BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - III COMPUTER SCIENCE & ENGINEERING-A&M : SUMMER : 2024
SUBJECT: DATA STRUCTURES

Day : Thursday
Date : 09/05/2024

S-23937-2024

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data if necessary.

Q.1 Explain the Big O notation with examples. Describe how it is used to analyse the performance of algorithms. Provide an analysis of two common data structure operations using Big O notation. **(10)**

OR

Q.1 Discuss the concept and implementation of two-dimensional arrays in memory. Include in your answer the steps to declare, initialize and access elements in a C/CPP context and explain how they differ from one-dimensional arrays. **(10)**

Q.2 Describe the process of inserting and deleting a node in a doubly linked list. Include diagrams to illustrate the changes in pointers with each operation. **(10)**

OR

Q.2 Compare and contrast singly linked lists, circularly linked lists and doubly linked lists. Discuss the advantages and disadvantages of each type in terms of insertion, deletion and traversal operations. **(10)**

Q.3 Illustrate with code and explanation how to convert a decimal number to binary using a stack. Discuss the stack operations involved and the rationale behind using a stack for this type of problem. **(10)**

OR

Q.3 Define a stack and its operations with examples in both array and linked list representations. **(10)**

Q.4 Discuss the implementation of a circular queue using an array. Include pseudocode and explain the handling of the queue's front and rear pointers during enqueue and dequeue operations. **(10)**

OR

Q.4 Explain the concept of a priority queue and its applications. Describe how a priority queue can be implemented using a linked list, including code snippets or pseudocode to illustrate the operations. **(10)**

Q.5 Describe the hashing process with a focus on hash functions and handling collisions. Provide examples of two collision resolution techniques and discuss their efficiency in maintaining the performance of hash tables. **(10)**

OR

Q.5 Compare and contrast three sorting algorithms (eg. Bubble sort, Quick Sort and Merge Sort). Discuss their complexity, method of operation and suitable application scenarios. **(10)**

Q.6 Explain the different types of file organizations mentioned (Sequential, Relative, Indexed Sequential). Include advantages and typical use cases for each type to illustrate why and when each might be used. **(10)**

OR

Q.6 Discuss the key differences between text files and binary files in terms of data storage and operations. Provide examples of operations in C/CPP that demonstrate how to create, open and modify each type of file. **(10)**

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