



# R K COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada & SBTET, Amaravati)

(An ISO 9001:2015 Certified Institution)

Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456



A REPORT ON  
VIRTUAL INTERNSHIP  
ON  
DATA STRUCTURES AND ALGORITHMS IN PYTHON

FROM 05/05/2022 TO 10/06/2022

ORGANIZED BY:

DEPARTMENT OF E.C.E.

IN ASSOCIATION WITH:

VXL IT ACADEMY

RESOURCE PERSON:

A. PHANI



*AP*  
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Kethanakonda (V), Ibrahimpatnam (M),  
Vijayawada, AMARAVATI-521 456.



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Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456



Date: 08-04-2022

From

Head of the Department,  
Electronics and communication Engineering,  
RK College of Engineering,  
Kethanakonda (V),  
Ibrahimpatnam (M),  
Vijayawada.

To

VXL IT ACADEMY  
Vijayawada.

**Sub: To Organizing a VIRTUAL INTERNSHIP on “Data Structures and Algorithms in Python”.**

Our Department is planning to conduct a Virtual Internship on “Data Structures and Algorithms in Python” to our II B. Tech. Students preferably from 05-05-2022 to 10-06-2022.

If acceptable to you, I request you to design the Syllabus and send us the documentation.

Thanking you,



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Kethanakonda (V), Ibrahimpatnam (M),  
Vijayawada, AMARAVATI-521 456.

Yours Sincerely,

HOD-E.C.E

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HOD ECE  
Kethanakonda (V), Ibrahimpatnam (M),  
Vijayawada, AMARAVATI-521 456.

# VXL IT ACADEMY

in true spirit of employability enhancement

Date: 25-04-2022

TO

The Head of the Department,  
Electronics and communication Engineering,  
RK College of Engineering,  
Kethanakonda(V),  
Ibrahimpatnam (M),  
Vijayawada.

**Sub: Acceptance to Organise a Virtual Internship on Data Structures and Algorithms in Python**

We are assigning a trainer to organize an internship on Data Structures and Algorithms in Python through online mode from 05-05-2022 to 10-06-2022.

**TRAINER DETAILS:**

NAME OF THE TRAINER	DESIGNATION	ADDRESS
A. PHANI	Technical Trainer	VXL IT ACADEMY



Authorized Signatory



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DATE: 27-04-2022

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### CIRCULAR

All II B. tech students are here by informed that a virtual internship on “DATA STRUCTURES AND ALGORITHMS IN PYTHON” is going to be organized by the Department of Electronics and Communication Engineering in association with VXLIT ACADEMY from 05-05-2022 To 10-06-2022.

Hence all the interested students are required to register immediately.



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Venkateswarulu  
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## CONTENTS

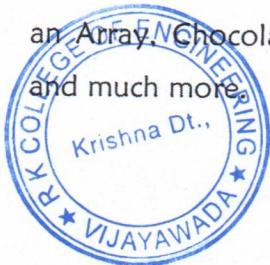
The content that will be provided in this “Data Structures and Algorithms in Python” Course is as follows:

- 1. Analysis of Algorithms** – Analysis of Algorithms (Background), Asymptotic Analysis, Big O Notation, Omega Notation, Theta Notation, Analysis of Common Loops, and much more.
- 2. Mathematics** – Python DSA – Count Digits, Palindrome Number, Factorial of a Number, Trailing Zeros in Factorial, GCD, and HCF of two numbers, LCM of two numbers, and much more.
- 3. List** – List (Dynamic Sized Array) Introduction, Working on List in Python, Average or Mean of a List, Separate Even and Odd, Get Similar Elements, Slicing (List, Tuple, and String), and much more.
- 4. Recursion** – Application of Recursion, Writing Base Cases in Recursion, Tail Recursion, and much more.
- 5. Searching** – Binary Search in Python, Recursive Binary Search in Python, Analysis of Binary Search, Index of First Occurrence in a sorted array, Index of Last Occurrence, and much more.
- 6. Sorting** – Sorting in Python, List Sort in Python, Sorted in Python, Stability in Sorting Algorithm, Bubble Sort, Selection Sort, and much more.
- 7. Hashing** – Introduction to Hashing, Hashing Application, Direct Address Table, Hashing Functions, Collision Handling, Chaining, Implementation of Chaining in Python, and much more.
- 8. String** – Strings in Python, Escape Sequences and Raw Strings, Formatted String in Python, String Comparison in Python, and much more.
- 9. Linked List** – Video – Problems with Array Data Structure, Linked List Introduction in Python, Simple Linked List Implementation in Python, Applications of Linked List, and much more.



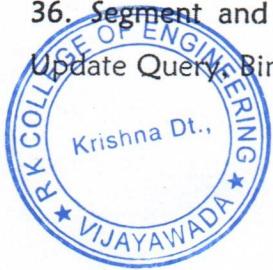
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- 10. Circular Linked List** – Circular Linked List in Python, Circular Linked List (Advantages & Disadvantages), Circular Linked List Traversal, Insert at the Beginning of Circular Linked List, and much more.
- 11. Doubly Linked List** – Doubly Linked List in Python, Singly Vs Doubly Linked List (Advantages & Disadvantages), Insert at the Beginning of DLL in Python, and much more.
- 12. Stack** – Stack Data Structure, Stack in Python, Linked List Implementation of Stack in Python, Stack Applications, and much more.
- 13. Queue** – Queue in Python, Queue in Data Structure, Application of Queue Data Structure, Implementation of Queue using Array, and much more.
- 14. Dequeue** – Introduction, Deque Applications, Deque in Python, List Implementation of Deque in Python, and much more.
- 15. Tree** – Tree Data Structure, Application of Tree, Binary Tree in Python, Tree Traversal, Inorder Traversal in Python, Preorder Traversal in Python, Postorder Traversal in Python, and much more.
- 16. Binary Search Tree** – Binary Search Tree (Background), Binary Search Tree (Introduction), Search in BST in Python, BST Insert in Python, BST Delete in Python, Floor in BST (Problem and Solution Idea), and much more.
- 17. Heap** – Binary Heap Introduction, Heap Python Implementation (Introduction), Binary Heap Insert, Binary Heap (Extract min and Heapify), Decrease Key and Delete Operations, and much more.
- 18. Bit Magic** – Bitwise Operator in Python (Part 1,2), Check whether the Kth bit is set or not, Count Set Bits, Power of Two, and much more.
- 19. List** – Left Rotate by d Places, Maximum difference, Stock Buy & Sell Part 2, Trapping Rainwater, Maximum Consecutive 1s, Longest even odd subarray, and much more.
- 20. Recursion** – Subset of a given string, Printing all Permutations, Tower of Hanoi in Python, Josephus Problem in Python, Subset sum problem, and much more.
- 21. Searching** – Search in Sorted Rotated Array, Median of two sorted arrays, Repeating Elements (Part 1,2), Allocate Minimum Pages (Naive Method), and much more.
- 22. Sorting** – Tail Call Elimination in Quick Sort, Kth Smallest, Minimum Difference in an Array, Chocolate Distribution Problem, Sort an array with two types of elements, and much more.



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- 23. Hashing** – Intersection of two arrays, Union of two unsorted arrays, Pair with given sum in an unsorted array, Subarray with 0 sums in Python, Check for Palindrome Permutation, and much more.
- 24. String** – Overview of Pattern Searching, Pattern Searching in Python, Naive Pattern Searching, Improved Naive Pattern Searching for Distinct, Rabin Karp Algorithm, and much more.
- 25. Linked List** – Reverse a linked list in groups of size k, Detect loop using Floyd's Cycle Detection Algorithm, Detect and remove loop in Linked List, and much more.
- 26. Stack** – Two stacks in an array, K stacks in an array, Previous Greater Elements, Next Greater Elements, Stock span problem, and much more.
- 27. Queue** – Queue and Deque, Queue implementation using circular list, Implementing stack using a queue, Reversing a queue, Generate numbers with given digits, Design a data structure with min/max operations, and much more.
- 28. Tree** – Level Order Traversal by Line (Part 1,2), Check for Balanced Binary Tree, Maximum Width of Binary Tree, Convert Binary Tree to Doubly Linked List, Construct Binary Tree from Inorder and Preorder, and much more.
- 29. Binary Search Tree** – Ceiling on the left side in an array, Find Kth Smallest in BST, Check for BST, Fix BST with Two Nodes Swapped, Pair Sum with given BST, and much more.
- 30. Heap** – Sort K Sorted Array, Purchase Maximum Items, K Largest Elements, K Closest Elements, Merge K Sorted Arrays, and much more.
- 31. Graph** – Introduction, Graph Representation (Adjacency Matrix), Graph Representation (Adjacency List), Graph Adjacency List Representation in Python, Adjacency Matrix and List Comparison, and much more.
- 32. Greedy** – Introduction to Greedy Algorithm, Activity Selection Problem, Activity Selection, Fractional Knapsack, and much more.
- 33. Backtracking** – Concept of backtracking, Rat in a Maze, N Queen Problem, and much more.
- 34. Dynamic Programming** – Introduction to DP, Memorization, Tabulation, Longest Common Subsequence (Part 1,2), Variation of LCS, and much more.
- 35. Trie** – Introduction, Representation, Search Insert, Delete, and much more.
- 36. Segment and Binary Indexed Trees** – Introduction, Segment Tree, Range Query, Update Query, Binary Indexed Tree (Introduction), and much more.



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## **Learning Outcomes: -**

At the conclusion of the course, the student should be able to

- Describe and use abstract data types including stacks, queues, lists, tree, hash, and graphs.
- Implement different algorithmic techniques such as divide and conquer, greedy algorithms, dynamic programming, and backtracking.
- Explain the asymptotic performance of the algorithms studied in this course and understand the practical implications.
- Analyze complex Python programs written by another author.
- Solve interview problems efficiently on the LeetCode and HackerRank interview websites.





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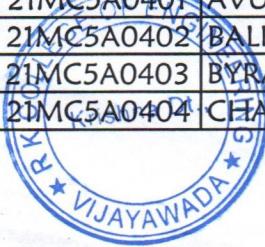
## INTERNSHIP PARTICIPATED STUDENTS LIST (2021-22)

S.No	Hall Ticket Number	Name Of The Student	Signature of the student
1	20MC1A0401	ALLAM SURENDRA	A. Surendra
2	20MC1A0402	ANDRA TEJASREE	A. Tejasree
3	20MC1A0403	ARLAGADDA SAI KUMAR	A. Sai Kumar
4	20MC1A0404	ATHYALA VINAYKUMAR	A. Vinay
5	20MC1A0405	BAKKIREDDY DILEEP REDDY	B. Dileep Reddy
6	20MC1A0406	BANGI PARAMESWARUDU	B. Paramesh
7	20MC1A0408	BUJULA VENKATESWAR REDDY	B. Venkateswar
8	20MC1A0409	C YAMINI	C. Yamini
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22	20MC1A0426	GOLLA VIVEKANANDA	G. Vivekananda
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34	20MC1A0439	KATIKI VAMSIKRISHNA	K. Vamsi Krishna
35	20MC1A0440	KOLLI VIJAY BABU	K. Vijay Babu
36	20MC1A0441	KOMARABATHINA RAVI BABU	K. Ravi Babu



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79	21MC5A0402	BALINA CHANDRA MOUNIKA	B. Chandra mounika
80	21MC5A0403	BYRAPUNENI BARGAV SAI GOPAL	B. Bargav Sai Gopal,
81	21MC5A0404	CHAPPARAPU OMKAR	C. Omkar



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106	21MC5A0429	K JAGADEESH VENKATA DURGA PRASAD	K. Jagadeesh

Venu  
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# VXL IT ACADEMY

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This is to certify that A. Surendra

has completed Internship / On Job Training on

"Data structures and Algorithms in python"

held from 05-05-22 to 10-06-22

Authorised Signatory

PRINCIPAL  
COLLEGE OF ENGINEERING  
Opp. M&M Beside "B" Benz Circle Area, M.G.Road, Kothanakonda (N), MARAVATI - 524 203. Ph : 0866-6646686, 9963674858, E-mail:vxlinfo@gmail.com  
Vill. Kothanakonda, AMARAVATI, Andhra Pradesh, India



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This is to certify that A. Teja Sree

has completed Internship / On Job Training on

"Data Structures and Algorithms in python"

held from 05-05-22 to 10-06-22

  
PRINCIPAL  
COLLEGE OF ENGINEERING (M).  
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Kethanakonda, AMARAVATI, Andhra Pradesh, India  
Vijayawada, Andhra Pradesh, India



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**VXL IT ACADEMY**

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This is to certify that A. Sai Kumar

has completed Internship / On Job Training on

"Data Structures and Algorithms in python"

held from 05-05-2022 to 10-06-2022

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PRINCIPAL ENGINEERING COLLEGE  
Opp. MCW, Beside 'Big C' Benz Circle Area, M.G.Road, Vizianagaram (M),  
A.P., India - 520019. Ph: 0866-66466886, 9963674858, E-mail: vxlinfo@gmail.com



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This is to certify that A. Vinay kumar.

has completed Internship / On Job Training on

"Data Structures And Algorithms in python"

held from 05-05-2022 to 10-06-2022

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Kethankonda  
Amaravati  
Andhra Pradesh

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This is to certify that B. Dileep Reddy

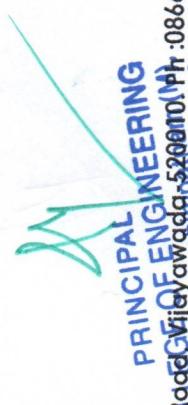
has completed Internship / On Job Training on

"Data Structures And Algorithms in Python"

held from 05-05-2020 to 06-06-2022



Authorised Signatory





This is to certify that B. Parameswarudu  
has completed Internship / On Job Training on  
"Data Structures And Algorithms in python"  
held from 05-05-2022 to 10-06-2022

Authorised Signatory



Opp. M&M Beside 'Big C' Benz Circle Area, M.G. Road, Vijayawada, AP, India

Ph: 9866-6646686, 9963674858, E-mail:vxlinfo@gmail.com

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This is to certify that P. Venkateswar Reddy  
has completed Internship / On Job Training on  
"Data structures And Algorithms in python"  
held from 05-05-2020 - 10-06-2022

  
**Authorised Signatory**  
PRINCIPAL  
Beside 'Big C' Benz Circle Area, M.G.Road, Vijayawada-520010, Ph.: 0866-6646688, 9963674858, E-mail:vxlinfo@gmail.com  
Kethanakonda (V), Ibrahimpatnam (M),  
Kethanakonda, AMARAVATI-521 456.  
Vijayawada, APRAVATI-521 456.



**VXL IT ACADEMY**

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This is to certify that C. Yamini

has completed Internship / On Job Training on

“Data Structures And Algorithms in Python”

held from 05-05-2020 to 10-06-2022

Authorised Signatory



**VXL IT ACADEMY**

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This is to certify that C. Venu madhav

has completed Internship / On job Training on

"Data Structures And Algorithms in python"

held from 05-05-2020 to 10-06-2022

Authorised signatory



PRINCIPAL  
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**VXL IT ACADEMY**

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in true spirit of employability enhancement



This is to certify that C. Pavan Kumar

has completed Internship / On Job Training on

"Data Structures And Algorithms in python"

held from 05-05-2020 to 10-06-2022



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