Total No. of Questions : 12]

SEAT No. :

P1152

[Total No. of Pages : 4

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May - June 2012

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Pattern) (Sem. - II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates :-

1) *Answer any 3 questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Find out the time complexity for the recurrence equation as follows: **[10]**

i) $T(n) = T(n/2) + 1$

ii) $T(n) = 2T(n/2) + n$

Also explain the above equations belongs to which searching/ sorting algorithms.

b) Write an algorithm to delete an element from a linked list. Also mention the worst case running time for this operation. **[8]**

OR

Q2) a) Consider the following algorithm **[12]**

```
ALGORITHM sum (n)
// Input : A non-negative integer n
S ← o
for i = 1 to n do
    s ← s + i
return s.
```

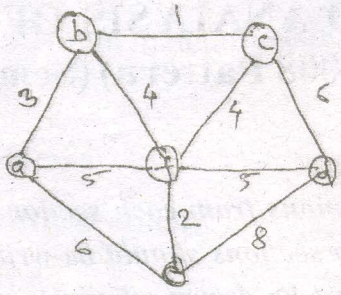
i) What does this algorithm computes?
ii) What is its basic operation?
iii) How many times the basic operations executed?
iv) What is the efficiency class of this algorithm?
v) Suggest an improved algorithm and indicate its efficiency class. If you cannot do it, try to prove that it cannot be done.

b) Setup and solve a Recurrence relation for the number of calls made by F(n), the recursive algorithms for computing n! **[6]**

P.T.O.

Q3) a) Explain the upper and lower hulls in the convex hull problem with an example. **[8]**

b) Analyze PRIMS algorithm of minimum spanning tree using greedy approach. Find the cost of minimum spanning tree of the give graph by using prims algorithm. **[8]**



OR

Q4) a) Find out minimum cost spanning tree using KRUSKAL algorithm. **[8]**

Edge	Cost	Edge	Cost
(V_1,V_7)	1	(V_4,V_5)	7
(V_3,V_4)	3	(V_1,V_2)	20
(V_2,V_7)	4	(V_1,V_6)	23
(V_3,V_7)	9	(V_5,V_7)	25
(V_2,V_3)	15	(V_5,V_6)	28
(V_4,V_7)	16	(V_6,V_7)	36

b) Construct the Huffman tree for the following data and obtain its Huffman code.. **[8]**

Character	A	B	C	D	E	–
Probability	0.5	0.35	0.5	0.1	0.4	0.2

Encode text DAD-BE using the above code.

Decode the text 1100110110 using above information.

Q5) a) Compare matrix generation for warshalls algorithm and floyds algorithm with suitable examples. **[8]**

b) Conside the knapsack problem : n = 3, $(W_1, W_2, W_3) = (2, 3, 4)$ $(P_1, P_2, P_3) = (1, 2, 5)$ and m = 6. Solve the problem using dynamic programming approach. **[8]**

OR

Q6) What is dynamic programming approach? Solve the following problem using dynamic approach. **[16]**

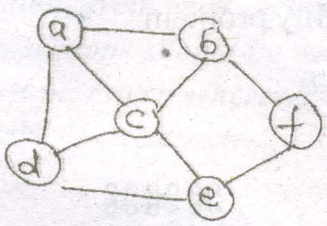
N = 4 and (a_1, a_2, a_3, a_4) = (do, if, int, while)

P(1:4) = (3, 3, 1, 1) and q(0, 4) = (2, 3, 1, 1, 1)

Compute and construct OBST for above value using Dynamic approach.

SECTION - II

Q7) a) Find the Hamitonion cycle by using backtracking approach for given graph. **[8]**



b) Find all possible solutions for five queen problem using backtracking approach. **[8]**

OR

Q8) Consider knapsack problem : n = 8, **[16]**

$(W_1, W_2, W_3, W_4, W_5, W_6, W_7, W_8)$ = (1, 11, 21, 23, 33, 43, 45, 55)

P = (11, 21, 31, 33, 43, 53, 55, 65), m = 110.

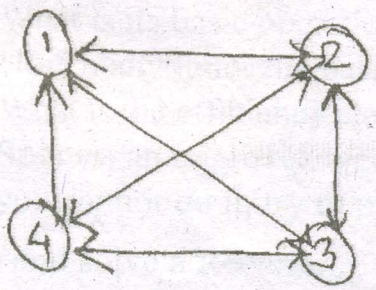
Solve the problem using backtracking approach.

Q9) a) What is LC search? How does it help in finding a solution for branch and bound algorithm. **[8]**

b) What is the differance between backtracking approach and branch and bound approach. Illustrate using 8 queens problem. **[8]**

OR

Q10) What is Travelling sales person problem? Find the solution of the following travelling salesperson problem using Dynamic approach and Branch & Bound approach. **[16]**



$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

*Q11)*a) Define NP-Hard and NP- Complete problems. Represent the relation between them. Prove that P is a subset of NP. **[8]**

b) Explain flow shop scheduling. Show that the Job sequencing with deadlines problem is NP-Hard. **[10]**

OR

*Q12)*a) Explain the cooks theorem in details with suitable example. **[8]**

b) Write short notes on : **[10]**

i) P and NP problems

ii) CNF- satisfability problem

iii) RSA - algorithm

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