity and differences between Greedy algorithm and Dynamic Programming.

Q.2 (a) Define P, NP, NP hard and NP complete problems. [5]

Q.2 (b) Using CNF formula $F = (X_1 \lor X_2) \land (\overline{X_1} \lor \overline{X_2}) \land (X_1 \lor X_3)$, Show that [5] Clique-Decision-Problem is NP hard.

Q.3 (a) How does approximation factor influence any approximation algorithm? [5] What do you mean by PTAS and FPTAS?

Q.3 (b) Write a 2-approximation algorithm for Vertex Cover problem and then [5] prove that how your algorithm is 2-approximation

Q.4 Design a bitonic merging network for $n = 16$, that would sort the bitonic [10] sequence 3, 5, 8, 9, 10, 12, 14, 20, 95, 90, 60, 40, 35, 23, 18, 0, illustrating outcome of each column of comparators.

Q.5 (a) What is the purpose of randomized algorithms? How does it uses [5] probabilistic analysis? Explain with appropriate example

Q.5 (b) Present a randomized strategy for the problem of searching an unsorted [5] array, write pseudocode for your strategy.

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