**UNIVERSITY COLLEGE OF ENGINEERING**

**(BIT CAMPUS), TIRUCHIRAPPALLI-620 024**

**DEPARTMENT OF CSE / IT**

**EC8393 FUNDAMENTALS OF DATA STRUCTURE IN C**

**II- YEAR III - SEM**

**ACADEMIC YEAR: 2018-19 - ODD SEMESTER**

**Prepared by**

Mr.K.Saravana kumar

Teaching Fellow

Department of IT

BIT Campus

Tiruchirappalli

**EC8393 FUNDAMENTALS OF DATASTRUCTURES IN C**

**UNIT I C PROGRAMMING BASICS**

Structure of a C Program-compilation and linking processes-Constants, variables-Data Types-Expressions using operators in C-Managing input and output operations-Decision making and branching-Looping statements. Arrays-Initialization-Declaration-One dimensional and two dimensional arrays-Strings-String operations-String Arrays-Simple programs-sorting-searching-matrix operation

**PART-A**

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| **Q.** |  | **BT** |  |  |
| **No** | **Questions** | **Level** | **Competence** |  |
| 1 | **Distinguish** between high level language and low level | BTL -4 | Analyzing |  |
| language. |  |
|  |  |  |  |
| 2 | **Compare** the Compiler and Interpreter. | BTL -2 | Understanding |  |
| 3 | **Define** programming language. | BTL -1 | Remembering |  |
| 4 | **Tell** the use of return type of printf() & scanf(). | BTL -1 | Remembering |  |
| 5 | **Assess** what operation is performed when the %f, %e and%g | BTL -5 | Evaluating |  |
| format specifies are used to display the value. |  |
|  |  |  |  |
| 6 | **What** is a variable? | BTL -1 | Remembering |  |
| 7 | **Compare and contrast** the prefix and postfix forms of the ++ | BTL -2 | Understanding |  |
| operator. |  |
|  |  |  |  |
| 8 | **Distinguish** the terms Break and Continue. | BTL -4 | Analyzing |  |
| 9 | **Name** the use of EOF. | BTL -1 | Remembering |  |
| 10 | **Explain** the various form of looping statement. | BTL -5 | Evaluating |  |
| 11 | **Create** a C code to print thetext “Data Structures” using the arrays. | BTL -6 | Creating |  |
| 12 | Write the syntax of array declaration **with** an example. | BTL -3 | Applying |  |
| 13 | **Identify** the purpose of null statement. | BTL -3 | Applying |  |
| 14 | **Analyze** the need of null character at the end of string. | BTL -4 | Analyzing |  |
| 15 | **Discuss** the types of I/O statements available in C. | BTL -6 | Creating |  |
| 16 | **How** would you initialize the size of an array. | BTL -1 | Remembering |  |
| 17 | **Show** the declaration of a string. | BTL -2 | Understanding |  |
| 18 | **Identify** the features of array. | BTL -3 | Applying |  |
| 19 | **Show** the c code that narrates the difference between do-while | BTL -2 | Understanding |  |

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|  | and while loop. | |  |  |  |  |
| 20 | **Write** a program using conditional operators to determine | |  | BTL -1 | Remembering |  |
| Whether a year entered is leap year or not. | |  |  |
|  |  |  |  |  |
|  |  | **PART-B** |  |  |  |  |
| **Q.** |  |  |  |  |  |  |
| **No** |  | **Questions** |  | **BT Level** | **Competence** |  |
| 1 | **Explain** the constants, expressions and statements in C. | | (13) | BTL -2 | Understanding |  |
| 2 | i ) | **Compare** various types of operators in C. | (6) | BTL -4 | Analyzing |  |
|  |  |  |  |  |  |
|  | ii) | **List** and explain the various data types in C | (7) |  |  |  |
| 3 | **Describe** the structure of a C program with an example. | | (13) | BTL -1 | Remembering |  |

1. i) **Write** a Program to find the area and circumference of a

|  |  |  |
| --- | --- | --- |
| circle with radius r. | (6) BTL -1 | Remembering |
| ii) **Write** a program to find the sum of first 100 integers. | (7) |  |

1. i) Write a C program to **find** whether the given year is leap

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|  | year or not. | | (7) | BTL -1 | Remembering |  |
|  | ii) Write a C program to **find** whether the given number is | | |  |
|  |  |  |  |
|  | palindrome or not using C. | | (6) |  |  |  |
| 6 | **Compose** a program to narrate about ‘for’, ‘while’ and ‘do | |  | BTL -6 | Creating |  |
|  | while’ looping statements. | | (13) |  |
|  |  |  |  |
| 7 | i) | **Assess** C code for the reverse of a number. | (7) |  |  |  |
|  | ii) Write a C program to **determine** the roots of quadratic | |  | BTL -5 | Evaluating |  |
|  | equation. | | (6) |  |  |  |
| 8 | i) | **Summarize** the need of array variables. Describe it with | |  |  |  |
|  |  | respect to arrays. Declaration of array & initialization. (6) | | BTL- 2 | Understanding |  |
|  | ii) | **Demonstrate** a Program to reorder a one dimensional |  |  |
|  |  |  |  |  |
|  |  | array. | (7) |  |  |  |
| 9 | **What** is a two dimensional array explain its initialization? (13) BTL -1 | | | | Remembering |  |

1. i) **Develop** a C program for performing Matrix operations. (6)

|  |  |  |  |  |  |
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|  | ii) **Identify** and explain the various ways of reading and |  | BTL- 3 | Applying |  |
|  | writing string in c. | (7) |  |  |  |
| 11 | **Distinguish** Two dimensional and one dimensional array and |  | BTL- 4 | Analyzing |  |
|  | explain it with example. And initialize it with example. | (13) |  |
|  |  |  |  |
| 12 | Write and **explain** a C program to find the given number is | | BTL-2 | Understanding |  |
|  | palindrome or not without using string function. | (13) |  |
|  |  |  |  |

1. Write Short note on the following **with** examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | i) String and character array . | (6) | BTL -3 | Applying |
|  | ii) String input & output. | (7) |  |  |
| 14**Analyze** the various string functions with example. | | (13) | BTL -4 | Analyzing |
|  | **PART-C** |  |  |  |
| **Q.** | **Questions** |  | **BT Level** | **Competence** |

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| **No** |  |  |  |  |  |
| 1 | **Explain** the terms keywords, identifiers, character set, constants and | | BTL -5 | Evaluating |  |
|  | variables along with examples. | (15) |  |
|  |  |  |  |
| 2 | **Develop** a C program for the following: |  | BTL-6 | Creating |  |
|  | i) To find the area and circumference of the circle. | (7) |  |
|  | ii) To find the sum of 100 integers. | (8) |  |  |  |
| 3 | **Examine** the working of various string functions such as |  | BTL -4 | Analyzing |  |
|  | strlen(),strcpy(),strcat(),strcmp(). | (15) |  |  |
|  |  |  |  |
| 4 | **Formulate** a C program to search an element from an array. | (15) | BTL-6 | Creating |  |

**UNIT II FUNCTIONS,POINTERS,STRUCTURES AND UNIONS**

Functions-Pass by value-Pass by reference-Recursion-Pointers-Definition-Initialization-Pointers Arithmetic-Structures and unions-definition-Structure within a structure-Union-Programs using structures and unions-Storage class-Preprocessor directives.

**PART-A**

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| **Q.** |  | **BT** |  |  |
| **No** | **Questions** | **Level** | **Competence** |  |
| 1 | **Define** the term user-defined function | BTL -1 | Remembering |  |
| 2 | **Support** your views on a function call with example. | BTL -5 | Evaluating |  |
| 3 | **Invent** the meaning of default arguments and command line | BTL -6 | Creating |  |
| arguments. |  |
|  |  |  |  |
| 4 | **Develop** the function declaration and definition with example. | BTL -3 | Applying |  |
| 5 | **List** out the use of library function. | BTL -1 | Remembering |  |
| 6 | **Show** the declaration of pointer along with definition. | BTL -2 | Understanding |  |
| 7 | **What** is pointer arithmetic? | BTL -1 | Remembering |  |
| 8 | **Define** void pointer and null pointer. | BTL -1 | Remembering |  |
| 9 | **Examine** the term recursive function. | BTL -4 | Analyzing |  |
| 10 | **Evaluate** the meaning of function pointer. | BTL -5 | Evaluating |  |
| 11 | **What** is term structure? | BTL -1 | Remembering |  |
| 12 | Perform various operations that **make use of** structure. | BTL -3 | Applying |  |
| 13 | **Find** the use of operator on structure. | BTL -1 | Remembering |  |
| 14 | **Distinguish** Structure and array. | BTL-4 | Analyzing |  |
| 15 | **Illustrate** the need of typedef. | BTL -2 | Understanding |  |
| 16 | **Apply** your view on the term Union in C | BTL -3 | Applying |  |
| 17 | **Discuss** the operators used to access the structure members. | BTL -6 | Creating |  |
| 18 | **Extend** your views about malloc and calloc. | BTL -2 | Understanding |  |
| 19 | **Compare** the types of memory allocation. | BTL -4 | Analyzing |  |
| 20 | **Summarize** on initializing Unions. | BTL -2 | Understanding |  |

**PART-B**

|  |  |  |  |  |  |  |  |
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| **Q.** |  |  |  |  |  |  |  |
| **No** |  | **Questions** |  |  | **BT Level** | **Competence** |  |
| 1 | i) | **Interpret** function declaration and function definition. | (6) |  | BTL -2 | Understanding |  |
|  | ii) **Summarize** examples for the above. | | (7) |  |  |
|  |  |  |  |  |
| 2 | i) **Compose** a C program on computation of Sine series. | | (6) |  | BTL -6 | Creating |  |
|  | ii) | **Formulate** the applications of recursive function. | (7) |  |  |
|  |  |  |  |  |
| 3 | **Analyze** and write a C program to demonstrate the scientific | | | | BTL -4 | Analyzing |  |
|  | calculator using built-in functions. | | (13) |  |  |
|  |  |  |  |  |
| 4 | **List out** the operations performed by pointers with example. | | | | BTL -1 | Remembering |  |
|  |  |  | (13) |  |  |
|  |  |  |  |  |  |  |
| 5 | **Explain** in detail about i) Array of pointers. | | (6) |  | BTL -2 | Understanding |  |
|  |  | ii) Passing arrays to functions. | (7) |  |  |
|  |  |  |  |  |  |
| 6 | i) | **What** is fixed argument functions? Explain. | (6) |  | BTL -1 | Remembering |  |
|  | ii) | **What** is a variable argument function? Explain. | (7) |  |  |
|  |  |  |  |  |
| 7 | i) | **Criticize** on changing the value of a variable using pass by |  |  | BTL-5 | Evaluating |  |
|  |  | reference. | (6) |  |  |
|  | ii) **Evaluate** the program for swapping of two numbers. | | (7) |  |  |  |  |
| 8 | i) | **Develop** the code for preparing student mark statement. | (6) |  | BTL- 3 | Applying |  |
|  | ii) **Build** your understanding about functions and structures. | | (7) |  |  |
|  |  |  |  |  |
| 9 | **Explain** the structure with data member of various types and declare | | | |  | Understanding |  |
|  | two structure variable. Write a program to read data into these and | | | | BTL -2 |  |
|  | print the same. Define structure. | | (13) |  |  |  |  |
| 10 | **Examine** about structures and its operations. | | (13) |  | BTL -4 | Analyzing |  |
| 11 | i) | **Tell** about self-referential structures. | (6) |  |  |  |  |
|  | ii) **Define** the process of accessing the structure member through | |  |  | BTL -1 | Remembering |  |
|  | pointer using dynamic memory allocation. | | (7) |  |  |  |  |
| 12 | i) | **When** is array of pointers used in structure? Narrate it. | (6) |  | BTL- 1 | Remembering |  |
|  | ii) | **Show** how to use Union inside structure with example. | (7) |  |  |
|  |  |  |  |  |
| 13 | i) **Apply** your understanding on preparing a code for employee | |  |  | BTL- 3 | Applying |  |
|  | payroll. | | (6) |  |  |
|  | ii) **Develop t**he need of structured data type. | | (7) |  |  |  |  |
| 14 | Distinguish Unions and structures along with programming | |  |  | BTL- 4 | Analyzing |  |
|  | examples. | | (13) |  |  |
|  |  |  |  |  |
|  |  | **PART-C** |  |  |  |  |  |
| **Q.** |  |  |  |  |  |  |  |
| **No** |  | **Questions** |  |  | **BT Level** | **Competence** |  |
| 1 | **Explain** a C program to implement employee payroll of a company | | |  | BTL -5 | Evaluating |  |
|  | along with explanation. | | (15) |  |  |
|  |  |  |  |  |
| 2 | **Develop** a C program for the following: | |  |  | BTL-6 | Creating |  |
|  | i) To sort the given N names. | | (7) |  |  |
|  | ii) To show the recursive function. | | (6) |  |  |  |  |
| 3 | **Examine** nested structures with a sample C program of your own | | |  | BTL -4 | Analyzing |  |
|  | example. | | (15) |  |  |
|  |  |  |  |  |

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| 4 | **Formulate** a C program to read the details of the book name, author | | BTL-6 | Creating |  |
|  | name and price of 200 books in a library and display the total cost in | |  |
|  | your own terms. | (15) |  |  |  |

**UNIT III LINEAR DATA STRUCTURES**

Arrays and its representation-Stacks and Queues-Linked list-Linked list based implementation of Stacks and queues-Evaluation of Expression-Linked list based polynomial addition.

**PART-A**

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| **Q.** |  | **BT** |  |  |
| **No** | **Questions** | **Level** | **Competence** |  |
| 1 | **Where** do we use data structures how it is classified? | BTL -1 | Remembering |  |
| 2 | **Name** ADT operations. | BTL -1 | Remembering |  |
| 3 | **Summarize** linear data structures and Nonlinear data structures. | BTL -2 | Understanding |  |
| 4 | **List** the different types of linked list. | BTL -1 | Remembering |  |
| 5 | **Contrast** between array and linked list | BTL -2 | Understanding |  |
| 6 | **Analyze** the term single linked list. | BTL -4 | Analyzing |  |
| 7 | How to create a new node, give **with** an example? | BTL -3 | Applying |  |
| 8 | **Discuss** the use of header pointer and null pointer. | BTL -6 | Creating |  |
| 9 | **Apply** your understanding about dummy header. | BTL -3 | Applying |  |
| 10 | **Develop** the circular linked list. | BTL -3 | Applying |  |
| 11 | **Define** push and pop operations | BTL -1 | Remembering |  |
| 12 | **When** did you use the stack in computer system? | BTL -1 | Remembering |  |
| 13 | **Compare** stack and queue. | BTL -5 | Evaluating |  |
| 14 | **Examine** the conditions that are followed in the array | BTL -4 | Analyzing |  |
| implementation of queue. |  |
|  |  |  |  |
| 15 | **Compare and contrast** stack and queue and give its application. | BTL -2 | Understanding |  |
| 16 | **Analyze** any two data structures used in operating system. | BTL -4 | Analyzing |  |
| 17 | **Write** about prefix, infix and postfix notations. | BTL -1 | Remembering |  |
| 18 | **Compose** the following expressions into postfix and prefix forms. | BTL -6 | Creating |  |
| A+B\*(C-D)(P-R). |  |
|  |  |  |  |
| 19 | **Evaluate** the value of the expression ab+c\*d using stack. | BTL -5 | Evaluating |  |
| 20 | **Show** how ADT representation is used to evaluate arithmetic | BTL -2 | Understanding |  |
|  | expression? |  |
|  |  |  |  |
|  | **PART-B** |  |  |  |

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| **Q.** |  |  |  |  |  |  |  |
| **No** |  |  | **Questions** |  | **BT Level** | **Competence** |  |
| 1 | **Explain** array based implementation of list with example. | | | (13) | BTL -2 | Understanding |  |
| 2 | **Discuss** in detail about linked list ADT with example. | | | (13) | BTL -6 | Creating |  |
| 3 | **List** and explain the Queue ADT operation for insertion and deletion | | | | BTL -4 | Analyzing |  |
|  | routine in linked list. | | | (13) |  |
|  |  |  |  |
| 4 | i) | **Write** the concept of pointer implementation and cursor | |  |  |  |  |
|  |  | implementation. | | (6) | BTL -1 | Remembering |  |
|  | ii) **Show** a function to test whether a linked list is empty using | | |  |  |
|  |  |  |  |  |
|  |  | cursor implementation. | | (7) |  |  |  |
| 5 | i) Give the **outline** about the application of stack. | | | (6) | BTL -2 | Understanding |  |
|  | ii) | **Explain** in detail about Circular linked list. | | (7) |  |
|  |  |  |  |
| 6 | **Describe** about the implementation stack using linked list. | | | (13) | BTL -1 | Remembering |  |
|  |  |
|  |  | | | |  |  |  |
| 7 | **Access** the ADT operation for insertion and deletion routine in stack using | | | | BTL-5 | Evaluating |  |
|  | array implementation. | | | (13) |  |
|  |  |  |  |
| 8 | **Develop** the array and linked list implementation of queue operation | | | .(13) | BTL- 3 | Applying |  |
| 9 | i) | **Outline** the applications of queue. | | (6) | BTL -2 | Understanding |  |
|  | ii) | **Compare** stack and queue. | | (7) |  |
|  |  |  |  |
| 10 | **Analyze** and evaluate thepostfix expression 2 4 + 3 \* 1 5 - 8 3 + \* -. | | | | BTL -4 | Analyzing |  |
|  | (13) | |  |  |  |
|  |  |  |  |  |  |
| 11 | Write a procedure to convert an infix expression a+b\*c+(d\*e+f)\*g | | | | BTL -1 | Remembering |  |
|  | postfix notation. | | | (13) |  |
|  |  |  |  |
| 12 | i) **List** the process of postfix valuation with an example. | | | (6) | BTL- 1 | Remembering |  |
|  | ii) **List** and define the balancing symbols with example. | | | (7) |  |
|  |  |  |  |
| 13 | **Develop** the processof conversion from infix expression to postfix using | | | | BTL- 3 | Applying |  |
|  | stack. | |  | (13) |  |
|  |  |  |  |  |
| 14 | **Examine** an algorithm to add and subtract two polynomials P1 and | | | | BTL- 4 | Analyzing |  |
|  | P2. | |  | (13) |  |
|  |  |  |  |  |
|  |  |  | **PART-C** |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Q.** |  |  |  |  |  |  |  |
| **No** |  |  | **Questions** |  | **BT Level** | **Competence** |  |
| 1 | **Recommend** a suitable c code to swap two adjacent elements by | | | |  |  |  |
|  | adjusting only the pointers using: | | |  | BTL -5 | Evaluating |  |
|  |  |  |  |  |  |
|  |  | a. | Singly linked lists. | (7) |  |  |  |
|  |  | **b.** | Doubly linked lists. | (8) |  |  |  |
| 2 | A deque is a data structure consisting of a list of items, on which the | | | |  |  |  |
|  | following operations are possible: | | |  |  |  |  |
|  |  | Push (X,D): Insert item X on the front end of deque D. | |  | BTL-6 | Creating |  |
|  |  |  |  |  |  |
|  |  | Pop(D): remove the front item from deque D and return it. | | |  |  |  |
|  |  | Inject(x,D): Insert item X on the rear end of deque D. | |  |  |  |  |
|  |  |  |  |  |  |  |  |

Eject(D): Remove the rear item from deque that take O(1)

time per operation.

Combine the above mentioned operations and write a C code to **formulate** deque operations.

(15)

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| 3**Examine** an algorithm to implement Queue ADT. Give |  | BTL -4 | Analyzing |  |
| relevant examples and diagrammatic representation. | (15) |  |
|  |  |  |

1. **Design** an algorithm to convert an infix expression to postfix

|  |  |  |
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| expression using stacks and apply to the expression (a+b- | BTL-6 | Creating |
| d\*e+(f\*g+h)\*i). | (15) |  |

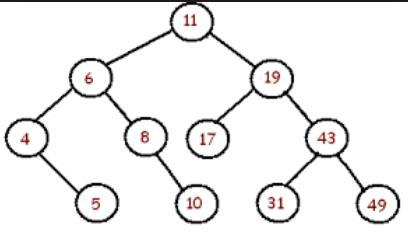
**UNIT IV NON- LINEAR DATA STRUCTURES**

Trees-Binary Tree-Binary tree representation and traversal-Binary search tree-Application of trees-Set representations-Union Find operation-Graph and its representation-Graph Traversal

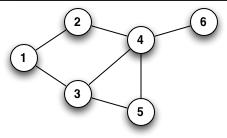
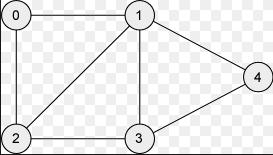
**PART-A**

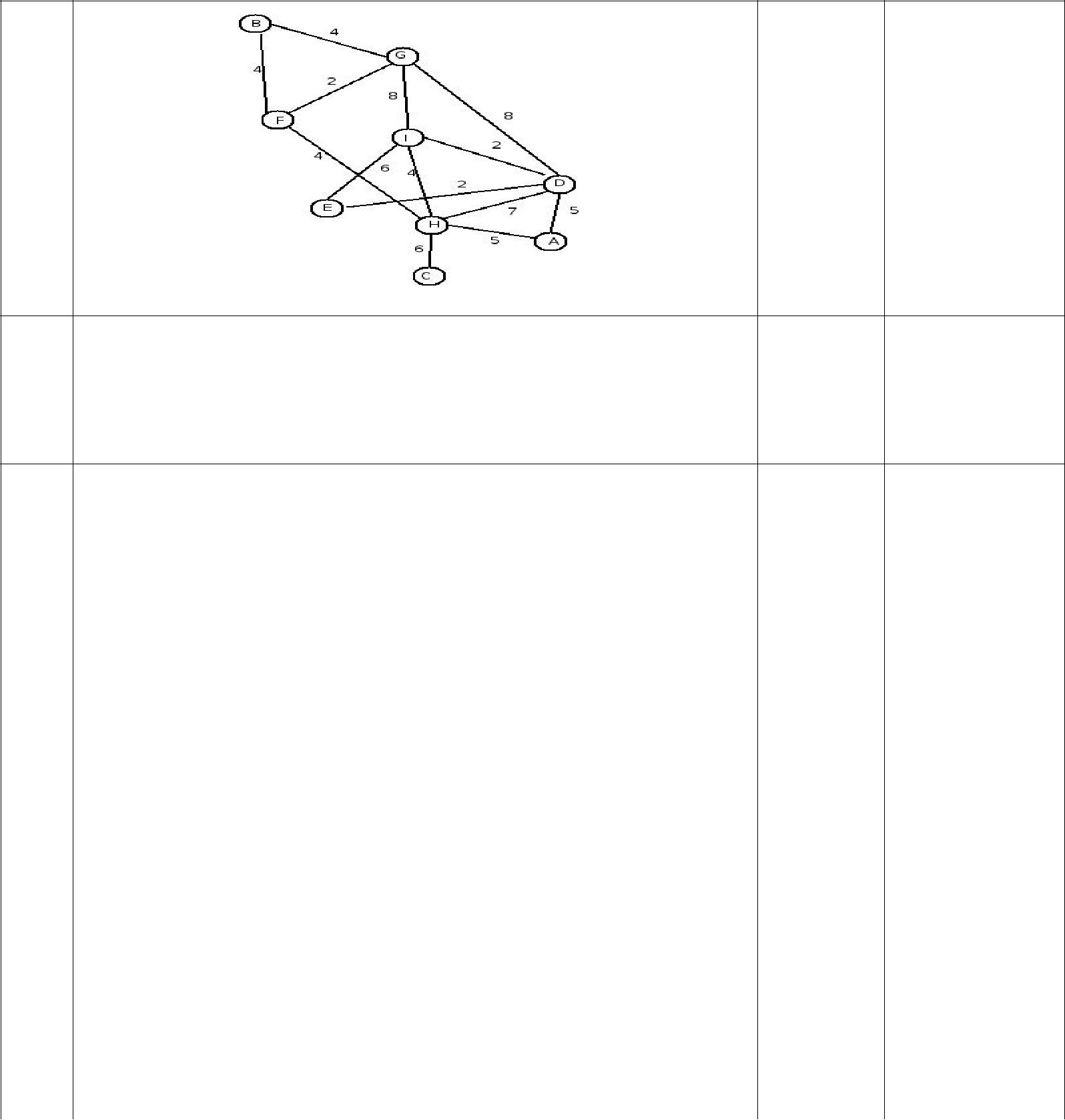
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| --- | --- | --- | --- |
| **Q.** |  | **BT** |  |
| **No** | **Questions** | **Level** | **Competence** |
| 1 | **Compose** the term height and depth of the tree. | BTL -6 | Creating |
|  |  |  |  |
| 2 | **Identify** the number of trees possible with 3 nodes? | BTL -3 | Applying |
|  |  |  |  |
| 3 | **Define** Binary tree and list its properties? | BTL -1 | Remembering |
|  |  |  |  |
| 4 | **What** are the two methods of binary tree implementation? | BTL -1 | Remembering |
|  |  |  |  |
| 5 | **Identify** the differences between binary search with linear search. | BTL -3 | Applying |
|  |  |  |  |
| 6 | **List** the applications of binary tree. | BTL -4 | Analyzing |
| 7 | **Assess** the different type of tree traversal. | BTL -5 | Evaluating |
| 8 | **Name** the type of binary tree. | BTL -1 | Remembering |
| 9 | **Compose** the term equivalence relation. | BTL -6 | Creating |
| 10 | **Explain** about union operation. | BTL -2 | Understanding |
| 11 | **Label** the different types of union. | BTL -1 | Remembering |
| 12 | **Define** Graph and Acyclic graph. | BTL -1 | Remembering |
|  |  |  |  |
| 13 | **Compare and contrast** in-degree and out degree of the graph. | BTL -4 | Analyzing |
|  |  |  |  |
| 14 | **Construct** an acyclic graph. | BTL -3 | Applying |
|  |  |  |  |
| 15 | **List** the different ways of representing graph. | BTL -1 | Remembering |
|  |  |  |  |
| 16 | **Analyze** the two traversal strategies used in traversing graph. | BTL -4 | Analyzing |
|  |  |  |  |
| 17 | **Illustrate** the Differences between path and Cycle of the graph. | BTL -2 | Understanding |
|  |  |  |  |
| 18 | **Compare** DFS and BFS. | BTL -2 | Understanding |
|  |  |  |  |
| 19 | **Explain** the tree and graph. | BTL -2 | Understanding |
|  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 20 | | **Access** about connected components. | | |  |  |  | BTL -5 |  | Evaluating |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | **PART-B** |  |  |  |  |  |  |  |  |
|  | **Q.** |  |  |  |  |  |  |  |  |  |  |  |
|  | **No** |  |  | **Questions** |  |  |  | **BT Level** |  | **Competence** |  |  |
|  | 1 | **Write s**hort note on the following terms related to tree: | | |  |  |  |  |  |  |  |  |
|  |  | i) | | Path |  | (2) |  |  |  |  |  |  |
|  |  | ii) | | Degree |  | (3) |  |  |  |  |  |  |
|  |  | iii) | | Level |  | (2) |  | BTL -1 |  | Remembering |  |  |
|  |  | iv) | | Leaves |  | (2) |  |  |  |  |  |  |
|  |  | v) | | Child |  | (2) |  |  |  |  |  |  |
|  |  | vi) | | Height |  | (2) |  |  |  |  |  |  |
|  |  |  | | | | |  |  |  |  |  |  |
|  | 2 | **Apply** your understanding to explain about binary search tree and | | | | |  |  |  |  |  |  |
|  |  | draw | the | binary search tree for the following input | list | 60, |  | BTL -3 |  | Applying |  |  |
|  |  | 25,75,15,50,66,33,44. Trace an algorithm to delete the nodes 25, 75, | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | 44 from the tree. | | |  | (13) |  |  |  |  |  |  |
|  |  |  | | | | |  |  |  |  |  |  |
|  | 3 | **Examine** the various tree traversal and predict a binary tree with | | | | |  | BTL -4 |  | Analyzing |  |  |
|  |  | Preorder:ABCDEFGHI and Inorder:BCAEDGHF . | | |  | (13) |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | 4 | Describe the two applications of tree with a neat example. | | | (13) | |  | BTL -2 |  | Understanding |  |  |
|  |  |  | |  | |  |  |  |  |  |  |  |
|  | 5 | **Conclude** | | the types of tree traversal methods? Explain it | | with |  | BTL -5 |  | Evaluating |  |  |
|  |  | example and deduce a routine for each of them. | | | (13) | |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  | | | | |  |  |  |  |  |  |
|  | 6 | i) **Illustrate** your understanding by finding the inorder, preorder | | | | |  |  |  |  |  |  |
|  |  |  | and postorder form for the following graph: | |  | (7) |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | BTL - 2 |  | Understanding |  |  |
|  |  | ii) **Show** some applications of trees. | | |  | (6) |  |  |  |  |  |  |
|  |  |  | | | |  |  |  |  |  |  |  |
|  | 7 | **Analyze** in detail the implementation of Binary Search Tree and | | | |  |  | BTL - 4 |  | Analyzing |  |  |
|  |  | perform its operations. | | |  | (13) |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | 8 | i) | **Analyze** and explain the dynamic equivalence problem. | | (6) | |  |  |  |  |  |  |
|  |  | ii) | **Examine** the path compression algorithm and analyze | | | the |  | BTL -4 |  | Analyzing |  |  |
|  |  |  | Union/Find algorithm used. | |  | (7) |  |  |  |  |  |  |
|  |  |  | | |  |  |  |  |  |  |  |  |
|  | 9 | **Describe** in detail about the smart union algorithm. | | |  | (13) |  | BTL -1 |  | Remembering |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 10 | **Define** graph. List out the different ways for representing the graph | | | BTL -1 | Remembering | |  |
|  |  | and explain them with example. | | (13) |  |
|  |  |  |  |  |  |
|  |  |  | |  |  |  |  |  |
|  | 11 | i) **Relate** the following graph using breadth first search. | | (7) |  |  |  |  |
|  |  |  |  |  | BTL - 1 | Remembering | |  |
|  |  | i) **Write** about BFS and DFS with suitable example. | | (6) |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | 12 | i) | **Develop** the following graph using depth first search. | (7) |  |  |  |  |
|  |  |  |  |  | BTL - 3 | Applying | |  |
|  |  | ii) **Construct** a C routine for BFS and DFS. | | (6) |  |  |  |  |
|  |  |  | |  |  |  |  |  |
|  | 13 | **Interpret** in detail about BFS and DFS with suitable examples. | | (13) | BTL -2 | Understanding | |  |
|  | 14 | **Compose** an example in detail about connected component. | | (13) | BTL -6 | Creating | |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | **PART-C** |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | **Q.** |  |  |  |  |  |  |  |
|  | **No** |  | **Questions** |  | **BT Level** | **Competence** |  |  |
|  | 1 | Consider the following graph: | |  |  |  |  |  |
|  |  | i) | **Evaluate** the shortest path from A to all other vertices for the | |  |  |  |  |
|  |  |  | following graph: | (6) | BTL -5 | Evaluating |  |  |
|  |  | ii) | **Access** the shortest unweighted path from B to all other vertices | |  |  |  |  |
|  |  |  | for the graph. | (7) |  |  |  |  |





1. **Develop** binary search tree and do the following operations.
   1. Show the result of inserting 3,1,4,6,9,2,5,7 into an initially empty

|  |  |  |
| --- | --- | --- |
| binary search tree. | (6) BTL-6 | Creating |
| ii) Show the result of deleting the root. | (7) |  |

1. **Examine** graph and construct a graph by considering five cities

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (1).New Delhi,(2).Mumbai,(3)Chennai,(4).Bangalore and | | | | |  |  |  |
| (5).Kolkata and the list of flights that connects these cities are | | | | |  |  |  |
| shown below: | |  | (13) | |  |  |  |
|  | **Flight No.** | **Origin** | **Destination** |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 101 | 2 | 3 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 102 | 3 | 2 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 103 | 5 | 3 |  | BTL -4 | Analyzing |  |
|  |  |  |  |  |  |
|  | 104 | 3 | 4 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 105 | 2 | 5 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 106 | 5 | 2 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 107 | 5 | 1 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 108 | 1 | 4 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 109 | 5 | 4 |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 110 | 4 | 5 |  |  |  |  |
|  |  |  |  |  |  |  |  |

1. **Formulate** the term binary search tree and do the followingoperations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| i) Show the result of inserting 3,1,4,6,9,2,5,7 into an initially | | BTL-6 | Creating |  |
| empty binary search tree. | (6) |  |
|  |  |  |
| ii) Show the result of deleting the root. | (7) |  |  |  |

**UNIT V SEARCHING AND SORTING ALGORITHMS**

Linear Search-Binary Search, Bubble Sort, Insertion Sort-Merge sort-Quick sort-Hash tables-Overflow handling

**PART-A**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q.** |  |  | **BT** |  |  |  |
| **No** | **Questions** |  | **Level** |  | **Competence** |  |
| 1 | **Explain** about sorting. |  | BTL -2 |  | Understanding |  |
|  |  | |  |  |  |  |
| 2 | **Label** the two main classifications of sorting based on the source of | | BTL -1 |  | Remembering |  |
| data. |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 3 | **Analyze** the applications of external and internal sorting. |  | BTL -4 |  | Analyzing |  |
| 4 | **What** is the purpose of quick sort. |  | BTL -1 |  | Remembering |  |
| 5 | **Assess** the advantage of merge sort. |  | BTL -5 |  | Evaluating |  |
| 6 | **Define** median three partitioning. |  | BTL -1 |  | Remembering |  |
| 7 | **Compare** divide and conquer technique with merge sort. |  | BTL -2 |  | Understanding |  |
|  |  |  |  |  |  |  |
| 8 | **What** is the purpose of insertion sort. |  | BTL -1 |  | Remembering |  |
|  |  |  |  |  |  |  |
| 9 | **Summarize** about merge sort. |  | BTL -2 |  | Understanding |  |
|  |  |  |  |  |  |  |
| 10 | **List** the advantages of merge sort. |  | BTL -1 |  | Remembering |  |
|  |  |  |  |  |  |  |
| 11 | **Analyze** the key characteristics of binary search. |  | BTL -4 |  | Analyzing |  |
|  |  |  |  |  |  |  |
| 12 | **Compare** the linear search with binary search. |  | BTL -2 |  | Understanding |  |
|  |  | |  |  |  |  |
| 13 | **Name** the techniques used to choose the pivot element for quick sort. | | BTL -1 |  | Remembering |  |
| 14 | **Analyze** the term hashing. |  | BTL -4 |  | Analyzing |  |
|  |  |  |  |
|  |  |  |  |  |  |  |
| 15 | **Identify** the advantage of merge sort. |  | BTL -3 |  | Applying |  |
| 16 | **Create** algorithm for insertion sort. |  | BTL -6 |  | Creating |  |
| 17 | **Support** your views about insertion sort with example. |  | BTL -5 |  | Evaluating |  |
| 18 | Trace the steps of insertion sort 12, 19, 33, 26, 29, 35, 22. **Construct** | | BTL -3 |  | Applying |  |
| the total number of comparisons made during sorting. |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 19 | **Identify** the time complexity of quick sort and binary search. |  | BTL -3 |  | Applying |  |
|  |  | |  |  |  |  |
| 20 | **Plan** and rearrange the following numbers 45, 22,6,77,47,8 using | | BTL -6 |  | Creating |  |
| insertion sort. |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  | **PART-B** |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Q.** |  |  |  |  |  |  |
| **No** | **Questions** |  | **BT Level** |  | **Competence** |  |
| 1 | **Illustrate** the correct sequence 3, 1, 4,7,5,9,2,6,5 using Insertion sort | | BTL -2 |  | Understanding |  |
|  | with routine. | (13) |  |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |
| 2 | **Elaborate** about insertion sort with example and code. | (13) | BTL -6 |  | Creating |  |
|  |  |  |  |  |  |  |
| 3 | **Analyze** and explain an algorithm for quick sort with example. | (13) | BTL -4 |  | Analyzing |  |
| 4 | Summarize quick sort algorithm and trace the following **list** of | | BTL -1 |  | Remembering |  |
|  | numbers: 90,77,60,99,55,88,66, 10. | (13) |  |  |
|  |  |  |  |  |
|  |  | |  |  |  |  |
| 5 | **Explain** Merge sort routine and trace the following numbers 1, 13, | | BTL -2 |  | Understanding |  |
|  | 24, 26, 2, 15, 27, 38. | (13) |  |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6 | **Show** an algorithm for merge sort and give its worst case, best case | | | BTL -1 | Remembering |  |
|  | and average case analysis. | | (13) |  |
|  |  |  |  |
|  |  | | |  |  |  |
| 7 | **Evaluate** the linear search & binary search algorithm in detail with | | | BTL-5 | Evaluating |  |
|  | an example for each. | | (13) |  |
|  |  |  |  |
|  |  | | |  |  |  |
| 8 | i) **Identify** the differences between linear search algorithm and | | |  |  |  |
|  | binary search algorithm. | | (7) | BTL- 3 | Applying |  |
|  | ii) **Experiment** it with an example. | | (6) |  |  |  |
|  |  | | |  |  |  |
| 9 | **Explain** C Program to implement the linear search technique with an | | | BTL -2 | Understanding |  |
|  | example. | (13) |  |  |
|  |  |  |  |  |
|  |  |  | |  |  |  |
| 10 | **Analyze** | your view about bubble sort technique with suitable | | BTL -4 | Analyzing |  |
|  | example. |  | (13) |  |
|  |  |  |  |  |
|  |  | |  |  |  |  |
| 11 | Briefly **tell** about on Hashing and overflow handling. | | (13) | BTL -1 | Remembering |  |
|  |  | | |  |  |  |
| 12 | **Describe** binary search algorithm and search the element 22 from the | | | BTL- 1 | Remembering |  |
|  | given list 2,7,14,4,17,5,19,8,22,9,25,12,27,14,28,33. | | (13) |  |
|  |  |  |  |
|  |  | | |  |  |  |
| 13 | **Develop t**he technique insertion sort for the following 9, 7, 6, 15, 16, | | | BTL- 3 | Applying |  |
|  | 5, 10, 2 5, 26, 18, 11 . | | (13) |  |
|  |  |  |  |
|  |  | |  |  |  |  |
| 14 | **Analyze** the algorithm for | |  |  |  |  |
|  | i) | Quick sort. | (6) | BTL- 4 | Analyzing |  |
|  | ii) | Insertion sort. | (7) |  |  |  |
|  |  |  |  |  |  |  |
|  |  | **PART-C** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Q.** |  |  |  |  |  |  |
| **No** |  | **Questions** |  | **BT Level** | **Competence** |  |
| 1 | i). **Conclude** how quick sort processes the input 142, 543, 123, 65, | | |  |  |  |
|  | 453, 879, 572, 434, 111, 242, 811, 102. | | (7) | BTL -5 | Evaluating |  |
|  |  |  |  |  |
|  | ii). For the quick sort implementation, **Estimate** the running time | | |  |  |  |
|  | when all keys are equal. | | (8) |  |  |  |
| 2 | Given an array containing only 0s and 1s in sorted order. **Create** a strategy | | |  |  |  |
|  | using any of the sorting techniques to do the following: | |  |  |  |  |
|  | a. | Find the first occurrence of 1 in array. | (5) | BTL-6 | Creating |  |
|  |  |  |  |
|  | b. | Find the last occurrence of 0. | (5) |  |  |  |
|  | c. Find number of instances of 0s in sorted array. | | (5) |  |  |  |
| 3 | **Analyze** and explain C code to implement Insertion sort. | | (15) | BTL -4 | Analyzing |  |
| 4 | **Create** a hash table of size 10.Using linear probing insert the keys | | | BTL-6 | Creating |  |
|  | 72,27,36,24,63,81,92,101 into the table. | | (15) |  |
|  |  |  |  |