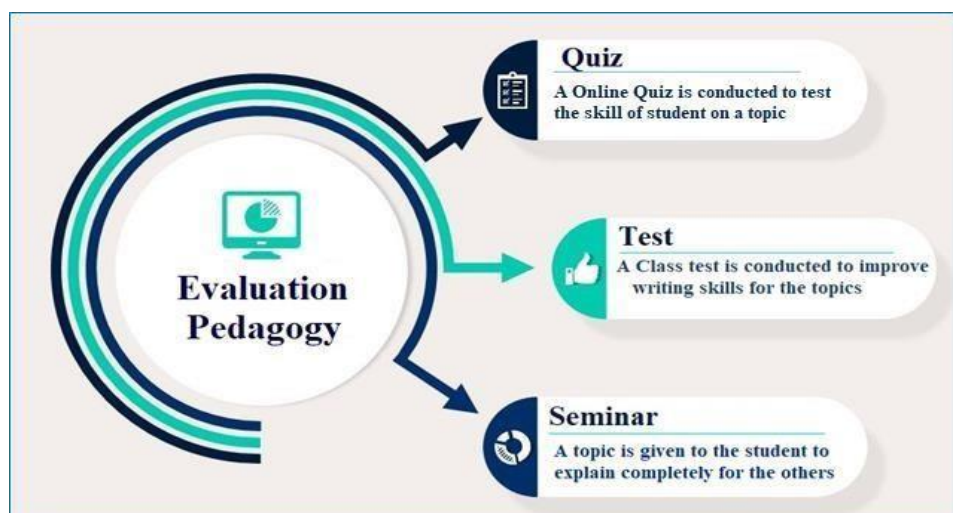
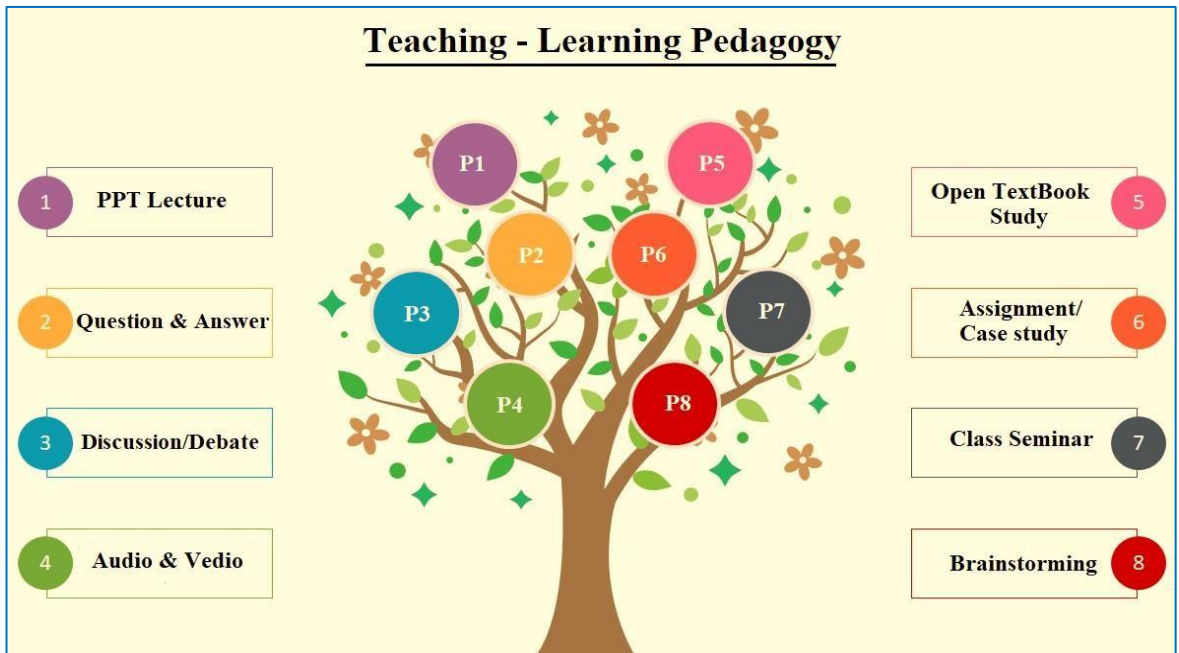


# DEPARTMENT OF COMPUTER SCIENCE



<b>Course: B.Sc(Major, Minor)</b>	<b>Year:I</b>	<b>Semester:II</b>			
<b>Subject</b>	<b>PROBLEM SOLVING IN C</b>				
<b>Units</b>	1.General Fundamentals 2. Introduction to C 3.Decision Control and looping Statements 4. Arrays and Functions 5.Structure Union and Enumerated Data types 6. Pointers				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	<ul style="list-style-type: none"> <li>To understand the evolution and functionality of a Digital Computer.</li> <li>Apply logical skills to analyze a given problem.</li> <li>Develop an algorithm for solving a given problem.</li> <li>Understand ‘C’ language constructs like iterative statements, Array processing , Pointers etc.</li> <li>Apply ‘C’ language constructs to the algorithm to write a ‘C’ language program</li> </ul>				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split:Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8
<b>Resource Material:</b>	<p><b>Study Material(Handouts):</b>  1.<a href="https://www.mcmotihari.ac.in/wpcontent/uploads/2019/11/file_5dc2a6c80c260.pd">https://www.mcmotihari.ac.in/wpcontent/uploads/2019/11/file_5dc2a6c80c260.pd</a>  2. <a href="https://onlinecourses.nptel.ac.in/noc20_cs06/preview">https://onlinecourses.nptel.ac.in/noc20_cs06/preview</a></p> <p><b>Reference Books:</b>  1. E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.  2. Brain W Kernighan and Dennis M Ritchie - The ‘C’ Programming language” - Pearson publications.  3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.  4. YashavantKanetkar - Let Us ‘C’ – BPB Publications.</p> <p><b>YouTube Links:</b>  <a href="https://youtu.be/8PopR3x-VMY">https://youtu.be/8PopR3x-VMY</a></p> <p><b>Power Point Presentations:</b>  <a href="https://www.slideshare.net/gauravjuneja11/c-language-ppt">https://www.slideshare.net/gauravjuneja11/c-language-ppt</a></p> <p><b>QuestionBank:</b>  <a href="https://www.acsce.edu.in/acsce/wp-content/uploads/2020/03/Module-wise-Question-Bank-CPS.pdf">https://www.acsce.edu.in/acsce/wp-content/uploads/2020/03/Module-wise-Question-Bank-CPS.pdf</a></p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	<p><b>Introduction to computer and programming:</b> Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms</p> <p><b>Fundamentals of C:</b> History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O</p>	P1,P2,P3	PQ,P6,PT
II	<p><b>Control statements:</b> Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and go to.</p>	P1,P2,P3,P5	P6,PT
III	<p><b>Derived data types in C: Arrays:</b> One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation.</p> <p><b>Strings:</b> Declaring &amp; Initializing string variables; String handling functions, Character handling functions.</p>	P1,P2,P3,P5	PQ,PT
IV	<p><b>Functions:</b> Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address &amp; by value. Local and Global variables.</p> <p><b>Storage classes:</b> automatic, external, static and register.</p> <p><b>Pointers:</b> Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.</p>	P1,P2,P4	PQ,P6,PT

V	<b>Dynamic Memory Management:</b> Introduction, Functions- malloc, calloc, realloc, free <b>Structures:</b> Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. <b>Unions</b> - Union definition; difference between Structures and Unions	PQ,P6,PT, <b>P8</b>	PQ,PT
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<b>Course: B.Sc</b>	<b>Year:I</b>	<b>Semester:II</b>			
<b>Subject</b>	<b>DIGITAL LOGIC DESIGN</b>				
<b>Units</b>	1. Number Systems 2. Logic Gates and Boolean Algebra 3. Combinational Logic Circuits – 1 4. Combinational Logic Circuits – 2 5. Sequential Logic Circuits				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Understand how to Convert numbers from one radix to another radix and perform arithmetic operations. 2. Simplify Boolean functions using Boolean algebra and k- maps 3. Design adders and sub tractors circuits 4. Design combinational logic circuits such as decoders, encoders, multiplexers 5. Use flip flops to design registers and counters.				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total:60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8

<b>Resource Material:</b>	<p><b>StudyMaterial(Handouts):</b>  <a href="https://youtu.be/1prCy3kdy1U">https://youtu.be/1prCy3kdy1U</a>  <a href="https://youtu.be/7bVnsXHO6Uw">https://youtu.be/7bVnsXHO6Uw</a></p> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Kohavi, Jha, “Switching and Finite Automata Theory”, 3rd edition, Cambridge.</li> <li>2. Leach, Malvino, Saha, “Digital Principles and Applications”, 7th edition, TMH.</li> <li>3. Roth, “Fundamentals of Logic Design”, 5th edition, Cengage</li> </ol> <p><b>YouTube Links:</b>  <a href="https://youtu.be/INetYZqtjTo">https://youtu.be/INetYZqtjTo</a>  <a href="https://youtu.be/Q9gmAgwT6o8">https://youtu.be/Q9gmAgwT6o8</a></p> <p><b>Power Point Presentations:</b>  <a href="https://youtu.be/EtkD1-0WR7I">https://youtu.be/EtkD1-0WR7I</a>  <a href="https://youtu.be/0lwhoQ5aQe8">https://youtu.be/0lwhoQ5aQe8</a></p>
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UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	<b>Number Systems:</b> Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and unweighted code	P1,P3,P2,P6	PQ,PT
II	<b>Logic Gates and Boolean Algebra:</b> NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates, minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions	P1,P5,P3,P2	P6,PT,PQ
III	<b>Combinational Logic Circuits – 1:</b> Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.	P1,P3,P5,P7	P6,PT
IV	<b>Combinational Logic Circuits – 2:</b> Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers	P1,P2,P5,P6	PQ, PT
V	<b>Sequential Logic Circuits:</b> Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip-flops, flip-flops with asynchronous inputs (preset and clear). Design of registers, shift registers, bidirectional shift registers, universal shift register, design of ripple counters, synchronous counters and variable modulus counters	PQ,P7,PT,P8	PQ,P6,PT

<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:III</b>			
<b>Subject</b>	<b>Object Oriented Programming using Java</b>				
<b>Units</b>	1.OOPs Concepts and Java Programming 2.Classes & Objects,Inheritance, Polymorphism 3.Interface,Packages,Exception Handling 4.Multithreading,Stream based I/O (java.io) 5. GUI Programming with Swing,Event Handling				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Understand the basic concepts of Object-Oriented Programming and Java Program Constructs 2. Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch 3. Demonstrate various classes in different packages and can design own packages 4. Manage Exceptions and Apply Threads 5. Create GUI screens along with event handling				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8

**Resource  
Material:**

**Study Material(Handouts):**

<https://youtu.be/eIrMbAQSU34>

**Reference Books:**

1. Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11 th Edition, Prentice Hall, 2018.
2. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press.

**YouTube Links:**

<https://youtu.be/7GwptabrYyk>

[https://youtu.be/6T\\_HgnjoYwM](https://youtu.be/6T_HgnjoYwM)

**Power Point Presentations:**

<https://youtu.be/rYuODpFfoVc>

[https://youtu.be/xiCBefiV\\_GQ](https://youtu.be/xiCBefiV_GQ)



UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	OOps Concepts and Java Programming: Introduction to Object-Oriented concepts, procedural and object-oriented programming paradigm Java programming: An Overview of Java, Java Environment, Data types, Variables, constants, scope and life time of variables, operators, type conversion and casting, Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format(), Control Statements	P1,P2,P3	PQ,P6,PT
II	Arrays, Command Line Arguments, Strings-String Class Methods Classes & Objects: Creating Classes, declaring objects, Methods, parameter passing, static fields and methods, Constructors, and 'this' keyword, overloading methods and access Inheritance: Inheritance hierarchies, super and subclasses, member access rules, 'super' keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods;	P1,P2,P3,P5	P6,PT
III	Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages. Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.	P1,P2,P3,P5	PQ,PT
IV	Multithreading: Differences between multiple processes and multiple threads, thread states, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication. Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, The Console class, Serialization	P1,P2,P4	PQ,P6,PT
V	GUI Programming with Swing- Introduction, MVC architecture, components, containers. Understanding Layout Managers - Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout. Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes..	PQ,P6,PT,P8	PQ,PT

<b>Course: B.Sc</b>	<b>Year:II</b>		<b>Semester:III</b>		
<b>Subject</b>	<b>Data Structures using C</b>				
<b>Units</b>	<ol style="list-style-type: none"> <li>1. Data Structures using C</li> <li>2. Linked List, Implementation of Linked List ADT</li> <li>3. Stacks,Queues</li> <li>4. Searching,Sorting</li> <li>5. Binary Trees,Graphs</li> </ol>				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	<ol style="list-style-type: none"> <li>1. Understand various Data Structures for data storage and processing.</li> <li>2. Realize Linked List Data Structure for various operations</li> <li>3. Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.</li> <li>4. Understand and implement various searching &amp; sorting techniques.</li> <li>5. Understand the Non-Linear Data Structures such as Binary Trees and Graphs</li> </ol>				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8

**Resource  
Material:**

**Study Material(Handouts):**

[https://youtu.be/ASAo20o\\_EXs](https://youtu.be/ASAo20o_EXs)

**Reference Books:**

1. “Data Structures through C”, Yashavant Kanetkar, BPB Publications
2. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley Dreamtech Publication.
3. Lipschutz, “Data Structures” Schaum’s Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd .
4. Michael T. Goodrich, Roberto Tamassia, David M. Mount “Data Structures and Algorithms in C++”, Wiley India.

**YouTube Links:**

<https://youtu.be/B31LgI4Y4DQ>

<https://youtu.be/MtVZAXepMPM>

**Power Point Presentations**

<https://youtu.be/vAZvJUYiLLU>

[https://youtu.be/7WCqQ\\_pgFs8](https://youtu.be/7WCqQ_pgFs8)

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
<b>I</b>	Basic Concepts: Pointers and dynamic memory allocation, Algorithm-Definition and characteristics, Algorithm Analysis-Space Complexity, Time Complexity, Asymptotic Notation Introduction to Data structures: Definition, Types of Data structure, Abstract Data Types (ADT), Difference between Abstract Data Types, Data Types, and Data Structures. Arrays-Concept of Arrays, Single dimensional array, Two dimensional array, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)	P1,P2,P3	PQ,P6,PT
<b>II</b>	Linked List: Concept of Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array, Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Linked List ADT: Creating a List, Traversing a linked list, Searching linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node), Application of linked lists	P1,P2,P3,P5	P6,PT
<b>III</b>	Stacks: Introduction to stack ADT, Representation of stacks with array and Linked List, Implementation of stacks, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation - Tower of Hanoi, Recursion: Concept and Comparison between recursion and Iteration  Queues: Introduction to Queue ADT, Representation of Queues with array and Linked List, Implementation of Queues, Application of Queues Types of Queues-Circular Queues, De-queues, Priority Queue	P1,P2,P3,P5	PQ,PT
<b>IV</b>	Searching: Linear or Sequential Search, Binary Search and Indexed Sequential Search Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort	P1,P2,P4	PQ,P6,PT
<b>V</b>	Binary Trees: Concept of Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Applications of Binary Tree. Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs (DFS, BFS), Application of Graphs.	PQ,P6,PT,P8	PQ,PT

<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:III</b>			
<b>Subject</b>	<b>Computer Organization</b>				
<b>Units</b>	1.Register Transfer Language and Micro Operations. 2.CPU and Micro Programmed Control. 3.Memory Organization 4.Input-Output Organization 5.Computer Arithmetic and Parallel Processing.				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Identify different types of instructions 2. Differentiate between micro-programmed and hard-wired control units. 3. Analyse the performance of hierarchical organization of memory. 4. Summarize different data transfer techniques. 5. Demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8
<b>Resource Material:</b>	<p><b>Study Material(Handouts):</b>  <a href="https://youtu.be/CDO28Esqmcg">https://youtu.be/CDO28Esqmcg</a>  <a href="https://youtu.be/OI8D69VKX2k">https://youtu.be/OI8D69VKX2k</a></p> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Carl Hamacher, ZvonksVranesic, SafeaZaky, “Computer Organization”, 5th edition, McGraw Hill.</li> <li>2. William Stallings, “Computer Organization and Architecture”, 8th edition, Pearson/PHI</li> </ol> <p><b>YouTube Links:</b>  <a href="https://youtu.be/oAneKttKjtA">https://youtu.be/oAneKttKjtA</a>  <a href="https://youtu.be/ucUHpSYm08U">https://youtu.be/ucUHpSYm08U</a></p> <p><b>Power Point Presentations:</b>  <a href="https://youtu.be/A3t7ckliyaA">https://youtu.be/A3t7ckliyaA</a>  <a href="https://youtu.be/OZjb6vy0vy4">https://youtu.be/OZjb6vy0vy4</a></p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Register Transfer Language and Micro Operations: Introduction- Functional units, computer registers, register transfer language, register transfer, bus and memory transfers, arithmetic, logic and shift micro-operations, arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, instruction cycle. Register reference instructions, Memory – reference instructions, input – output and interrupt	P1,P2,P3	PQ,P6,PT
II	CPU and Micro Programmed Control: Central Processing unit: Introduction, instruction formats, addressing modes. Control memory, address sequencing, design of control unit - hard wired control, micro programmed control	P1,P2,P3,P5	P6,PT
III	Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache Memory and mappings.	P1,P2,P3,P5	PQ,PT
IV	Input-Output Organization: Peripheral Devices, input-output interface, asynchronous data transfer, modes of transfer- programmed I/O, priority interrupt, direct memory access, Input – Output Processor (IOP).	P1,P2,P4	PQ,P6,PT
V	Computer Arithmetic and Parallel Processing: Data representation- fixed point, floating point, addition and subtraction, multiplication and division algorithms. Parallel Processing-Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.	PQ,P6,PT,P8	PQ,PT

<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:III</b>			
<b>Subject</b>	<b>Operating Systems</b>				
<b>Units</b>	1.Introduction to operating systems 2. Process Scheduling and threads 3.Process Management and deadlocks 4.Memory management 5.File and I/O Management, OS security				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1.Demonstrate knowledge and comprehension of operating system functions. 2. Analyze different process scheduling algorithms and apply them to manage processes and threads effectively 3. Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems. 4. Compare and contrast different memory allocation strategies and evaluate their effectiveness 5. Evaluate disk scheduling algorithms while implementing OS security measures				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8
<b>Resource Material:</b>	<p><b>Study Material(Handouts):</b>  <a href="https://youtu.be/WtNoaKUcawY">https://youtu.be/WtNoaKUcawY</a>  <a href="https://youtu.be/a1l4MceYHaQ">https://youtu.be/a1l4MceYHaQ</a></p> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Operating Systems: Internals and Design Principles by Stallings (Pearson)</li> <li>2. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)</li> <li>3.Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition</li> </ol> <p><b>YouTube Links:</b>  <a href="https://youtu.be/ACsLvXuaKxw">https://youtu.be/ACsLvXuaKxw</a>  <a href="https://youtu.be/MYgmmJJfdBg">https://youtu.be/MYgmmJJfdBg</a></p> <p><b>Power Point Presentations:</b>  <a href="https://youtu.be/U3BSLvavPAs">https://youtu.be/U3BSLvavPAs</a>  <a href="https://youtu.be/xsbT36yVWKg">https://youtu.be/xsbT36yVWKg</a></p>				

<b>UNIT</b>	<b>DESCRIPTION</b>	<b>PEDAGOGY</b>	<b>INTERNAL EVALUATION</b>
<b>I</b>	What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.	P1,P2,P3	PQ,P6,PT
<b>II</b>	Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling- Non-Preemptive and Preemptive Scheduling Algorithms.	P1,P2,P3,P5	P6,PT
<b>III</b>	Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.	P1,P2,P3,P5	PQ,PT
<b>IV</b>	Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies–Fixed and - Variable Partitions, Paging, Segmentation, Virtual Memory.	P1,P2,P4	PQ,P6,PT
<b>V</b>	File and I/O Management, OS security: Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Disk Scheduling algorithms.	PQ,P6,PT, <b>P8</b>	PQ,PT



<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:IV</b>			
<b>Subject</b>	<b>Database Management Systems</b>				
<b>Units</b>	1. Overview of Database Management System 2. Entity-Relationship Model 3. Relational Model 4. Structured Query Language 5. PL/SQL				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Differentiate between database systems and file based systems 2. Design a database using ER model 3. Use relational model in database design 4. Use SQL commands for creating and manipulating data stored in databases. 5. Write PL/SQL programs to work with databases.				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8
<b>Resource Material:</b>	<p><b>Study Material(Handouts):</b>  <a href="https://youtu.be/dl00fOOYLOM">https://youtu.be/dl00fOOYLOM</a>  <a href="https://youtu.be/49Urokq3k7A">https://youtu.be/49Urokq3k7A</a></p> <p><b>Reference Books:</b>  1. Database Management Systems by Raghu Ramakrishnan, McGrawhill  2. Principles of Database Systems by J. D. Ullman  3. Fundamentals of Database Systems by R. Elmasri and S. Navathe  4. SQL: The Ultimate Beginners Guide by Steve Tale.</p> <p><b>YouTube Links:</b>  <a href="https://youtu.be/c5HAWKX-suM">https://youtu.be/c5HAWKX-suM</a>  <a href="https://youtu.be/mh26grO-9k">https://youtu.be/mh26grO-9k</a></p> <p><b>Power Point Presentations:</b>  <a href="https://youtu.be/-uvHesplbQk">https://youtu.be/-uvHesplbQk</a>  <a href="https://youtu.be/T2zolcNJRw8">https://youtu.be/T2zolcNJRw8</a></p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.	P1,P2,P3	PQ,P6,PT
II	Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.	P1,P2,P3,P5	P6,PT
III	Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3rd normal form.	P1,P2,P3,P5	PQ,PT
IV	Introduction, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.	P1,P2,P4	PQ,P6,PT
V	Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers..	PQ,P6,PT,P8	PQ,PT

<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:IV</b>			
<b>Subject</b>	<b>Object Oriented Software Engineering</b>				
<b>Units</b>	1.Introduction to Object-Oriented Programming 2.Requirements Analysis and Design 3.Software Construction and Testing 4.Software Maintenance and Evolution 5.Advanced Topics in Object-Oriented Software Engineering				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Understand and apply the fundamental principles of Object-Oriented Programming (OOP) concepts and Unified Modeling Language (UML) basics, in the development of software solutions. 2. Analyze and specify software requirements, develop use cases and scenarios, apply object- oriented analysis and design (OOAD) principles 3. Familiar with the concept of test-driven development (TDD) and its practical implementation 4. Analyze and Evaluate Software Maintenance and Evolution Strategies 5. Apply Advanced Object-Oriented Software Engineering Concepts				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8

**Resource  
Material:**

**Study Material(Handouts):**

<https://youtu.be/1UVA4Ixbwwc>

[https://youtu.be/BqVqjJq7\\_vI](https://youtu.be/BqVqjJq7_vI)

**Reference Books:**

1. Requirements engineering: processes and techniques, G.Kotonya and, I.Sommerville, 1998, Wiley

2. Design Patterns, E.Gamma, R. Helm, R. Johnson, and J. Vlissides

3. The Unified Modeling Language Reference Manual, J. Rumbaugh, I.Jacobson and G. Booch, Addison Wesley

**YouTube Links:**

<https://youtu.be/efW8IH6A21Q>

[https://youtu.be/24fJ\\_ZKo8LA](https://youtu.be/24fJ_ZKo8LA)

**Power Point Presentations:**

<https://youtu.be/-b1rd>

<https://youtu.be/VnVHg6OPrQ>

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Overview of software engineering, Introduction to Object-Oriented Programming (OOP) concepts (classes, objects, inheritance, polymorphism), Unified Modelling Language (UML) basics, Introduction to software development process and software development life cycle (SDLC).	P1,P2,P3	PQ,P6,PT
II	Requirements analysis and specification, Use cases and scenarios, Object-oriented analysis and design (OOAD), Design patterns, UML modelling techniques (class diagrams, sequence diagrams, state machine diagrams, activity diagrams)	P1,P2,P3,P5	P6,PT
III	Software construction basics, Object-oriented design principles, Object-oriented programming languages (Java, C++, Python), Software testing basics (unit testing, integration testing, system testing), Test-driven development (TDD)	P1,P2,P3,P5	PQ,PT
IV	Software maintenance basics, refactoring techniques Software version control, Code review and inspection, Software evolution and reengineering	P1,P2,P4	PQ,P6,PT
V	Model-driven engineering (MDE), Aspect-oriented programming (AOP), Component-based software engineering (CBSE), Service- oriented architecture (SOA), Agile software development and Scrum methodologies.	PQ,P6,PT,P8	PQ,PT

<b>Course: B.Sc</b>	<b>Year:II</b>	<b>Semester:IV</b>			
<b>Subject</b>	<b>Data Communication and Computer Networks</b>				
<b>Units</b>	1. INTRODUCTION AND THE PHYSICAL LAYER 2. THE DATA LINK LAYER AND THE MEDIUM ACCESS SUBLAYER 3. THE NETWORK LAYER 4. THE TRANSPORT LAYER 5. THE APPLICATION LAYER AND APPLICATION LAYER PROTOCOLS				
<b>Duration</b>	<b>60hours</b>				
<b>Learning Objectives</b>	1. Understand and apply network applications, hardware, software, and reference models for network communication. 2. Design and analyze data link layer protocols, multiple access protocols, and wireless LAN technologies. 3. Design routing algorithms, congestion control algorithms, and evaluate network layer protocols for internetworking. 4. Analyze transport service, transport protocols, and evaluate UDP and TCP in the internet. 5. Understand and evaluate application layer protocols, including DNS, email, WWW, and network management protocols.				
<b>Units</b>	U1	U2	U3	U4	U5
<b>Hours Split: Total: 60</b>	10	12	14	10	14
<b>Internal valuation:40marks</b>	8	8	8	8	8

**Resource  
Material:**

**Study Material(Handouts):**

<https://youtu.be/aPw0pltPrY4>

[https://youtu.be/OmYHJShD\\_QM](https://youtu.be/OmYHJShD_QM)

**Reference Books:**

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.

2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

**YouTube Links:**

[https://youtu.be/j0vdP\\_bi274](https://youtu.be/j0vdP_bi274)

<https://youtu.be/wdMwg3eHjSM>

**Power Point Presentations:**

<https://youtu.be/0ggBPLOZYCU>

<https://youtu.be/zUXVDFIOIT8>

<b>UNIT</b>	<b>DESCRIPTION</b>	<b>PEDAGOGY</b>	<b>INTERNAL EVALUATION</b>
<b>I</b>	Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay. Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.	P1,P2,P3	PQ,P6,PT
<b>II</b>	Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer on the internet. Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.	P1,P2,P3,P5	P6,PT
<b>III</b>	Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.	P1,P2,P3,P5	PQ,PT
<b>IV</b>	Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP	P1,P2,P4	PQ,P6,PT
<b>V</b>	Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http. APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.	PQ,P6,PT,P8	PQ,PT