

Seat No: _____

Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2023 - 24 Examination

Semester: 2

Subject Code: 303105151

Subject Name: Computational Thinking for Structured Design

Date: 29/05/2024

Time: 02:00 pm to 04:30 pm

Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) (15)

1. Which function is used to deallocate memory dynamically allocated by malloc(), calloc(), or realloc() in C?

- a) free()
- b) release()
- c) deallocate()
- d) remove()

2. Which preprocessor directive is used to specify a function that should be called before the execution of main() function in C?

- a) #pragma warn
- b) #pragma startup
- c) #pragma exit
- d) #pragma inline

3. The sorting algorithm which uses the principle of Divide and Conquer is -

- a) Quick sort
- b) Bubble sort
- c) Insertion sort
- d) Merge sort

4. How do you access members of a structure?

- a) Dot Operator (.)
- b) Arrow Operator (->)
- c) Both a and b
- d) None of the above

5. What is the space complexity of merge sort?

- a) $O(\log n)$
- b) $O(n)$
- c) $O(1)$
- d) $O(n \log n)$

6. The typedef keyword in C is used to create _____ for existing data types.

7. calloc() function initializes the allocated memory block to _____.

8. The _____ directive in C is used to define macros.

9. Enumeration or 'enum' is an _____ data type.

10. Linked List data structure is one of the examples of _____ structure.

11. What is dynamic memory allocation?

12. What are preprocessor directives?

13. Define Time complexity.

14. What is the use of the typedef keyword in C?

15. Define structure padding.

Q.2 Answer the following questions. (Attempt any three)

(15)

A) Differentiate between selection sort and bubble sort sorting techniques with suitable examples.

B) Write a C program to perform a binary search.

C) Explain object-like macros and chain macros with an example for each.

D) Explain the concept of DMA with functions. Also, provide an example.

Q.3 A) What is the need for Dynamic memory allocation in C? Explain any one library function in detail which is used to dynamically allocate the memory in C language? **(07)**

B) Explain the concept of pointers to structures and self-referential structure with examples. **(08)**

OR

B) Write a code for the following functions for a singly linked list:

(08)

1. insert a node at the beginning

2. insert a node at the end

3. delete the node at the beginning

4. delete at the end

5. display the list

Q.4 A) Create a 2D array dynamically. Take user input and print only even numbers. **(07)**

OR

A) Write a code for the following functions for a doubly linked list:

(07)

1. insert a node at the beginning

2. delete at the end

3. search a node in a linked list

B) Explain the Singly Linked List, Circular Linked List, and Doubly Linked List with suitable diagrams for each. **(08)**