REV-01 MCA/46/51

MASTER OF COMPUTER APPLICATION SECOND SEMESTER DESIGN AND ANALYSIS OF ALGORITHM

MCA-204 [USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Objective)

SET

2024/06

Full Marks: 70

20

11	ime: 30 mins.		Marks:
CI	hoose the correct answer from the follow	cin	ng: 1×20=2
1.	Which of the following algorithms is an exama. Quick Sort c. Bellman-Ford algorithm	b.	le of a greedy algorithm? Dijkstra's shortest path algorithm Kruskal's algorithm for minimum spanning tree
2.	Which of the following is a dynamic program a. Longest Common Subsequence c. Depth First Search	b.	ning problem? Binary Search Breadth First Search
3.	Which of the following algorithms is used to vertices in a graph? a. Depth First Search c. Breadth First Search	b.	nd the shortest path between two Dijkstra's shortest path algorithm Bellman-Ford algorithm
4.	Consider a complete graph G with 4 vertices a. 15 b. 8 c. 16		
5.	Identify the best case time complexity of se a. $O(nlogn)$ b. $O(n^2)$ c. $O(n^2)$		tion sort. d. O (1)
6.	Hamiltonian path problem is: a. NP problem c. P Class problem		NP complete Problem N class Problem
7.	What is the result of the recurrences which fall theorem (let the recurrence be given by $T(n)=a'$ a. $T(n) = O(n\log_b a)$ c. $T(n) = O(n^c (\log n)^{k+1})$	T(n b.	der the extended second case of Master's /b)+f(n) and f(n)= $n^c(\log n)$ k? $T(n) = O(n^c \log n)$ $T(n) = O(n^2)$
8.	Which one of the following helps in calculation the completion of the algorithm?	ing	the longest amount of time taken for
	a. Theta notation c. Time Complexity		Big-Oh notation Omega notation
9.	The basic operation of thealgorithm and the array given.		
	c. Brute force	d.	Greedy Insertion sort
0.	is a concept wherein larger solution	ns	for problems are found based upon the

solution of a number of smaller problems.

a. Decrease and conquer

c. Branch and bound

USTM/COE/R-01

b. Divide and conquer

1 d. Backtracking

11. 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 subgraph of the G

c. It includes every vertex of the G

d. It can be either cyclic or acyclic

12. If a 2-regular graph contains 6 vertices then each of the vertices degree are: c. 12

a. 6

b. 8

d. 2

13. Which of the following is false?

a. The spanning trees do not have any cycles

c. Edge e belonging to a cut of the graph if has the weight smaller than any other edge in the same cut, then the edge e is present

b. MST have n - 1 edges if the graph has n edges d. Removing one edge from the spanning tree will not make the graph disconnected

14. Which of the following is true?

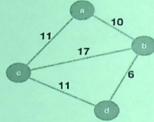
in all the MSTs of the graph

a. Prim's algorithm initialises with a vertex b. Prim's algorithm initialises with a edge

c. Prim's algorithm initialises with a vertex which has smallest edge

d. Prim's algorithm initialises with a forest

15. Consider the given graph



What is the weight of minimum spanning tree using the Prim's algorithm, starting from vertex a?

a. 23

b. 28

c. It never accepts cycles in the MST

c. 27

d. 11

16. Which of the following is false about Prim's algorithm?

a. It is a greedy algorithm

b. It constructs MST by selecting edges in increasing order of their weights

d. It can be implemented using the Fibonacci heap

17. Floyd Warshall Algorithm can be used for finding.....

a. Transitive closure c. Topological sort

b. Minimum spanning tree d. Single source shortest path

18. What approach is being followed in Floyd Warshall Algorithm?

a. Linear Programming c. Greedy technique

b. Backtracking

d. Dynamic Programming

19. Which of the following is an advantage of recursive bubble sort over its iterative version?

a. It has better time complexity

b. It has better space complexity

c. It is easy to implement

d. It has no significant advantage

20. Which of the following sorting algorithm is stable?

a. Selection sort

b. Quick sort

c. Bubble sort

d. Heap sort

[Descriptive]

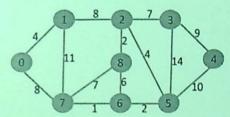
Time: 2 hr. 30 mins. Marks: 50

[Answer question no.1 & any four (4) from the rest]

- 1. What is Time Complexity and Space Complexity? What are the different factors of time complexity? Explain different Asymptotic notations in terms of Time Complexity.
- 2. a) What is tree method? Solve the recurrence relation. $T(n)=3T(n/4) + cn^2$ using tree method. 1+4=5
 - b) Analysis the time complexity of merge sort. 5
- 3. a) What is Master theorem? Solve the following recurrence relation using master theorem. T(n) = 4T(n/2) + n
- b) Find the complexity of the following recurrence relation. 5 T(n)=9T(n/3)+n
- the algorithm using best case, worst case and average case.

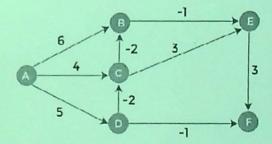
 5. a) Implement Dijkstra's algorithm and find out shortest path of the 5+5=10

4. Write the algorithm of Quick sort and analysis the time complexity of



given bellow graph.

b) Implement Bellman-Ford Algorithm to find out the shortest path of the given bellow graph.



- 6. a) Solve the recurrence relation. T(n)=2T(n/2)+n, T(1)=1
 - b) Write the algorithm of linear search algorithm.

5+5=10

10

7.	Analysis of Time Complexity of Binary Search Algorithm using Average case and also write the algorithm.	
3.	Explain forward and backward substitution methods with example.	10

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