**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, November 2022**

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|  | **2BT3141** | Roll No. | Total Printed Pages: 2 |
| **2BT3141** |  |
| B. Tech. II Year III- Semester (Main) End Semester Examination, November 2022  **(CE / CS / AIDS / CC / AI / DS)** | |
| **BCECCE3102 : Data Structures and Algorithms** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | How to measure efficiency of an algorithm? What are the types of analysis of an algorithm can be done in run time? Define each of them with example. | **(6)** | **Remember** |
|  |  |  |  |  |
|  | **(b)** | Explain time and space complexity of an algorithm with an example. | **(6)** | **Understand** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | What are the string operations? Write the generic formulas for each string process. Explain how to replace “IN” with “TECH” in “ENGINE”. | **(6)** | **Remember and Apply** |
|  |  |  |  |  |
|  | **(b)** | Explain Binomial Coefficient using recursion and write the pseudocode. | **(6)** | **Understand and Apply** |
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|  |  | **UNIT-II (CO2)** |  |  |
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| **Q.3** | **(a)** | What is worst case, best case and average case time complexity of sequential search algorithm? Explain the time complexity of sequential search algorithm in recursive method. | **(6)** | **Understand and Apply** |
|  |  |  |  |  |
|  | **(b)** | What are the two main properties of sorting? What are the two main methods of sorting? Explain Selection sort and it’s time complexity. | **(6)** | **Understand and Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.4** | **(a)** | Sort the given array using Merge sort {38, 27, 43, 3, 9, 82, 10}. | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | Explain time complexity of Quick sort for each case. | **(6)** | **Remember** |
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|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | Define Stack. Explain with an example. Give a real life example Explain why Stack is a recursive data structure. | **(6)** | **Understand** |
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|  | **(b)** | Evaluate the following Infix, Postfix and Prefix expressions:  i) Infix: 2+3\*4/6-2^1^2\*2/2 ii) Postfix: 234\*6/21^^2\*2/+-  iii) Prefix: -+2/346/\*^2^12222 | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.6** | **(a)** | Define Dequeue and Priority queue. Explain with examples. | **(6)** | **Remember** |
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|  | **(b)** | What is Circular queue? Explain with an example. What is the significance of Circular queue in terms of space complexity compare to Linear queue? | **(6)** | **Understand** |
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|  |  | **UNIT-IV (CO4)** |  |  |
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| **Q.7** | **(a)** | What is ‘head’ and ‘tail’ of a linked list? Write down the algorithm to insert a node at the beginning of Linear Linked List? | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Represent a Priority Queue using Singly Linked list and delete a node from it. | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.8** | **(a)** | Define Circular Linked list. Discuss the advantages over Linear Linked list. | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Write down the pseudo code for deletion of node at the beginning of Circular Linked List. | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **UNIT V (CO5)** |  |  |
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| **Q.9** | **(a)** | Define Complete Binary Tree and Construct a Binary Search Tree for the given array = {10,7,14,20,1,5,8} | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | Determine the type of tree shown below and traverse in inorder, preorder and postorder | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.10** | **(a)** | Define Directed and Undirected Graph with proper examples and write down the basic difference between BFS and DFS. | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Traverse the following graph using both BFS and DFS | **(6)** | **Apply** |