2608

Analysis & Design of Algorithms (New)
(1110)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Attempt **any two** sub questions from each unit.
6. Assume suitable data, if necessary.
7. Use of non programmable calculator is allowed.

UNIT - I

1. a) i) What is meant by time complexity ? Define different time complexity notations, give example one for each. **5**

   ii) Find the simplest form of the exact order of growth of the worst case time complexity of the max algorithm, assuming that each line of code take some constant time every time it is executed
   Procedure max (a_1, a_2 ..... a_n integers)
   $V = a_1$
   for i = 2 to n
   if a_i > V then V : = a_i
   return V. **5**

   b) i) Compare the efficiency of insertion and Merge sort ? **5**

   ii) $T(n) = 4T\left(\frac{n}{2}\right) + n^3$ solve the equation. **5**

   c) Write the insertion sort algorithm and calculate the best and worst case ? **10**

UNIT - II

2. a) Trace the quick sort algorithm to the sort the list C, O, L, L, E, G, E in alphabetical order and calculate the worst case and the best case for it. **10**

   b) Explain the Strassen's matrix multiplication concept with an example. **10**

c) i)   Write and explain the control abstraction of divide and conquer approach. **5**

ii) Analyze the hiring problem with indicator random variable. **5**

UNIT - III

3. a) i)   Define back tracking ? Describe the concept of backtracking by giving suitable example ? **5**

ii) Draw the search tree to color the graph with three colors ? **5**

b) Draw the tree organization of the 4 - queen solution space. Number the nodes using DFS and find atleast two solutions. **10**

c) Obtain the solution of the travelling sales person problem by using LCBB method. **10**

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{bmatrix}$$

UNIT - IV

4. a) i)   What are the differences between greedy and dynamic programming method of problem solving techniques ? **5**

ii) Explain the algorithm for job sequencing with deadlines. Applying the same, find the solution for the instance n = 4 (p1---p4) = (100, 10, 15, 27) and (d1---d4) = (2, 1, 2, 1). **5**

b) Solve the multistage graph using dynamic approach. **10**
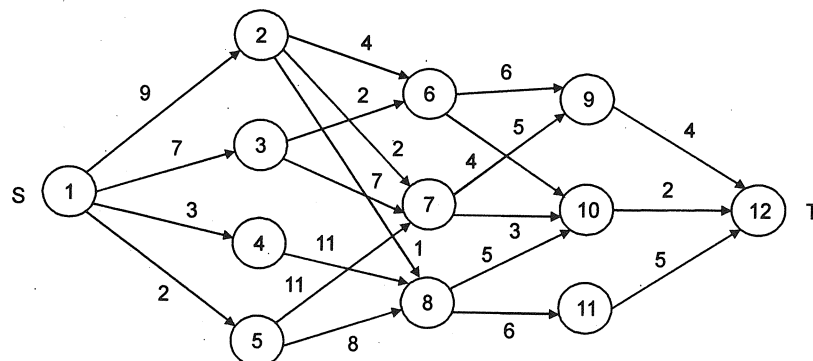
c) Obtain the four for given matrix using dynamic approach. **10**

$$\begin{bmatrix} 0 & 10 & 12 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

UNIT - V

5. a) State and explain cooks theorem. **10**

   b) i) Differentiate between Np complete and Np Hard problems. **5**

   ii) Explain approximation algorithm with example. **5**

   c) i) State the SAT Problem ? **5**

   ii) Describe the Code generation Problem. **5**

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