Total No. of printed pages = 3



**MCA 182302**

Roll No. of candidate | | | | | | | | | | |

10/3/2021

**M.C.A. 3rd Semester End-Term Examination**

**DESIGN AND ANALYSIS OF ALGORITHMS**

**New regulation (W.e.f. 2017-18) & New Syllabus (W.e.f. 2018-19)**

Full Marks – 70 Time – Three hours

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The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the appropriate answer: (10 × 1 = 10)

(i) O-notation provides an asymptotic

(a) upper bound (b) lower bound

(c) light bound (d) none of these

(ii) In which sorting technique at every step each element is placed in its proper position?

(a) Bubble sort (b) Merge sort

(c) Heap sort (d) Quick sort

(iii) Optimal substructure property is exploited by

(a) Dynamic programming (b) Greedy method

(c) Both (a) and (b) (d) None of these

(iv) Steps of Divide and Conquer approach

(a) Divide, Conquer and Combine

(b) Combine, Conquer and Divide

(c) Combine, Divide and Conquer

(d) Divide, Combine and Conquer

[Turn over

(v) Which of the given options provides the increasing order of asymptotic complexity of functions $f_1, f_2, f_3$ and $f_4$?

$f_1(n)=2^n$
$f_2(n)=n^{(3/2)}$
$f_3(n)=n\lg n$
$f_4(n)=n^{\lg n}$



(a) $f_3, f_2, f_1, f_4$ (b) $f_2, f_3, f_1, f_4$

(c) $f_2, f_3, f_4, f_1$ (d) $f_3, f_2, f_4, f_1$

(vi) The complexity of searching an element from a set of $n$ elements using Binary search algorithm is

(a) $O(n\log n)$ (b) $O(\log n)$

(c) $O(n^2)$ (d) $O(n)$

(vii) For analyzing an algorithm which is better complexity time?

(a) $O(\lg n)$ (b) $O(n)$

(c) $O(2^n)$ (d) $O(\lg\lg n)$

(viii) Which case of Master's theorem is applicable in the recurrence relation $T(n)=0.5*T(n/2)+1/n$?

(a) Case 3

(b) Case 1

(c) Master's theorem is not applicable

(d) Case 2

(ix) Division Pattern of Problems in Divide and Conquer approach

(a) Iterative (b) Recursive

(c) Parallel (d) Random

(x) The running time of quick sort depends on the selection of.

(a) Selection of pivot elements

(b) Number of input

(c) Number of passes

(d) Arrangements of the elements

2. (a) He the asymptotic notations used in Analysis of algorithm.

(b) What is an algorithm? Write the characteristics of Algorithm. (1 + 5 = 6)

(c) What are the basic asymptotic efficiency classes? (3)

3. (a) Write the Insertion Sort algorithm and Analyze the time complexity for the best case and the worst case. (3 + 5 = 8)

(b) Merge sort and write the advantages of merge-sort. (5 + 2 = 7)

4. (a) Write sequence of operations in Quick sort for the array $A=<2,8,7,1,3,5,6,4>$. (5)

(b) What is a R-B tree? Explain with an appropriate example. (3 + 3 = 6)

(c) Write Insert and delete operation for the RB tree in Q.No.4b. (4)

5. (a) Explain Traveling Salesman Problem with suitable diagrams. (6)

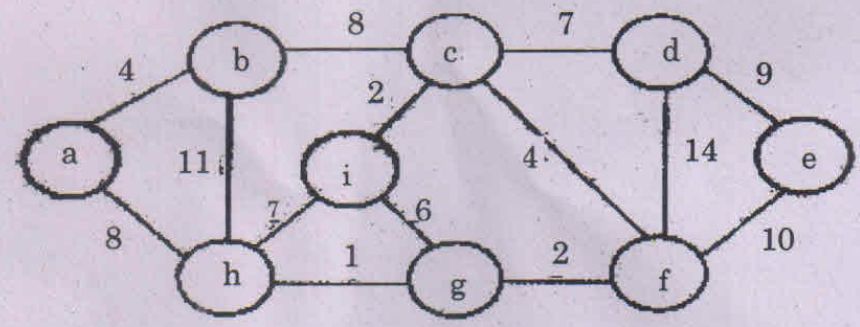
(b) Explain the Ford Fulkerson Algorithm using a suitable example. (6)

(c) Define maximum Bi-partie matching. (3)

6. (a) Differentiate between Greedy method and Dynamic programming. (6)

(b) Write the Floyd and War shall algorithm and explain with an example. (6)

(c) Apply Kruskal/s Algorithm to find minimum spanning tree on the following graph: (3)




7. Write short notes on (any *three*) : 3 × 5 = 15

(a) Recursion tree

(b) AVL and B Tree

(c) Problem classes

(d) Topological sort

(e) OS Tree.