BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Master of Computer Applications
Course Name – Design and Analysis of Algorithms
Course Code - MCA204
(Semester II)

Time : 1 Hr.15 Min.   Full Marks : 60

[The figure in the margin indicates full marks.]

Group-A
(Multiple Choice Type Question)   1 x 60=60

Choose the correct alternative from the following :

(1) Complexity of Tower of Hanoi problem is
  a) O (n)   b) $O(n^2)$
  c) $O(2^n)$ d) None of these

(2) o (g(n)) is [Read as small oh of g (n)] is
  a) asymptotically loose   b) asymptotically tight
  c) same as Big Oh   d) None of these

(3) There are _____ steps to solve the problem
  a) Seven   b) Four
  c) Six   d) Two

(4) 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)

(5) 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

(6) The worst-case time complexity of Bubble Sort is_____.
  a) $O(n^2)$ b) O(log n)
  c) O(n)   d) O(n logn)

(7) What is the result of the recurrences which fall under first case of Master's theorem (le

t the recurrence be given by $T(n)=aT(n/b)+f(n)$ and $f(n)=n^c$?

a) $T(n) = O(n^{\log_b a})$

b) $T(n) = O(n^c \log n)$

c) $T(n) = O(f(n))$

(8) Under what case of Master's theorem will the recurrence relation of binary search fall?

a) 1

b) 2

c) .3

d) It cannot be solved using master's theorem

(9) What is the objective of tower of Hanoi puzzle?

a) To move all disks to some other rod by following rules

b) To divide the disks equally among the three rods by following rules

c) To move all disks to some other rod in random order

d) To divide the disks equally among three rods in random order

(10) Two main measures for the efficiency of an algorithm are

a) Processor and memory

b) Complexity and capacity

c) Time and space

d) Data and space

(11) The time factor when determining the efficiency of algorithm is measured by

a) Counting microseconds

b) Counting the number of key operations

c) Counting the number of statements

d) Counting the kilobytes of algorithm

(12) The concept of order Big O is important because

a) It can be used to decide the best algorithm that solves a given problem

b) It determines the maximum size of a problem that can be solved in a given amount of time

c) It is the lower bound of the growth rate of algorithm

d) Both A and B

(13) Ω - notation provides an asymptotic

a) Upper bound

b) Lower bound

c) One that is sandwiched between the two bounds

d) None of these

(14) O- notation provides an asymptotic

a) Upper bound

b) Lower bound

c) Light bound

d) None of these

(15) Which of the following is used to depict the working of an algorithm?

a) Flow chart

b) Pseudo code

c) Source code

d) All of these

(16) for i = 1 to n do

begin

sum = sum +A[i];

if i == 100 then break;

end

the time complexity of the above algorithm is

a) O(1)

b) O(n)

c) O(n - 100)

d) None of these

(17) The time complexity of the expression $f(n) = 6*2^n + n^7$ using big-O notation is

a) $O(2^n)$

b) $O(n^7)$

c) $O(n \log_2 n)$

d) $O(n)$

(18) The average successful search time taken by binary search on a sorted array of 10 item is

a) 2.6

b) 2.8

c) 2.7

d) 2.9

(19) The space factor when determining the efficiency of algorithm is measured by

a) Counting the maximum memory needed by the algorithm

b) Counting the minimum memory needed by the algorithm

c) Counting the average memory needed by the algorithm

d) Counting the maximum disk space needed by the algorithm

(20) The Worst case occur in linear search algorithm when

a) Item is somewhere in the middle of the array

b) Item is not in the array at all

c) Item is the last element in the array

d) Item is the last element in the array or is not there at all

(21) The Average case occur in linear search algorithm

a) When Item is somewhere in the middle of the array

b) When Item is not in the array at all

c) When Item is the last element in the array

d) When Item is the last element in the array or is not there at all

(22) Which of the following data structure is not linear data structure?

a) Arrays

b) Linked lists

c) Both array and lined list

d) None of above

(23) The operation of processing each element in the list is known as

a) Sorting

b) Merging

c) Inserting

d) Traversal

(24) The Big-O notation of the expression $f(n) = n \log n + n^2 + e^{\log n}$ is

a) $O(n)$

b) $O(n^2)$

c) $O(n \log n)$

d) $O(e^{\log n})$

(25) Which of the following algorithm design techniques is used in the quick sort algorithm?

a) Dynamic Programming

b) Backtracking

c) Divide and conquer

d) greedy method

(26) Divide and conquer strategy is used in which of the following algorithms?

a) Merge sort and Selection sort

b) Quick sort and Computation of x^n

c) Both (a) and (b)

d) none of these

(27) Run Time of Merge Sort is

a) BIG O of N log N

b) Gamma of n log N

c) Theta of log N

d) Omega of N^2 log N

(28) The worst-case time complexity of Quick Sort is_____.

a)

b) $O(\log n)$

O(n²)

c) O(n)

d) O(n logn)

(29) Which of the following sorting algorithms does not have a worst case running time of O(n²) ?

a) Quick sort

b) Merge sort

c) Insertion sort

d) Bubble sort

(30) Which one of the following sorting algorithm is best suited to sort an array of 1 million elements?

a) Bubble sort

b) Insertion sort

c) Merge sort

d) Quick sort

(31) Apply Quick sort on a given sequence 7 11 14 6 9 4 3 12. What is the sequence after first phase, pivot is first element?

a) 6 4 3 7 11 9 14 12

b) 6 3 4 7 9 14 11 12

c) 7 6 14 11 9 4 3 12

d) 7 6 4 3 9 14 11 12

(32) Find the pivot element from the given input using median-of-three partitioning method. 8, 1, 4, 9, 6, 3, 5, 2, 7, 0.

a) 8

b) 7

c) 9

d) 6

(33) Minimum time required to solve tower of hanoi puzzle with 4 disks assuming one move takes 2 seconds, will be _____

a) 15 seconds

b) 30 seconds

c) 16 seconds

d) 32 seconds

(34) The best case behavior occurs for quick sort is, if partition splits the array of size n into _____

a) n/2 : (n/2) − 1

b) n/2 : n/3

c) n/4 : 3n/2

d) n/4 : 3n/4

(35) Consider the following heap after build heap phase. What will be its corresponding array?
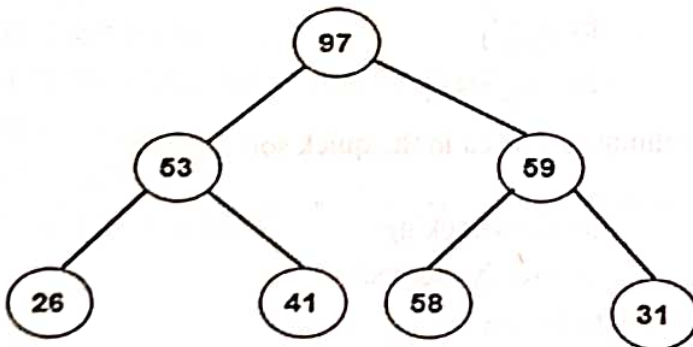
a) 26,53,41,97,58,59,31

b) 26,31,41,53,58,59,97

c) 26,41,53,97,31,58,59

d) 97,53,59,26,41,58,31

(36) Path Compression algorithm performs in which of the following operations?

a) Create operation

b) Insert operation

c) Find operation

d) Delete operation

(37) What is the depth of any tree if the union operation is performed by height?

a) O(N)   b) O(log N)
c) O(N log N)   d) O(M log N)

(38) Disjoint set data structure applicable to find

a) Minimum spanning tree
b) Minimum shortest path
c) Maximum spanning tree
d) Maximum path

(39) Select the algorithm which is not followed Dynamic Programming

a) 0/1 Knapsack Problem
b) Matrix Chain Multiplication
c) All Pair Shortest Path - Floyd Warshall Algorithm
d) Job sequencing with deadline

(40) Fractional knapsack problem is also known as _____

a) 0/1 knapsack problem
b) Continuous knapsack problem
c) Divisible knapsack problem
d) Non continuous knapsack problem

(41) What is the time complexity of Kruskal's algorithm?

a) $O(\log V)$
b) $O(E \log V)$
c) $O(E^2)$
d) $O(V \log E)$

(42) Consider the following statements.
S1. Kruskal's algorithm might produce a non-minimal spanning tree.
S2. Kruskal's algorithm can efficiently implemented using the disjoint-set data structure.

a) S1 is true but S2 is false
b) Both S1 and S2 are false
c) Both S1 and S2 are true
d) S2 is true but S1 is false

(43) Which of the following is true?

a) Prim's algorithm initializes with a vertex
b) Prim's algorithm initializes with a edge
c) Prim's algorithm initializes with a vertex which has smallest edge
d) Prim's algorithm initializes with a forest

(44) Consider the given graph.
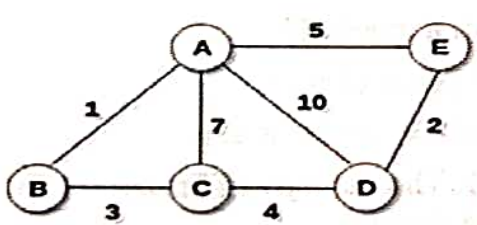
What is the weight of the minimum spanning tree using the Prim's algorithm, starting from vertex a?

a) 23
b) 28
c) 27
d) 10

(45) Which is optimal value in the case of job sequence problem item: 1 2 3 4 5 profit: 20 15 10 5 1 deadline: 2 2 3 3 3

a) (1,3,4)
b) (4,2,3)
c) (1,2,4)
d) none of these

(46) Which is optional value in the case of job sequence problem item: 1 2 3 4 5 6 7 profit: 3 5 20 18 1 6 30 deadlines: 1 3 4 3 2 1 2
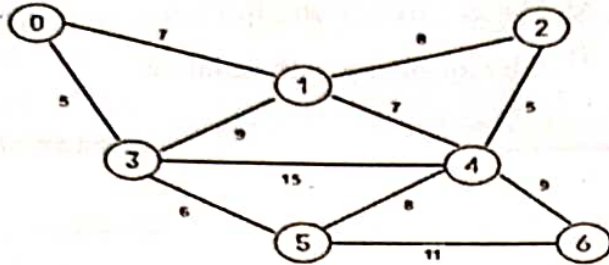
a) (1,5,6,4)
b) (7,6,4,3)
c) (2,3,1,7)
d) (6,7,4,3)

(47) Kruskal's algorithm is used to _____
   a) find minimum spanning tree
   b) find single source shortest path
   c) find all pair shortest path algorithm
   d) traverse the graph

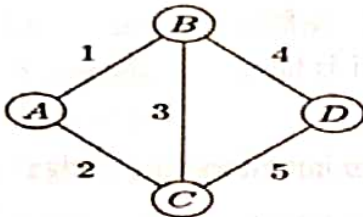(48) Consider the following graph. Using Kruskal's algorithm, which edge will be selected first?

   a) 0-1
   b) 1-2
   c) 2-4
   d) 1-3

(49) Which of the following edges form minimum spanning tree on the graph using kruskal s algorithm?

   a) AB, AC,BC
   b) AB,AC,BD
   c) AB,BD,DC
   d) None of these

(50) Which of the following is false in the case of a spanning tree of a graph G?
   a) It is tree that spans G
   b) It is a sub graph of the G
   c) It includes every vertex of the G
   d) It can be either cyclic or acyclic

(51) Given items as {value,weight} pairs {{40,20},{30,10},{20,5}}. The capacity of knaps ack = 20. Find the maximum value output assuming items to be divisible.
   a) 60
   b) 80
   c) 100
   d) 40

(52) Kruskal's algorithm is a _____
   a) divide and conquer algorithm
   b) dynamic programming algorithm
   c) greedy algorithm
   d) approximation algorithm

(53) If a problem can be broken into subproblems which are reused several times, the probl em possesses _____ property.
   a) Overlapping subproblems
   b) Optimal substructure
   c) Memorization
   d) Greedy

(54) What is the time complexity of the dynamic programming implementation of the Knap sack problem with n items and a maximum weight of W?
   a) O(n)
   b) O(n + w)

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

(55) Floyd- Warshall algorithm was proposed by _____
   a) Robert Floyd and Stephen Warshall   b) Stephen Floyd and Robert Warshall
   c) Bernad Floyd and Robert Warshall   d) Robert Floyd and Bernad Warshall

(56) Which of the following methods can be used to solve the matrix chain multiplication p
   roblem?
   a) Dynamic programming   b) Brute force
   c) Recursion   d) All of the mentioned

(57) Consider the two matrices P and Q which are 10 x 20 and 20 x 30 matrices respectivel
   y. What is the number of multiplications required to multiply the two matrices?
   a) 10 * 20   b) 10 * 20 * 20 * 30
   c) 10 * 30   d) 10 * 20 * 30

(58) What approach is being followed in Floyd Warshall Algorithm?
   a) Greedy technique   b) Dynamic Programming
   c) Linear Programming   d) Backtracking

(59) What is the time complexity of the dynamic programming implementation of the matri
   x chain problem?
   a) O(1)   b) O(n)
   c) $O(n^2)$ d) $O(n^3)$

(60) Bellmann Ford Algorithm is an example for _____
   a) Dynamic Programming   b) Greedy Algorithms
   c) Linear Programming   d) Branch and Bound