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B. TECH.
(V SEM) THEORY EXAMINATION 2022-23
PROGRAMMING, DATA STRUCTURES AND ALGORITHMS USING PYTHON

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2x10 = 20**

    (a) Explain the characteristics of python.
    (b) Illustrate the syntax of the range( ) method in python.
    (c) Write short notes on tuple data structure with any suitable example.
    (d) Describe big O notation with an example.
    (e) Find out value of Y if X = 'I love India' and Y=X [:9:2]
    (f) Explain the concept of variable length argument with an example.
    (g) Compare the list with the tuple data structure.
    (h) Explain the importance of memoization.
    (i) Explain hashing and write names of different collision techniques
    (j) Explain abstract data types (ADT) with examples.

SECTION B

2. **Attempt any *three* of the following:**   **10x3 = 30**

    (a) Illustrate the concept of list comprehension. Write a python code to multiply two matrices using the concept of list comprehension.
    (b) Explain -filter(),map(),reduce() functions with example
    (c) Code a program to use exception handling for dividing the numbers. and explain exception handling in detail.
    (d) Explain Euclid's algorithm for the greatest common division problem.
    (e) Explain and write python code for the binary search algorithm and explain its complexity.

SECTION C

3. **Attempt any *one* part of the following:**   **10x1 = 10**

    (a) Explain the Queue data structure. Also, write python code for different operations.
    (b) Explain the Stack data structure. Also, write python code for different operations.

4. **Attempt any *one* part of the following:**   **10 x1 = 10**

    (a) Describe grid path problem algorithms. Find out the maximum path from (0,0) to (5,6) if there exist two obstacle points (2,4) and (3,1).
    (b) Explain loop control statements-break, continue, pass with example

5. **Attempt any *one* part of the following:** 10x1 = 10

    (a)   Illustrate the concept of merge sort. Also, write python code for it.

    (b)   Explain different important commands in handling files. Also, write python code to count the number of lower-case alphabets present in a text file "PQR.txt".

6. **Attempt any *one* part of the following:** 10x1 = 10

    (a)   Write a python function to find out the longest common subsequences. Apply the concept to calculate the longest common subsequence of X = (B,A,C,D,B) and Y = (B,D,C,B).

    (b)   Explain the concept of user-defined list (linked list). Write python code to create a list and print the list.

7. **Attempt any *one* part of the following:** 10x1 = 10

    (a)   Create a binary search tree of the given list [14,16,11,21,10,13,12,8,36,25,42] and then delete 21 and 25 elements from it. Show all the steps

    (b)   Determine the best multiplication ways of a matrix of a given chain of a matrix with order A= 6*7, B= 7*4, C=4*5