

PARUL UNIVERSITY - Faculty of Engineering and Technology

Department of Computer Science & Engineering

SYLLABUS FOR 4th SEM B. Tech PROGRAMME

Competitive Coding Level-2A

Type of Course: B. Tech

Prerequisite: proficiency in a programming language (e.g., C++, Python) and a strong grasp of data structures and algorithms, with a focus on problem-solving skills and efficient code implementation. Familiarity with common coding platforms (e.g., Codeforces, LeetCode) is also beneficial.

Rationale: Competitive coding sharpens problem-solving skills, enhances algorithmic thinking, and fosters quick and efficient coding practices. It provides a platform for continuous learning, challenges individuals to tackle diverse problems, and fosters a competitive spirit that's valuable in technical interviews and real-world software development.

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
Lect Hrs/	Tut Hrs/	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
8	0	8	1	-		-	-		

Lect- Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P**- Practical, **CE**- CE, **T** - Theory, **P**- Practical

Objectives:

1. Develop strong problem-solving skills, improve algorithmic thinking, and enhance proficiency in coding by tackling a variety of challenging problems.
2. Cultivate the ability to write efficient and optimized code under time constraints, honing the skill of quickly translating algorithmic insights into practical solutions.
3. Gain a competitive advantage in technical interviews and coding assessments, showcasing the ability to tackle diverse coding challenges commonly encountered in job placements and coding competitions.
4. Foster a mindset of continuous learning by regularly engaging with new problems, staying updated on emerging algorithms, and adapting to evolving coding paradigms.

List of Practical's:

1. Write a program for implementing a MINSTACK which should support operations like push, pop, overflow, underflow, display
 - a. Construct a stack of N-capacity
 - b. Push elements
 - c. Pop elements
 - d. Top element
 - e. Retrieve the min element from the stack
2. Write a program to deal with real-world situations where Stack data structure is widely used
Evaluation of expression:
Stacks are used to evaluate expressions, especially in languages that use postfix or prefix notation. Operators and operands are pushed onto the stack, and operations are performed based on the LIFO principle.
3. Write a program for finding NGE NEXT GREATER ELEMENT from an array
4. Write a program to design a circular queue(k) which Should implement the below functions
 - a. Enqueue
 - b. Dequeue
 - c. Front
 - d. Rear
5. Write a Program for an infix expression, and convert it to postfix notation. Use a queue to implement the Shunting Yard Algorithm for expression conversion.
6. Write a Program for finding the Product of the three largest Distinct Elements. Use a Priority Queue to efficiently find and remove the largest elements
7. Write a Program to Merge two linked lists(sorted)
8. Write a Program to find the Merge point of two linked lists(sorted)
9. Write a Program to Swap Nodes pairwise
10. Write a Program to Understand and implement Tree traversals i.e. Pre-Order Post-Order, In-Order
11. Write a Program to verify and validate mirrored trees or not
12. Write a Program to determine the depth of a given Tree by Implementing MAXDEPTH
13. Write a program for Lowest Common Ancestors
14. Write a Program to Build BST
15. Write a Program for Building a Function ISVALID to VALIDATE BST

16. Write a Program to Traverse a Tree using Level Order Traversal
17. Write a Program to perform Boundary Traversal on BST
18. Write a Program to view a tree from left View
19. Write a Program for a basic hash function in a programming language of your choice. Demonstrate its usage to store and retrieve key-value pairs.
20. Implement a hash table using separate chaining for collision handling. Perform operations like insertion, deletion, and search on the hash table.
21. Write a Program to Implement Two sums using HASHMAP
22. Write a Program to Implement - Search, insert, and Remove in Trie
23. Write a Program to find The No of Words in a Trie
24. Write a Program to Implement Huffman coding
25. Write a Program to find Distinct substrings in a string