3rd Semester B.Tech CSE Syllabus

1. Data Structures

- **Topics Covered:**
    - Arrays, Linked Lists, Stacks, Queues
    - Trees and Graphs
    - Hashing and Hash Tables
    - Sorting and Searching Algorithms
    - Dynamic Programming Basics

2. Computer Organization and Architecture

- **Topics Covered:**
    - Basic Structure of Computers
    - Machine Instructions and Addressing Modes
    - Memory Hierarchy (Cache and Virtual Memory)
    - Input/Output Organization
    - Assembly Language Programming

3. Object-Oriented Programming (OOP)

- **Topics Covered:**
    - Concepts of Classes and Objects
    - Inheritance, Polymorphism, and Encapsulation
    - Abstract Classes and Interfaces
    - Templates and Exception Handling
    - Standard Template Library (STL)

4. Discrete Mathematics

- **Topics Covered:**
    - Logic and Proof Techniques
    - Sets, Relations, and Functions
    - Graph Theory and Trees
    - Combinatorics and Recurrence Relations
    - Boolean Algebra

Programming Basics

- **High-Level vs. Low-Level Languages**
    - High-level languages are easier to read and write, portable across systems, and abstract hardware details.
    - Low-level languages are closer to machine code and specific to hardware.

- **Translators:**
  - Interpreters execute code line by line, while compilers translate the entire code into machine language before execution.
- **Key Concepts and Examples:**
  - **Variables:** Variables store data values (e.g., `x = 10`).
  - **Indentation:** Defines code blocks in Python (e.g., loops, conditionals, or functions).
  - **Function Definition:** Functions are defined using `def` (e.g., `def add(a, b): return a + b`).
  - **Loops:** For-loop iterates over sequences (e.g., `for char in "Python": print(char)`).
  - **Error Handling:** Referencing an undefined variable raises a `NameError`.
  - **Modulo Operator:** `%` returns the remainder of a division (e.g., `10 % 2 == 0` for even numbers).

Artificial Intelligence (AI)

- **Definition:** AI simulates human intelligence in machines programmed to think, learn, and make decisions.
- **Key Features of AI:**
  1. **Machine Learning (ML):** Systems learn from data to make decisions (e.g., recommendation systems).
  2. **Natural Language Processing (NLP):** Machines understand and interpret human language (e.g., chatbots, virtual assistants).
  3. **Computer Vision:** Interprets visual information (e.g., facial recognition).
  4. **Robotics:** AI-driven robots perform autonomous tasks (e.g., self-driving cars).
  5. **Expert Systems:** Solve complex problems using knowledge and inference (e.g., medical diagnosis systems).

Data Structures and Algorithms (DSA)

- **Data Structures:**
  - **Array:** Fixed-size, sequential storage.
  - **Linked List:** Nodes connected by pointers.
  - **Stack:** Last In, First Out (LIFO).
  - **Queue:** First In, First Out (FIFO).
  - **Tree:** Hierarchical structure with nodes.
  - **Graph:** Nodes connected by edges.
  - **Hash Table:** Key-value pairs for data storage.
- **Algorithms:**
  - **Searching Algorithms:**
    - Linear Search: Sequentially searches for an element.

- Binary Search: Searches a sorted array by dividing it in halves.
    - **Sorting Algorithms:**
        - Bubble Sort, Quick Sort, Merge Sort, Insertion Sort.
    - **Graph Algorithms:**
        - Dijkstra's Algorithm (shortest path).
        - Kruskal's Algorithm (minimum spanning tree).
    - **Dynamic Programming:** Breaks problems into overlapping subproblems (e.g., Fibonacci).
    - **Greedy Algorithms:** Solves problems step-by-step (e.g., Huffman Coding).

Key Faculty at Graphic Era Hill University

1. **Ms. Sonal:** OOPS Lab
2. **Dr. Prateek Srivastav:** OOPS with C++
3. **Ms. Ayushi Jain:** DSA Lab
4. **Dr. Anupam Singh:** DSA with C

Wrestling Overview

- **Definition:** Wrestling is a physical combat sport focusing on grappling techniques.
- **Types of Wrestling:**
    1. **Freestyle Wrestling:** Full-body attacks and defense.
    2. **Greco-Roman Wrestling:** Upper-body techniques only.
    3. **Folkstyle Wrestling:** Emphasis on control and pinning (popular in U.S. schools).
    4. **Professional Wrestling:** Combines wrestling with entertainment (e.g., WWE).
    5. **Traditional Wrestling:** Region-specific styles (e.g., Kushti in India, Sumo in Japan).

Narendra Modi - Key Details

- **Full Name:** Narendra Damodardas Modi
- **Date of Birth:** September 17, 1950
- **Place of Birth:** Vadnagar, Gujarat, India
- **Notable Achievements:**
    - 14th Prime Minister of India (since May 26, 2014).
    - Member of Bharatiya Janata Party (BJP).

B.Tech CSE Subjects

1. **Data Structures**
   - o Study of methods to organize, store, and manage data efficiently.
   - o Topics: Arrays, Linked Lists, Stacks, Queues, Trees, Graphs, Sorting & Searching, Hashing.
2. **Computer Organization and Architecture**
   - o Understanding how computers work internally and execute instructions.
   - o Topics: Basic computer structure, memory hierarchy, I/O systems, addressing modes, assembly language.
3. **Object-Oriented Programming (OOP)**
   - o Programming paradigm based on objects and classes.
   - o Topics: Classes, Objects, Inheritance, Polymorphism, Encapsulation, Abstract Classes, Templates, Exception Handling.
4. **Discrete Mathematics**
   - o Foundation of computer science focusing on logic, sets, and structures.
   - o Topics: Logic, Graph Theory, Sets, Functions, Combinatorics, Boolean Algebra, Recurrence Relations.

What is Computer Science and Engineering (CSE)?
Answer:
CSE is a branch of engineering that combines computer science and engineering principles. It focuses on software development, hardware design, algorithms, and computing systems.

2. What are the career opportunities after CSE?
Answer:
Career options include Software Engineer, Data Scientist, AI/ML Engineer, Cloud Architect, Cybersecurity Expert, Web Developer, Game Developer, and more.

3. What programming languages will I learn in CSE?
Answer:
You'll typically learn languages like C, C++, Java, Python, and sometimes specialized languages like R, MATLAB, or JavaScript.

Subject-Specific Questions

4. What is the importance of Data Structures?
Answer:
Data Structures are essential for organizing and managing data efficiently, which improves the performance of software applications.

5. Why is Discrete Mathematics important in CSE?
Answer:
Discrete Mathematics provides tools for logical reasoning and problem-solving, essential for understanding algorithms, cryptography, and computer networks.

6. What is Object-Oriented Programming (OOP)?
Answer:
OOP is a programming paradigm that uses Classes and Objects to create reusable and modular code. It simplifies complex problems by modeling them as real-world entities.

7. What is Computer Organization and Architecture?
Answer:
This subject explains how computer systems are designed and how they process information. It covers the structure of processors, memory, and input/output systems.

Technical Questions

8. What is an Algorithm?
Answer:
An algorithm is a step-by-step procedure or formula for solving a problem. Examples include Sorting (e.g., Bubble Sort) and Searching (e.g., Binary Search).

9. What is the difference between Stack and Queue?
Answer:

- **Stack:** Follows Last In, First Out (LIFO).
- **Queue:** Follows First In, First Out (FIFO).

10. What is a Graph in Data Structures?
Answer:
A graph represents a set of objects connected by edges. It's used in network analysis, routing, and more.

Practical and Career-Related Questions

11. What labs are conducted in the CSE department?
Answer:
Labs typically include Programming Lab, Data Structures Lab, Database Management Lab, Networking Lab, and OOP Lab.

12. Are coding competitions helpful for CSE students?
Answer:

Yes, coding competitions improve problem-solving skills, algorithm design, and coding speed, which are valuable for placements and internships.

13. What tools and software are commonly used in CSE?
Answer:
Some popular tools are Git, Visual Studio Code, IntelliJ IDEA, Jupyter Notebook, MATLAB, and databases like MySQL or MongoDB.

Does the department provide placement assistance?
Answer:
Yes, the department organizes training programs, mock interviews, and connects students with top companies through campus placements.

16. What is the role of AI in CSE?
Answer:
Artificial Intelligence is a growing field in CSE, focusing on creating systems that can simulate human intelligence, like chatbots, recommendation systems, and autonomous vehicles.

17. What are the trending technologies in CSE?
Answer:
Trending technologies include Machine Learning, Artificial Intelligence, Cloud Computing, Blockchain, IoT, Cybersecurity, and DevOps.

18. Can I pursue research after completing CSE?
Answer:
Yes, CSE offers opportunities for research in fields like AI, Big Data, Cryptography, and Quantum Computing.