**Reg. No.**

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## B.E / B.TECH. DEGREE EXAMINATION, MAY 2023
### Third Semester
## EC18301 – OBJECT ORIENTED PROGRAMMIMG AND DATA STRUCTURES
*(Electronics and Communication Engineering)*
**(Regulation 2018A)**

**TIME: 3 HOURS**                                                                 **MAX. MARKS: 100**

**CO 1**   Explain the concepts of Object Oriented Programming.
**CO 2**   Implement abstract data types for linear data structures
**CO 3**   Implement abstract data types for non-linear data structures.
**CO 4**   Apply linear data structures to solve various problems.
**CO 5**   Discuss the different methods of organizing large amounts of data

### PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

| | | CO | RBT LEVEL |
|---|---|---|---|
| 1. | Distinguish between Object based and Object oriented programming languages. | 1 | 2 |
| 2. | List out the operators which cannot be overloaded as friend function. | 1 | 1 |
| 3. | What are pure virtual functions? Give example. | 2 | 1 |
| 4. | Define dynamic binding. | 2 | 1 |
| 5. | What is a circular queue?  What are the applications of circular queue? | 3 | 1 |
| 6. | Distinguish between linear and non-linear data structures. | 3 | 2 |
| 7. | Evaluate the given infix expression 1*3+15/(10+2)*2-4 to its prefix form. | 4 | 5 |
| 8. | List two applications for which depth first search is well suited. | 4 | 1 |
| 9. | What is meant by Merge sorting? | 5 | 1 |
| 10. | What is the time complexity of quick sort ? | 5 | 1 |

### PART- B (5 x 14 = 70 Marks)

| | | | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|---|---|
| 11. | (a) | | Explain operator overloading. Overload the numerical operators + and * for complex numbers "addition" and "multiplication" respectively. | (14) | 1 | 3 |
| | | | **(OR)** | | | |
| | (b) | (i) | Explain the features of object oriented programming. | (7) | 1 | 3 |
| | | (ii) | Define function overloading and demonstrate with suitable example | (7) | 1 | 3 |
| 12. | (a) | (i) | Construct a class called Student with data members such as rollno, name | (10) | 2 | 3 |

and branch. Create a class called Exam with data members such as roll number and a six subject marks. Derive a class Result from Student and Exam and have its own data members such as total mark and result. Write a C++ program to get the marks of the subjects and display the total.

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| | (ii) | Define virtual function and explain with an example. | (4) | 2 | 3 |

**(OR)**

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|---|---|---|---|---|---|
| (b) | (i) | Design a class for bank database to deposit and withdraw amount by implementing single inheritance and member functions returning objects | (10) | 2 | 3 |
| | (ii) | Develop an abstract base class to illustrate its usage. | (4) | 2 | 3 |

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| 13. (a) | | Write a C++ program to implement a stack using linked list and discuss the operations that can be performed on a stack. | (14) | 3 | 1 |

**(OR)**

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|---|---|---|---|---|---|
| (b) | (i) | Write routines to perform enqueue and dequeue of elements from the Array implementation of Queue ADT. | (10) | 3 | 1 |
| | (ii) | Write about the applications of queue | (4) | 3 | 1 |

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| 14. (a) | | Classify the binary tree traversals and explain them with their recursive routines. Trace the procedures using appropriate examples. | (14) | 4 | 4 |

**(OR)**

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|---|---|---|---|---|---|
| (b) | (i) | Compare and contrast traversals with breadth first and depth first. | (7) | 4 | 4 |
| | (ii) | List the ways to represent a graph and discuss on Dijkstra's shortest path algorithm. | (7) | 4 | 4 |

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| 15. (a) | | Explain the algorithm of insertion sort by sorting the following set of numbers as an example.<br>12,47,50,56,62,35,32,27,21 | (14) | 5 | 3 |

**(OR)**

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|---|---|---|---|---|---|
| (b) | | Explain divide and conquer technique with the help of merge sort by giving suitable example. | (14) | 5 | 3 |

## PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

| | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|
| 16. | Construct a C++ program to perform addition and multiplication on polynomials. | (10) | 3 | 6 |