Question Paper

Exam Date & Time: 22-Nov-2018 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCE THIRD SEMISTER B.Sc APPLIESD SCIENCES IN ENGG END SEMISTER NOV 2018 DESIGN AND ANALYSIS OF ALGORITHMS [CS 234]

Marks: 100

Duration: 180 mins.

Answer 5 out of 8 questions.

- What is algorithm? Give the notation used in an algorithm. ⁽⁶⁾
 Explain the various fundamentals of algorithmic problem solving
 - ^{B)} Write a note on various Asymptotic Notations .Explain with ⁽⁶⁾ example
 - C) Explain recursive solution to the Tower of Hanoi puzzle. Draw ⁽⁸⁾ the tree of recursive calls. Derive the recurrence relation to the number of moves made in Tower of Hanoi.
- ²⁾ Give the algorithm for MERGESORT and hence sort the list (10)A) 15,177,123,114,45,56,57 in ascending order.
 - ^{B)} Give an example to Compute two 4 digit 2101 * 1130 by ⁽⁴⁾ applying divide and conquer algorithm for large integer multiplication
 - ^{C)} Construct AVL tree for the list 5,6,8,3,2,4,7 step-by-step. ⁽⁶⁾ Mention balance factor and type of rotation at each stage if there is any rotation required.
- ³⁾ Write and explain brute force technique of String matching ⁽¹⁰⁾ algorithm. Give its time complexity in best and worst case. Simulate the algorithm on following Text and Pattern

JIM_SAW_ME_IN_A_BARBERSHOP : as Text

> BARBER : as Pattern

B)

(10)

Explain distribution counting method to sort for the following array.

13	11	12	13	12	12
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- 4) Give Éxpeansythelproplettiesution Headswitchvettampsleloexylandeteap same10) sort for the elements
 - $H[1:n] = \{2,10,8,7,6,9\}$. Show heap construction method as well as max deletion during Heap sort.
 - ^{B)} Apply Kruskal's algorithm to the following graph. Show step- ⁽¹⁰⁾ by-step solution to get the minimal spanning tree.



- ⁵⁾ Explain the dynamic programming algorithm to compute the ⁽¹⁰⁾ binomial of coefficient. Hence compute 6C3 using the same algorithm
 - ^{B)} Explain 2-3 tree and hence construct 2-3 tree for following (10) elements.
 9,5,8,3,2,4,7. Give its time efficiencies in inserting, deleting and searching.
- ⁶⁾ Write an algorithm for computing the mode in the given list of ${}^{(8)}$ elements using transform and conquer technique.
 - ^{B)} Write an algorithm to check for uniqueness of the element ⁽⁶⁾ using transform and conquer technique. Analyze the time complexity of the entire algorithm
 - ^{C)} Explain two versions of hashing for the following list of words. ⁽⁶⁾ A, FOOL, AND, HIS, MONEY, ARE, SOON,

PARTED

h(K) = sum of K's letters' positions in the alphabet MOD 13

Write an Floyd's algorithm to compute all pairs of shortest
 path of a graph.

Hence find the transitive closure of following graph.



- ^{B)} explain INSERTION SORT algorithm and trace the same for ⁽⁶⁾ following set of numbers to sort it in ascending order 189,145,168,190,129,134,117.
- ^{C)} Explain solving a knapsack problem by Memory function and find the optimal subset. ⁽⁶⁾

ITEM	WEIGHT	VALUE
1	2	12
2	1	10
3	3	20
4	2	15

⁸⁾ Write a note on cook's theorem

(4)

- A) B)
- What do you mean by variable length encoding ? Using ⁽⁸⁾ Huffman tree find encoding codeword for CABAB and DADA. Decode 011110011 from Huffman tree. Assume Symbols are A, B,C, D and _

and its frequencies respectively are 0.35, 0.1, 0.2, 0.2 and 0.15

^{C)} Write a note on exhaustive search . Give travelling salesman ⁽⁸⁾ problem for following graph. Find optimal solution.



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