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D-180284

B. Tech. EXAMINATION, 2018

Semester V (CBS)

ANALYSIS AND DESIGN OF ALGORITHM

(CSE, IT)

CS-506

Time : 3 Hours *Maximum Marks : 60*

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D of the question paper and all the subparts of the Section E (Compulsory).

Section A

1. (a) What do you mean by a recurrence relation ? Solve the following recurrence relation using interative expansion method :

(i) $$T(n)=\begin{cases}2T(n/2)+1, & n>1\\ 2, & n=1\end{cases}$$

(ii) $$T(n)=\begin{cases}2T(n/2)+Kn, & n>1\\ 2, & n=1\end{cases}$$

(b) What is Space Complexity ? With an example explain the components of fixed and variable part is space complexity. **6,6**

2. (a) Give the Big—O notation definition and briefly discuss with suitable example.

(b) Define Asymptotic notation. Distinguish between Asymptotic notation and Conditional asymptotic notation. **6,6**

Section B

3. (a) Sort the following set of elements using merge sort : 12, 24, 8, 71, 4, 23, 6, 89, 56.

(b) Explain about multistage graphs with example. **6,6**

4. (a) Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack instance : $n = 5$, $(p_1, p_2, \ldots\ldots, p_5) = (6, 15, 6, 8, 4)$, $(w_1, w_2, \ldots\ldots, w_5) = (4, 6, 3, 4, 2)$ and $m = 12$. Find an optimal solution using fixed-tuple sized approach.

(b) What are the advantages and disadvantages of Divide-And-Conquer ? 6,6

Section C

5. (a) Explan Bellman ford algorithm with example.

   (b) What is principle's of optimality ? Explain, how travelling sales person problem uses the dynamic programming techniques with example. 6,6

6. Explain difference between Prim's and Kruskal's minimum spanning Tree Algorithm. Derive the time complexity of Kurskal's algorithm. 12

Section D

7. (a) Implement an algorithm for Knapsack problem using NP hard approach.

   (b) State and prove cooks theorem. 6,6

8. (a) Explain bipartite matching with example.

   (b) Explain about the complexity classes P, NP and NP complete with suitable examples. 6,6

Section E

(Compulsory Question)

9. (a) What are the different mathematical notations used for algorithm analysis ?

(b) Write Control Abstraction of Greedy Method.

(c) Give the statement of reliability design problem.

(d) Describe and define any *three* Asymptotic Notations.

(e) Write Control Abstraction of Divide—and—Conquer.

(f) Find an optimal solution to the knapsack instance n = 4 objective and the capacity of knaspack m = 15, profits (6, 5, 7, 11) and weight are (3, 4, 3, 5). **2×6=12**