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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 $A=6*7$, $B=7*4$, $C=4*5$

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