Reg. No. : | | | | | | | | | | | | |

Question Paper Code : JK4208

M.C.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2017.

(From Academic Year – 2015 – New Question Paper Pattern)

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Abstract data type.

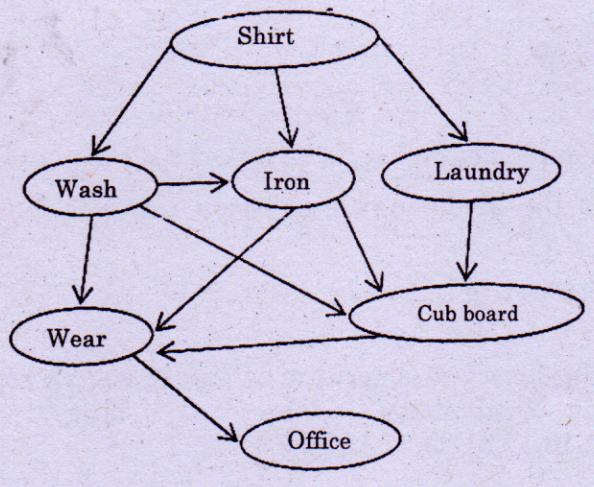
2. Convert the given infix expression into postfix expression. (A+B)*C-D.

3. What are the different traversing techniques used in binary trees?

4. How bit vectors of sets are implemented?

5. Differentiate between single source shortest path and all pairs shortest path.

6. Construct the minimum spanning tree for the given graph.



7. Arrange the given elements in ascending order using heap sort

33,12,44,5,16.

8. How to analyze recursive programs?

9. How branch and bound algorithms differ from divide and conquer algorithms?

10. Compare between local and global search algorithms.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Calculate the running time of the following algorithm. (7)

```
Start
Declare variables i, a,b, show
Initialize the variables, a = 0, b = 1 and show = 0
Enter the number of terms of Fibonacci series to be printed
Print First two terms of series
Useloop for the following steps
{
show = a + b
a = b
b = show
increase value of i each time by 1
print the value of show
}
End
```

(ii) Write the code to implement the following operations for linked queues. (6)

(1) Enqueue(7, 8, 5, 4, 6, 12)

(2) Dequeue( )

Or

(b) (i) How to implement a list using linked list? Explain. (7)

(ii) Convert the given infix expression into postfix expression using stack. (6)

A+b*c+(d*e+f)*g

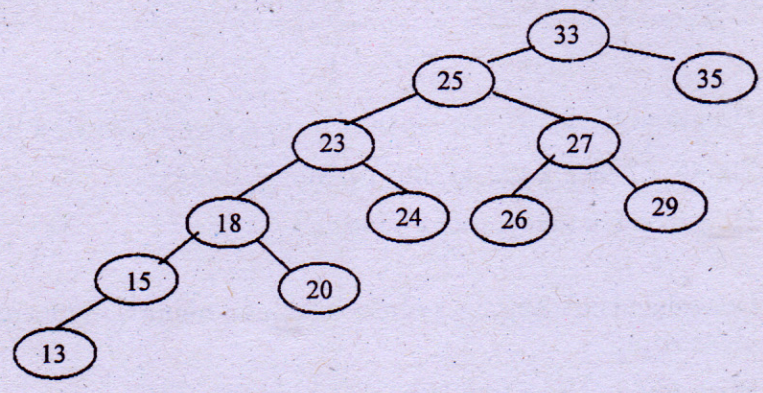
12. (a) (i) Write the insertion algorithm of binary search tree and insert the following numbers into a binary search tree 3,2,1,15,16,17,21,25,27,12,10,8,9,7. (7)

(ii) Define Sets ADT. Explain how union operation is implemented in sets. (6)

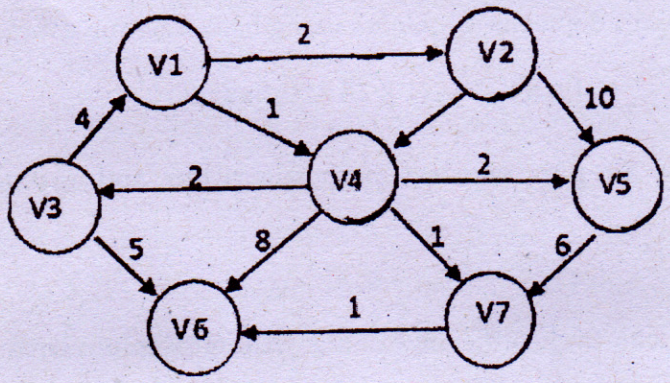
Or

(b) (i) Show the trie reference and compresses the structure of given data {ball, box, balloon, pen, pencil, peny,bat, boat, toy,tap, toss}. (7)

(ii) Balance the given binary search tree. (6)



13. (a) Given a directed graph whose edges have positive weights, use Dijstrka's algorithm to find the shortest path between a given source and destination. (13)

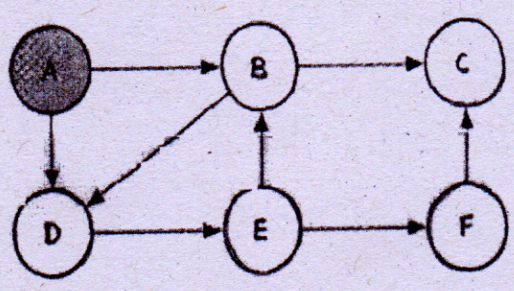


Or

(b) Do the following for the given graph (13)

(i) Implement DFS algorithm with A as source

(ii) Identify whether the graph is bi-connected if yes identify the articulation point.



14. (a) (i) Create and construct quick sort for the given list by considering the first element as pivot. (7)

(ii) Write the recursive algorithm of fibonacci series and analyze the same. (6)

Or

(b) (i) Create and construct heap sort for the given unsorted list (7)

23, 45, 67, 9, 33, 22, 11, 66, 74, 55.

(ii) How to solve recurrence equation? (6)

15. (a) (i) Discuss about closest points problem using Divide and Conquer algorithm. (7)

(ii) How greedy algorithm is implemented for file compression? Explain it with an example. (6)

Or

(b) (i) How to construct an optimal Binary search tree? (7)

(ii) Explain 8 queens' problems using backtracking concept. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Write the all pair shortest path algorithm and explain it with an example. (15)

Or

(b) How to calculate the efficiency of algorithms? Explain with an example. (15)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : KJ1359

M.C.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2017.

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Which data structure is used to perform recursion?

2. Calculate the address of the element a[2][4] of an array a[3][5] in row major order.

3. Give an ADT for union and intersection of set operation.

4. What is a trie? Give an example.

5. What is the disadvantage in using adjacency matrix for representing a graph?

6. Define strongly connected graph with an example.

7. Can we sort a set of pairs of numbers like {(1, 7), (2, 7), (5, 4), (3, 6)}? Give the result.

8. Perform insertion sort for the following elements: 34, 8, 64, 51, 32, 21. Show the result of all the passes.

9. What is the notion behind divide and conquer method?

10. Specify the relevance of Greedy method to solve Knapsack problem.

PART B — (5 × 16 = 80 marks)

11. (a) Write an algorithm to perform the following operation on a doubly linked list :

(i) Insert new node at the beginning of list.

(ii) Insert new node at middle.

(iii) Delete a node in the middle and last.

Or

(b) Suppose a queue is maintained by a circular array QUEUE with N=12 memory cells. Find the number of elements in queue if

(i) FRONT = 4, REAR = 8

(ii) FRONT = 10, REAR = 3

(iii) FRONT = 5, REAR = 6 and then elements are deleted.

12. (a) (i) Draw an binary tree for the given expression $A * B - (C + D) * (P / Q)$. (6)

(ii) Give the implementation of Balanced tree with an example. (10)

Or

(b) Solve the all-pairs shortest path problem for the digraph with the weight matrix given below :

	A	B	C	D
A	0	∞	∞	3
B	2	0	∞	∞
C	∞	7	0	1
D	6	∞	∞	0

13. (a) (i) Write the importance of articulation points. Give an example and write an algorithm to identify them. (8)

(ii) Explain graph matching with an example. (8)

Or

(b) Draw the B-tree of order 3 created by inserting the following data arriving in sequence 92 24 6 7 11 8 22 4 5 16 19 20 78.

14. (a) For each of the sorting algorithms insertion-sort and merge-sort, show the array after each successive exchange operation starting the initial array [3, 2, 4, 5, 1, 0].

Or

(b) Give an algorithm for quick sort and also compute its complexity.

15. (a) (i) Write a pseudo code for a divide and conquer algorithm for merging two sorted arrays into a single sorted one. Explain with an example. (8)

(ii) Write a program to allocate memory dynamically for strings and store their addresses in array of pointers to string. (8)

Or

(b) (i) Prove that any algorithm that works by comparing keys to find the second largest from a set of n keys must do at least $n + \log n - 2$ comparisons in the worst case. (8)

(ii) Describe the Travelling salesman problem and discuss how to solve it using dynamic programming. (8)

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Question Paper Code : K1359

M.C.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2016.

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

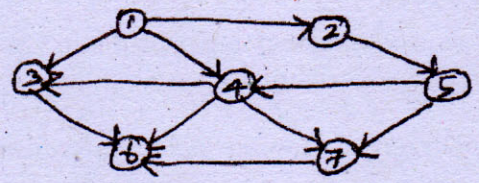
1. Write any two applications of stack.

2. Discuss best-case time analysis for linear search algorithm.

3. What is the time complexity of binary search tree?

4. What do you mean by disjoint set?

5. Write down the adjacency matrix of the graph.



6. Define minimum spanning tree.

7. Write the average case and worst case time complexity of

   (a) Selection sort

   (b) Insertion sort.

8. Arrange the given array using bubble sort. {12, 4, 5, 10, 1}.

9. Compare backtracking and branch-and-bound.

10. Give any two properties of dynamic programming.

PART B — (5 × 16 = 80 marks)

11. (a) Write an algorithm to convert infix expression to postfix expression. Trace the algorithm using one example and show the stack contents. (16)

Or

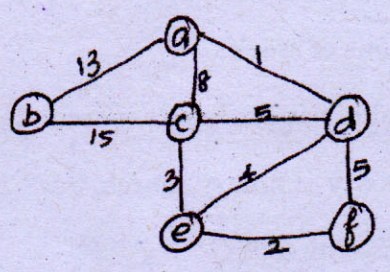
(b) Discuss the doubly linked list and algorithm for the operations that can be performed on them in detail. (16)

12. (a) Explain how to find a maximum element and minimum element in BST. Explain in detail about deletion in Binary Search Tree. (16)

Or

(b) Write the procedure to implement single and double rotation while inserting nodes in an AVL trees. (16)

13. (a) (i) Find minimum cost spanning tree for the following weighted graph. (10)



(ii) Explain the application of DFS. (6)

Or

(b) What is single source shortest path problem? Discuss Dijikstra's single source shortest path algorithm with an example. (16)

14. (a) (i) What is recurrence? How to solve recurrence problem? (8)

(ii) Give the radix sort algorithm in detail. (8)

Or

(b) Write the routine for sorting n elements in increasing order using heap sort. (16)

15. (a) Explain N-queens problem using back-tracking technique. (16)

Or

(b) Explain travelling salesman problem using branch and bound technique. (16)

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Reg. No. | | | | | | | | | | | | |

Question Paper Code : J1398

M.C.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2016.

(From Academic Year – 2015 – New Question Paper Pattern)

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ADT.

2. Why do we need data structures?

3. What is the maximum number of nodes in any sample binary tree?

4. What is Trie?

5. What is articulation point?

6. Define Minimum Spanning Tree.

7. How you calculate the efficiency of algorithms?

8. What are the different methods of solving Recurrence relations?

9. List out any two local search algorithms.

10. How to find the solution for 8-Queens problem?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Write an algorithm for Insertion, deletion on Queues. (7)

(ii) Write an algorithm for push and pop operation on stack. (6)

Or

(b) Explain in detail how to calculate the Running time of recursive procedure to find factorial of a given number. (13)

12. (a) (i) Explain the algorithm to construct an expression tree? (7)

(ii) What are the different tree traversal techniques? Explain with examples. (6)

Or

(b) Write the data structure to bit vector implementation of Set and procedures to perform set operations. (13)

13. (a) Explain about Dijkstra's Algorithm to find shortest path with suitable example. (13)

Or

(b) Consider the basic block given below and Draw the DAG. (13)

$A = b + c$
$c = a + d$
$d = b + c$
$e = d - b$
$a = e + b$

Find the minimum number of nodes and edges present in the DAG representation.

14. (a) Write the procedure to implement the quick sort method to sort the following values 13, 81, 43, 31, 92, 10, 57, 26, 65, 75. (13)

Or

(b) Explain in detail of the procedure to implement heap sort with an example. (13)

15. (a) Write the dynamic programming algorithm to solve knapsack problem. (13)

Or

(b) (i) Define Backtracking and apply backtracking to the problem of finding Hamiltonian circuit. (7)

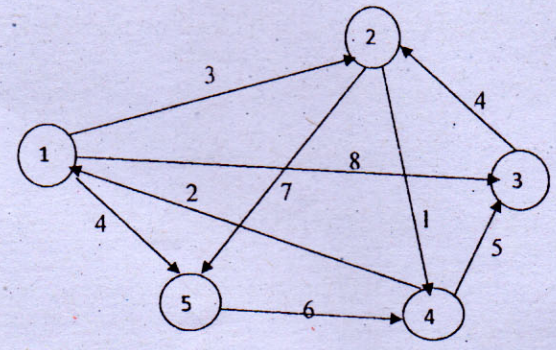
(ii) Write short notes on Greedy algorithm. (6)

PART C — (1 × 15 = 15 marks)

16. (a) For the given graph

(i) Find the shortest path from vertex 1 to all other vertices. (7)

(ii) Find the shortest path from each vertex to all other vertices. Mention and use the appropriate algorithm. (8)



Or

(b) Explain the procedure to perform insertion of Binary search tree with the given values

(i) Construct BST: 48,57,17,54,29,7,36,89,30 (7)

(ii) Delete 17 and 37. (8)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : S1359

M.C.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2016.

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the basic operations that can be performed on the data structures?

2. Is it possible to insert different type of elements in a stack? How?

3. Draw a binary Tree for the expression : A * B – (C + D) * (P / Q) .

4. In an AVL tree, at what condition the balancing is to be done?

5. Define directed graph and undirected graph.

6. How to represent the traversing technique in tree and graph?

7. Create a heap with following list of keys :

   8, 20, 9, 4, 15, 10, 7, 22, 3, 12

8. Give the types of sorting with example.

9. Define Divide and Conquer Strategy.

10. List the application for Backtracking technique.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write an algorithm to insert, delete a node in the beginning of the linked list. (12)

    (ii) Write a procedure to reverse a singly linked list. (4)

Or

(b) Let P be a pointer to a singly linked list. Show how this list may be used as a stack. That is, write algorithms to push and pop elements. Specify the value of P when the stack is empty. (16)

12. (a) Make a Binary Search Tree for the following sequence of numbers. (16)

45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48

Traverse the tree inorder, preorder and postorder.

Or

(b) Explain the construction of balanced trees with an example. (16)

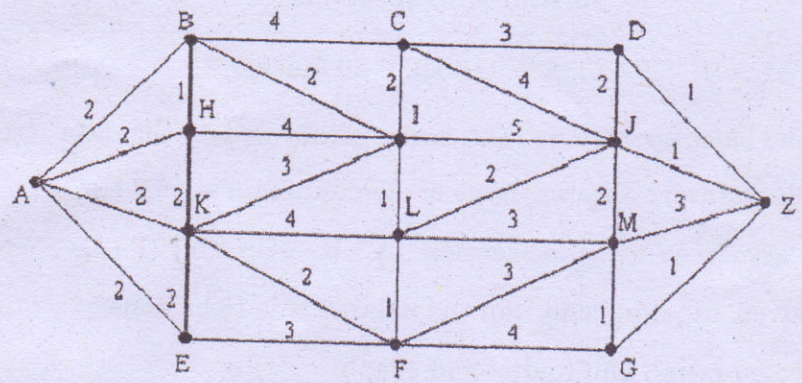
13. (a) Explain the minimum spanning tree algorithms with an example. (16)

Or

(b) (i) Write short notes on Biconnectivity. (4)

(ii) Explain Dijkstra's algorithm for finding the shortest path in a given graph. (12)

Find the shortest path from A to Z using Dijkstra's Algorithm.



14. (a) What is quick sort? Sort the following array using quick sort method and analyze the algorithm. (16)

24 6 47 35 10 90 82 31

Or

(b) Write a short notes on efficiency and analysis of an algorithm. (16)

15. (a) (i) Explain the Knapsack problem with an example using greedy method. (10)

(ii) Write short notes about Eight Queens Problem using Back tracking technique. (6)

Or

(b) Describe about the design methods of an algorithm with an application. (16)

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 80359

M.C.A. DEGREE EXAMINATION, AUGUST 2015.

Second Semester

DMC 7203 – DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Abstract data type. Give example.

2. What is a recursive procedure? Give example.

3. What is a BST? List its advantages.

4. Define trie. Give example.

5. What is a MST? Give its algorithmic constraints.

6. Illustrate biconneeted components.

7. List the parameters for analysis of algorithms.

8. Name the types of sorting schemes. Give example under each.

9. Define backtracking algorithmic technique.

10. Give the names of any two realtime problems and its respective algorithmic techniques used for solving it.

PART B — (5 × 16 = 80 marks)

11. (a) Explain circular queues and describe its operation with corresponding algorithms. (16)

Or

(b) Illustrate the following with its algorithm

(i) evaluation of postfix expression. (8)

(ii) addition of sparse matrices. (8)

12. (a) What is a balanced tree? Explain with algorithm for deletion of a node from BST. (16)

Or

(b) Describe

(i) Binary tree recursive traversals (10)

(ii) set operations. (6)

13. (a) Illustrate all pairs shortest path algorithm fro graph with six vertices. (16)

Or

(b) Explain

(i) Kruskal's algorithm. (8)

(ii) Application of graph. (8)

14. (a) Perform quick sort for the following data and give its algorithm

05, 100, 105, 99, 44, 01, 03, 55, 97, 45. (16)

Or

(b) Analyse

(i) towers of Hanoi for n=5. (8)

(ii) bin sorting technique. (8)

15. (a) Discuss on dynamic programming technique with an example. (16)

Or

(b) Write short notes on

(i) greedy technique (8)

(ii) binary search (8)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 22361

M.C.A. DEGREE EXAMINATION, FEBRUARY/MARCH 2015.

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define abstract data type.

2. What is the running time for binary search and linear search?

3. Draw different possible trees whose preorder traversal is ABC.

4. List different operations performed on sets.

5. What do you meant by articulation points in a graph?

6. Write the different representation method of directed graph.

7. Write the best case, average case and worst case run time complexity of quick sort.

8. Define recursion.

9. Write the advantages and disadvantages of greedy algorithms.

10. List the different problems which can be solved by dynamic programming.

PART B — (5 × 16 = 80 marks)

11. (a) Write an algorithm that accepts a linked list, traverse it, and returns the data in the mode with the minimum key value.

Or

(b) Write a function to check if the contents of two stacks are identical. Neither stack is to be changed.

12. (a) A binary tree has 10 nodes. The inorder and preorder traversal of the tree are shown below. Draw the tree

Pre order : JCBADEFIGH

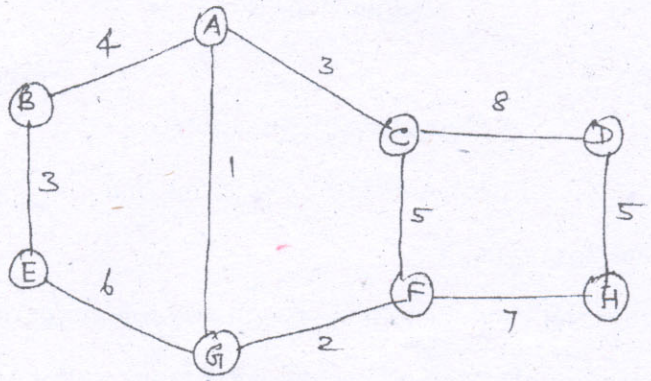
Inorder : ABCEDFJGIH

Or

(b) (i) Explain about Bit-vector implementation of sets. (8)

(ii) Write algorithm to insert a node in binary search tree. (8)

13. (a) Find the minimum spanning tree to the following graph.



Or

(b) Write algorithm to perform single source shortest path problem.

14. (a) An array contains the elements shown below. What would be the value of the elements in the array after three passes of the heap sort algorithm?

44, 78, 22, 7, 98, 56, 34, 2, 38, 35, 45.

Or

(b) Write a recursive algorithm to add the first n elements of the series

$$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\ldots\ldots+\frac{1}{n}$$

15. (a) You are given a currency system with coins of (decreasing) value $C_1, C_2, \ldots\ldots C_N$ rupees. Give an algorithm that computes the minimum number of coins required to give K rupees in change.

Or

(b) Explain the basic principles of dynamic programming with an example.

Reg. No. : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code : 46358

M.C.A. DEGREE EXAMINATION, AUGUST 2014.

Second Semester

DMC 7203 — DATA STRUCTURES AND ALGORITHMS

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define data structures.

2. What is recursion?

3. Give the time complexity of binary search and linear search.

4. What is a trie?

5. What is a MST?

6. Define directed acyclic graphs.

7. Write the steps for bin sorting.

8. How do you measure the efficiency of algorithms?

9. Write an recursive algorithm for towers of Hanoi.

10. Name the algorithm design techniques.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the operations on stacks and write the algorithms. (16)

Or

(b) With respective algorithms explain the insertion and deletion operations in lists. (16)

12. (a) How is a binary tree traversed? Give its algorithm. (16)

Or

(b) Illustrate the insertion and deletion of nodes in BST. (16)

13. (a) What are articulation points? Give example and write an algorithm to identify them. (16)

Or

(b) With an example and algorithm explain the graph traversal techniques. (16)

14. (a) Illustrate quick sort and give its algorithm for $n = 10$. (16)

Or

(b) Perform heap sort for $n = 15$ and give its algorithm. (16)

15. (a) What is back tracking? Explain with example. (16)

Or

(b) How is dynamic programming useful to solve a problem? Give example. (16)