

OPTUM CODING QUESTIONS

Coding questions–

1. Find the largest palindrome in a given string.
2. Implement queue using two stacks.
3. Find the middle element of the linked lists in a single pass (you can only traverse the list once).
4. N numbers ranging From 1 to N are given, there is exactly one number missing and exactly one is repeated find the repeated and missing number.
5. Convert a binary tree to its mirror
6. Length of the longest common subsequence for two given strings
7. Password checking based on the conditions given
8. Reverse a linked list in groups of size k
9. Find the occurrences of a digit d in a given range from 0 to n
10. To check if numbers at even indices of an array were even or not.
11. In a given String return the most frequent vowel coming.
12. In a given character Array change the most frequent with the given alphabet.
13. A Magic Matrix is a square grid filled with distinct positive integers in the range such that each cell contains a different integer and the sum of the integers in each row, column is equal. Consider the magic matrix given below and Write a Program to prove that sum of diagonal

elements is also equal.
$$\begin{bmatrix} 2 & 7 & 6 \\ 9 & 5 & 1 \\ 4 & 3 & 8 \end{bmatrix}$$

14. The premier championship series of sports car racing **FIA World Endurance Championship** has organized car racing competition. In order to find out the winner, they have to calculate the difference between the departure time and arrival time of each car. Design a C program to calculate the time difference in 24hr format.
15. Given a List of 10 numbers. Write the algorithm for creating another list of the same set of 10 numbers but rearranged such that all the numbers which are multiples of 2 are to the left of all the numbers which are not multiples of 2.

Write a program for solving the above problem assuming

- a. The lists are implemented using an Array data structure.
- b. The lists are implemented using the Doubly Linked list data structure.

16. Given a list of 10 numbers. Write an algorithm for creating another list of the same set of 10 numbers such that the numbers which occupy the “odd” positions in the first list are put in the first half of the new list and those which occupy the “even” positions in the first list are put in the second half of the new list without altering their relative order.

17. Write a program for solving the above problem assuming

- a. The lists are implemented using an Array data structure.
- b. The lists are implemented using the Doubly Linked list data structure.

18. Let the word "Gandhi" be represented using a list data structure with one character occupying one position in the list. Traverse the whole list from left to right and while traversing associate the "ascii code" of the particular character as a value to that character. Once all the characters of the word have been assigned the respective values rearrange the list so that it forms a priority queue (assuming the character with the smallest Ascii value will have the highest priority). Display the contents of the priority queue as tuples: "character, priority".

19. Write a program for solving the above problem assuming

- a. The "character string" and the associated "ascii values" are represented using an Array data structure, and the priority queue is also implemented using an array data structure.
- b. The lists are implemented using the Linked list data structure.

20. On the occasion of the "KarnatakaRajyotsava", a school is preparing a dance recital with a team comprising of primary school and High school students. One of the patterns in this dance recital requires this team of students to form a circular pattern with each child holding the hand of the child on its either side. The dance teacher formed the circular pattern with all the primary school students being next to each other followed by the high school students with the last high school student holding the hand of the first primary school student. However, on seeing the rehearsal the principal felt that it would be better if the primary school students and the High school students are interleaved i.e neither two primary school students nor two high school students will be next to each other in this formation. Develop a program which will convert the first pattern to the second pattern assuming that there are 5 primary school students and 5 high school students. Assume the names of the primary school students are (a,b,c,d,e) and those of the High school students are (A,B,C,D,E) respectively.

21. A bakery has got a carousel (circular belt) of containers designed into which they put the buns as they are taken out of the oven. The belt has a special feature that indicates the temperature of the hottest bun on the carousel by lighting up that container. The circular belt is constantly revolving. The baker's assistant has a habit of putting the new bun into the container right after the currently hottest bun on the belt. Initially the customers used to pick up the buns at random and after sometime they also realized that the hottest bun would be the one in the illuminated container. Then the customers would pick up buns from the illuminated container only. Design a data structure to support this and its associated operations for adding buns by the assistant and removal of buns by the customers using the logic stated earlier.

22. The baker observed the system built according to the scheme stated above for a few days and realized that the hotter buns were always getting picked up first by the customers while the colder buns would be left out. Therefore, he got an attachment made such that the customer would have to press a button to get a bun and the machine would push out the coldest bun on the carousel.

Or

A baker had a vending machine into which he would fill the new buns as and when they are taken out of the oven one at a time. He would always arrange it such that the buns on the carousel of the machine are always in descending order of their time of putting them on the carousel and there are no empty slots between the youngest and the oldest bun on the carousel. His assistant has been instructed to pick up the buns strictly in the descending order of age to fulfil any customer's order. Design an appropriate data structure and its associated operations so as to support the above scheme of the baker.