7. (a) Implement DFS operation with the help of an example of a Graph of your choice containing at least ten nodes. **7.5**

(b) Describe the collision resolution techniques used in hashing and compare their advantages and disadvantages. **7.5**

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015404

May 2024

B.Tech. (ENC) (Fourth Semester)

Data Structure Using Python (ECP-404)

Time : 3 Hours] [*Maximum Marks : 75*

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other. The python program should be free from errors.

Part A

1. (a) Discuss the importance of a good hash function in hashing. **1.5**

(b) Compute time complexity (Find $n0$ and c) of the following relations using Big Oh notation : **1.5**

$T(n) = 213$, $T(n) = 13n^2 - 3n$, $T(n) = 3n^3 + n^2 + 4n$.

(c) Derive time complexity of selection sort. **1.5**

(d) Discuss the concept of recursion in programming. Provide an example of a problem that can be solved using recursion. **1.5**

(e) What is the difference between a linked list and an array ? When would you prefer to use one over the other ? **1.5**

(f) What is the time complexity of extracting the minimum element from a heap ? **1.5**

(g) Calculate the time complexity of a binary search algorithm. **1.5**

(h) Explain, what is the limitation of linear queue and how it can be resolved ? **1.5**

(i) Write a code in python to check whether given number is prime or not. **1.5**

(j) Write a program in python that prints the following sequence : **1.5**

A

BB

CCC

DDDD

ZZZ.....Z (26 times)

Part B

2. (a) Write a functions in Python to implement insertion and deletion of an item in the beginning in a singly linked list. 7.5

(b) Implement Binary search in Python language using a subroutine. 7.5

3. (a) Write a Python function to check if a given string is a palindrome or not, considering only alphanumeric characters and ignoring cases. 7.5

(b) Implement selection sort in Python language. Also calculate its time complexity. 7.5

4. Write a program in Python to create a sorted list L3, to merge two sorted lists L1 and L2. 15

5. (a) Implement deletion from a circular Queue operation using Python. 7.5

(b) Implement a Python function to perform an in-order traversal of a binary tree. 7.5

6. (a) Write code for subroutine to implement insertion of new value in binary search tree using linked representation. 7.5

(b) Write a program to implement a function to insertion in Priority Queue. 7.5