



**JAI HIND COLLEGE  
BASANTSING INSTITUTE OF SCIENCE  
&  
J.T.LALVANI COLLEGE OF COMMERCE  
(AUTONOMOUS)**

"A" Road, Churchgate, Mumbai - 400 020, India.

**Affiliated to  
University of Mumbai**

Program: B.Sc IT

Proposed Courses: S.Y.BSc.IT

Semester III

**Credit Based Semester and Grading System (CBCS) with effect from  
the academic year 2022-23**

**S.Y.BSc. IT**

**Academic year 2022-2023**

<b>Semester III</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Lectures /Week</b>
SBIT301	Applied Mathematics	3	5
SBIT302	Applied Data Structures and Algorithms	2	5
SBIT303	Operating System	3	5
SBIT304	Databases and Transactions	3	5
SBIT305	Core Java with JSP	3	5
SBIT301 PR	Applied Mathematics Practical	2.5	3
SBIT302 PR	Applied Data Structures and Algorithms Practical	2	3
SBIT303 PR	Operating System Practical	2.5	3
SBIT304 PR	Databases and Transactions Practical	2.5	3
SBIT305 PR	Core Java with JSP Practical	2.5	3

### Semester III – Theory

<b>Course Code: SBIT301</b>	<b>Course Title: Applied Mathematics (Credits: 03 Lectures/Week:05)</b>	
	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Apply mathematical concepts and principles to perform computations</li> <li>➤ Apply mathematics to solve problems</li> <li>➤ Create, use and analyze graphical representations of mathematical relationships</li> <li>➤ Apply technology tools to solve problems</li> <li>➤ Perform abstract mathematical reasoning</li> </ul> <p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>➤ This is a class designed to provide additional enrichment applications for students. systems of linear equations, quadratic equations, literal equations, word problems and their solutions, vectors. Students will take leadership roles in this class to work on advanced problems</li> </ul>	
<b>Unit I</b>	<p><b>Matrices:</b> Inverse of a matrix, Properties of matrices, Elementary Transformation, Rank of Matrix, Echelon or Normal Matrix, Inverse of matrix, Linear equations, Linear dependence and linear independence of vectors, Linear transformation, Characteristics roots and characteristics vectors, Properties of characteristic vectors, Caley-Hamilton Theorem, Similarity of matrices, Reduction of matrix to a diagonal matrix which has elements as characteristics values.</p> <p><b>Complex Numbers:</b> Complex number, Equality of complex numbers, Graphical representation of complex number (Argand's Diagram), Polar form of complex numbers, Polar form of <math>x+iy</math> for different signs of <math>x, y</math>, Exponential form of complex numbers, Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex angles, Definition of hyperbolic function, Relations between circular and hyperbolic functions</p>	<b>15 L</b>
<b>Unit II</b>	<p><b>Equation of the first order and of the first degree:</b> Separation of variables, Equations homogeneous in <math>x</math> and <math>y</math>, Non-homogeneous linear equations, Exact differential</p> <p><b>Differential equation of the first order of a degree higher than the first:</b> Introduction, Solvable for <math>p</math> (or the method of factors), Solve for <math>y</math>, Solve for <math>x</math>, Methods of Substitution.</p>	<b>15 L</b>
<b>Unit III</b>	<p><b>The Laplace Transform:</b> Introduction, Definition of the Laplace Transform, Table of Elementary Laplace Transforms, Theorems on Important Properties of Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, The Convolution Theorem, Laplace Transform of an Integral, Laplace Transform of Derivatives, Laplace Transformation of Special Function, Periodic Functions, Heaviside Unit Step Function, Dirac-delta Function (Unit Impulse Function)</p> <p><b>Inverse Laplace Transform:</b> Shifting Theorem, Partial fraction Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients</p>	<b>15 L</b>
<b>Unit IV</b>	<p><b>Multiple Integrals:</b> Double Integral, Triple Integral Change of the order of the integration, Double integral in polar co-ordinates</p> <p><b>Applications of Integral:</b> area, Volume</p>	<b>15 L</b>

	<b>Beta and Gamma Functions:</b> Definitions, Properties and Problems , Duplication formula.	
<b>Textbook:</b>		
<ol style="list-style-type: none"> <li>1. P. N. Wartikar and J. N. Wartikar , (1984).A text book of Applied Mathematics VoII Pune VidyarthGrihaPrka, Pune</li> <li>2. P. N. Wartikar and J. N. Wartikar , (1984).A text book of Applied Mathematics VoIII Pune VidyarthGrihaPrka, Pune</li> </ol>		

### Evaluation Scheme

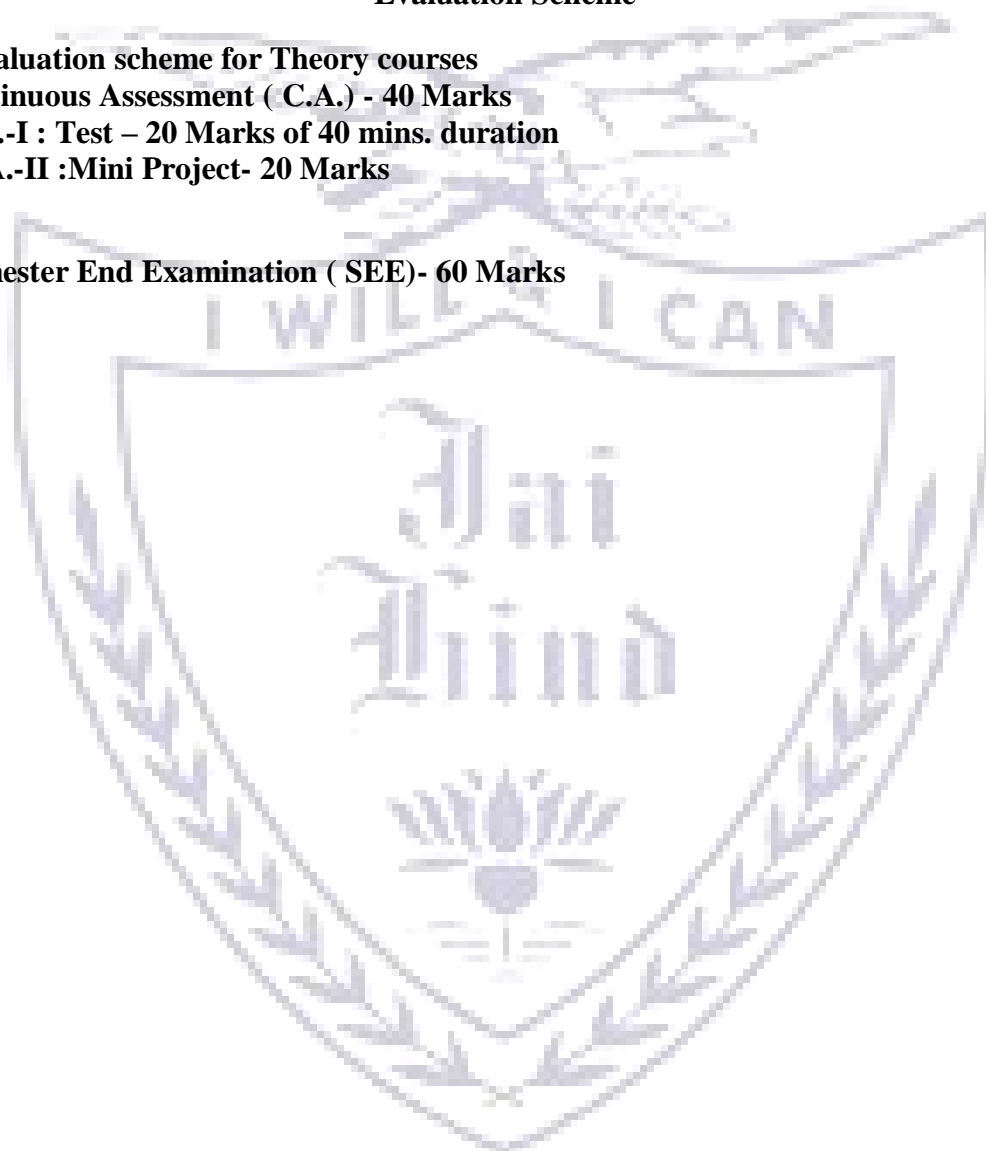
**[A] Evaluation scheme for Theory courses**

**I. Continuous Assessment ( C.A.) - 40 Marks**

**(i) C.A.-I : Test – 20 Marks of 40 mins. duration**

**(ii) C.A.-II :Mini Project- 20 Marks**

**II. Semester End Examination ( SEE)- 60 Marks**



<b>Course:</b> <b>SBIT302</b>	<b>Course Title: Applied Data Structures and Algorithms (Credits : 02 Lectures/Week: 05 )</b>	
	<b>Objectives:</b> <ul style="list-style-type: none"> <li>• To impart the basic concepts of data structures and algorithms</li> <li>• To understand concepts about searching and sorting techniques</li> <li>• To Understand basic concepts about stacks, queues, trees and graphs</li> <li>• To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures</li> <li>• To improve the logical ability</li> </ul> <b>Outcomes:</b> <ul style="list-style-type: none"> <li>• Describe how arrays, records, linked lists, stacks, queues, trees, and graphs are represented in memory and used by algorithms</li> <li>• Describe common applications for arrays, records, linked list, stacks, queues, trees, and graphs</li> <li>• Demonstrate different methods for traversing trees.</li> </ul>	
<b>Unit I</b>	<b>Introduction</b> Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Asymptotic Analysis and Notations, Rate of Growth and Big O Notation, Role of data structure in compiler design –scanning,parsing, lexical analysis, symbol table. <b>Array</b> Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Traversing, Insertion, Deletion, Searching, Sorting, Merging of Arrays, Multidimensional Arrays, Memory Representation of Two Dimensional Arrays, General Multi-Dimensional Arrays, Sparse Arrays, Sparse Matrix, Memory Representation of Special kind of Matrices, Advantages and Limitations of Arrays.	<b>15 L</b>
<b>Unit II</b>	<b>Linked List</b> Linked List, One-way Linked List, Traversal of Linked List, Searching, Memory Allocation and De-allocation, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List, Traversing a Two way Linked List, Searching in a Two way linked List, Insertion of an element in Two way Linked List, Deleting a node from Two way Linked List, Header Linked List, Applications of the Linked list, Representation of Polynomials, Storage of Sparse Arrays, Application – Disk Management system. <b>Stack</b> Introduction, Operations on the Stack Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion , Application – backtracking and 8 Queens Problem	<b>15 L</b>

<p><b>Unit III</b></p>	<p><b>Queue</b> Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue, Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues</p> <p><b>Sorting and Searching Techniques</b> Bubble, Selection, Insertion, Merge Sort Searching: Sequential, Binary, Indexed Sequential Searches Binary Search.</p> <p><b>Tree</b> Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Reconstruction of Binary Tree from its Traversals, Huffman Algorithm, Binary Search Tree, Operations on Binary Search Tree, Heap, Memory Representation of Heap, Operation on Heap, Heap Sort. Application- multi dimensional packet classification, minmax algorithm</p>	<p><b>15 L</b></p>
<p><b>Unit IV</b></p>	<p><b>Advanced Tree Structures</b> Red Black Tree, Operations Performed on Red Black Tree, AVL Tree, Operations performed on AVL Tree, 2-3 Tree, B-Tree, Application – Query Processing Hashing Techniques Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing, Quadratic, Double hashing, Bucket hashing, Deletion and rehashing.</p> <p><b>Graph</b> Introduction, Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph, Operations Performed on Graph, Graph Traversal, Applications of the Graph, Reachability, Shortest Path Problems, Spanning Trees, Application – Web as dynamic graph</p>	<p><b>15 L</b></p>
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Lalit Goyal, Vishal Goyal, Pawan Kumar(2014). <i>A Simplified Approach to Data Structures</i>. SPD</li> <li>2. Dinesh.P Mehta and Sartaj Sahni, <i>Handbook of Data structures</i></li> </ol>		

### Evaluation Scheme

#### [A] Evaluation scheme for Theory courses

##### I. Continuous Assessment ( C.A.) - 40 Marks

- (i) C.A.-I : Test – 20 Marks of 40 mins. duration
- (ii) C.A.-II :Case Study- 20 Marks

##### II. Semester End Examination ( SEE)- 60 Marks

<b>Course:</b> <b>SBIT303</b>	<b>Course Title: Operating System (Credits: 03 Lectures/Week: 05)</b>	
	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• Learn how Operating System is Important for Computer System</li> <li>• Understand the structures of operating systems, including CPU scheduling, memory management, and device management.</li> <li>• Covers topics including file systems, virtual memory, disk request scheduling, concurrent processes, deadlocks, security, and integrity.</li> <li>• Understand the fundamentals of cloud computing and concepts of virtualization</li> <li>• It will provide the students basic understanding about cloud and virtualization along with how one can migrate over it.</li> </ul> <p><b>Outcomes:</b>  Upon the completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>• Learn and understand the concepts, core structure of Operating Systems and basic architectural components involved in operating systems design.</li> <li>• Understand the process management policies and scheduling of processes by CPU.</li> <li>• Evaluate the requirement for process synchronization and coordination handled by the operating system.</li> <li>• Describe and analyze the memory management and its allocation policies.</li> <li>• Gain skills to install, configure and deploy the windows server operating system</li> <li>• Managing and maintaining windows server operating system</li> </ul>	
<b>Unit I</b>	<p><b>Introduction:</b>  <b>Operating system:</b> What is an operating system? History of operating system, Different operating systems, Operating system concepts, System calls, Operating system structure  <b>Introduction to Compiler Design:</b> Overview, Architecture, Phases  <b>Processes and Threads:</b> Processes, Threads, Inter-process communication, Scheduling, IPC problems</p>	15 L
<b>Unit II</b>	<p><b>Memory Management:</b> No memory abstraction, memory abstraction: address spaces, virtual memory, Paging: page replacement algorithms, design issues for paging systems, implementation issues, segmentation  <b>File Systems:</b> Files, Directories, File system implementation, File-system management and optimization  <b>Secondary-Storage Structure:</b> Disk Structure, Disk Scheduling, Disk Management, RAID Structure</p>	15 L
<b>Unit III</b>	<p><b>Deadlocks:</b> Resources, Introduction to deadlocks, The ostrich algorithm, Deadlock, detection and recovery, Deadlock avoidance, Deadlock prevention, Issues.  <b>Protection and Security:</b> Authentication, Program Threats, System threats  <b>Multiple Processor Systems:</b> Multiprocessors, Multi-computers, Distributed systems.</p>	15 L

<b>Unit IV</b>	<p><b>Virtualization:</b> History, Requirements for virtualization, Type 1 and 2 hypervisors, Techniques for efficient virtualization, Hypervisor microkernels, Memory virtualization, I/O virtualization, Managing Storage for a Virtual Machine, Virtual , appliances, virtual machines on multicore CPUs , Achieving the Benefits of Datacenter Virtualization,</p> <p><b>Cloud:</b> Overview, Architecture, Models-public, private, hybrid, SAAS Challenges.</p> <p><b>Migrating into a Cloud</b> Introduction, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration Risks and Mitigation, Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, Adoption and Consumption Strategies, issues for enterprise applications on the cloud</p>	15 L
<p><b>Textbook:</b></p> <ol style="list-style-type: none"> <li>1. Operating System Concepts. New Jersey, NJ, John Wiley and Sons, Abraham Silberschatz, Peter B. Galvineg Gagne, A. (2013).</li> <li>2. Modern Operating Systems, Tanenbaum</li> <li>3. Virtualisation Essentials ,Sybex, Mathew Portnoy</li> <li>4. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach</li> <li>5. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008</li> </ol>		

### Evaluation Scheme

**[A] Evaluation scheme for Theory courses**

**I. Continuous Assessment ( C.A.) - 40 Marks**

- (i) C.A.-I : Test – 20 Marks of 40 mins. duration
- (ii) C.A.-II : Mini Project- 20 Marks

**II. Semester End Examination ( SEE)- 60 Marks**



<b>Course Code: SBIT304</b>	<b>Course Title: Databases and Transactions (Credits : 03 Lectures/Week: 05 )</b>	
	<p>Objectives:</p> <ul style="list-style-type: none"> <li>• Manipulation of data.</li> <li>• Learning the development and structuring of data.</li> <li>• Managing the transactions of the automated information and management systems.</li> <li>• Foundation for learning various types of databases.</li> <li>• Detailed understanding of transaction management</li> </ul> <p>Outcomes:</p> <ul style="list-style-type: none"> <li>• Understand the basic concepts and the applications of database systems.</li> <li>• Able to perform the basic elements of a relational database management system</li> <li>• Identify the data models for relevant problems.</li> <li>• Understand transaction processing mechanisms in relational databases.</li> <li>• Able to describe and develop Relational Algebra and Relational Calculus queries.</li> </ul>	
<b>Unit I</b>	<p><b>Introduction to Databases:</b> Data, database system and file system, Purpose of database system, Relational databases, Database architecture.</p> <p><b>Data Models:</b> Type of data models, Business rules, Degrees of data abstraction, data independence.</p> <p><b>Database design and ER Model:</b> Overview, ER Model, Constraints, ER Diagrams, ERD Issues, Codd's rules, Relational Schemas.</p> <p><b>Relational database model and design:</b> Features, Logical view of data, Keys, integrity rule, Functional Dependency, Decomposition, Normalization (1NF, 2NF, 3NF, BCNF)</p> <p><b>Indexing:</b> Structure, indexing methods, ordered index, primary index, secondary index, clustering index</p>	<b>15 L</b>
<b>Unit II</b>	<p><b>Introduction to SQL and Constraints:</b> DDL, DQL, DML, TCL, Constraints, types of constraints, Integrity constraints</p> <p><b>Query Processing in SQL:</b> Character and numeric functions, Aggregate function, Null Values, Order by, Sequences, set operators, group by clause with rollup and cube, sub queries and nested sub queries, Joins and types, views.</p> <p><b>User Privileges:</b> User accounts and session creation and access.</p>	<b>15 L</b>
<b>Unit III</b>	<p><b>Introduction to PL / SQL:</b> Identifiers and Keywords, Operators, Expressions.</p> <p><b>Control Blocks:</b> Control Structures, Cursors, Parametric cursors, Collections and composite data types, Procedures and Functions, Exceptions Handling, Packages, Triggers, compound Triggers and controlling triggers.</p>	<b>15 L</b>
<b>Unit IV</b>	<p><b>Transaction management and Concurrency:</b> Control Transaction management: ACID properties, serializability and concurrency control, transaction control statements, Lock based concurrency control: 2PL, Strict s2PL, Deadlocks, Time stamping methods, phantom problems, Optimistic methods, Database recovery management.</p>	<b>15 L</b>

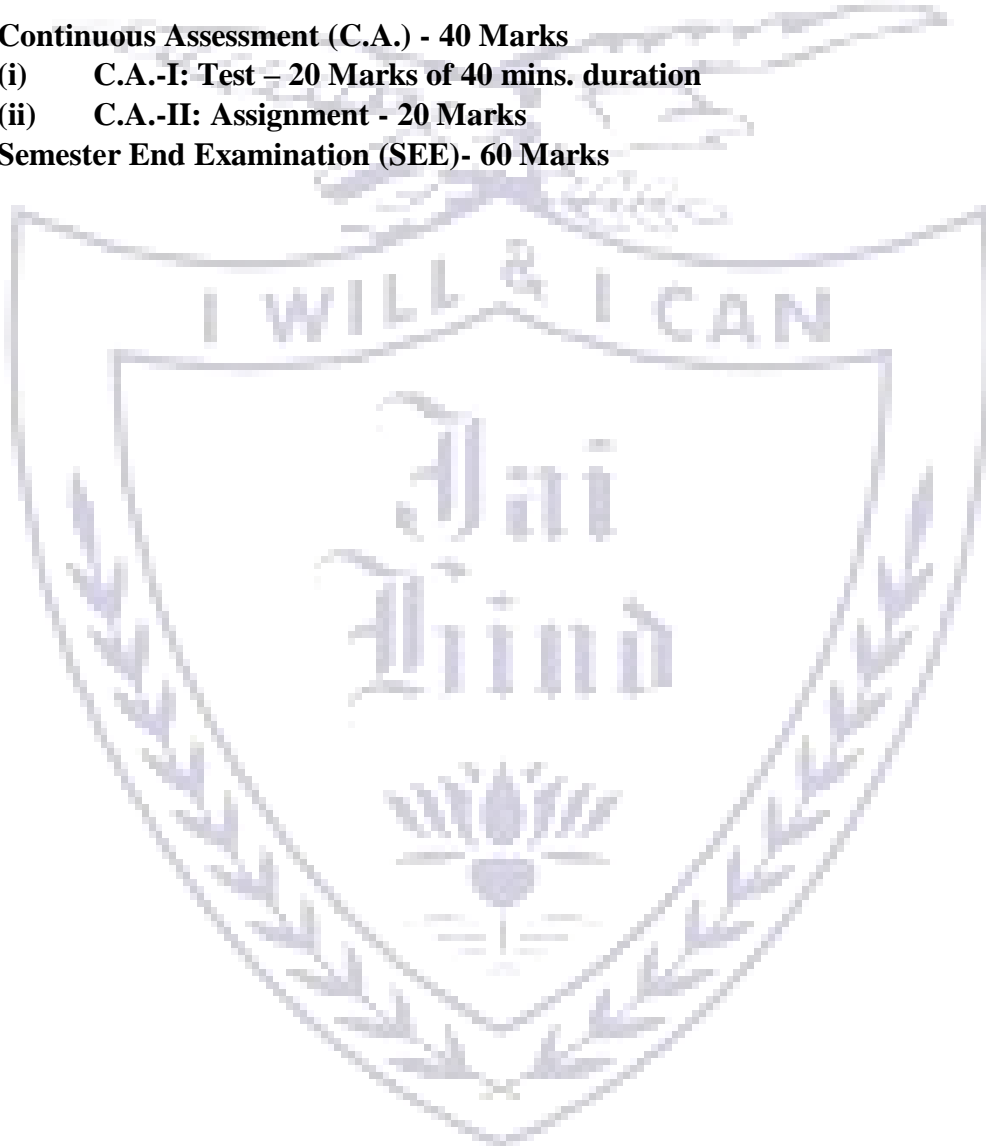
References:

1. Joel Murach, A. (2014). Murach's Oracle SQL and PL/SQL. California, Mike Murach & Associates
2. A Silberschatz, H Korth, S Sudarshan, Database System and Concepts. New York, NY. McGraw-Hill, Fifth Edition 3. C. J. Date (2003). Introduction to Database System. London, United Kingdom. Pearson, First Edition.

**Evaluation Scheme**

**[A] Evaluation scheme for Theory courses**

- I. Continuous Assessment (C.A.) - 40 Marks**
  - (i) C.A.-I: Test – 20 Marks of 40 mins. duration**
  - (ii) C.A.-II: Assignment - 20 Marks**
- II. Semester End Examination (SEE)- 60 Marks**



<b>Course Code:</b> SBIT305	<b>Course Title: Core Java with JSP (Credits: 03 Lectures/Week:05)</b>	
	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• To become familiar with the features of Java Language</li> <li>• To discover how to write Java code according to Object Oriented Programming principles.</li> <li>• To become comfortable with concepts such as Classes, Objects, Inheritance, Polymorphism and Interfaces</li> <li>• To learn Java APIs for Collections, I/O Streams</li> <li>• To design GUI applications and Applets using AWT and Swing.</li> <li>• To develop Multithreaded and Networking application Introduce Java EE Concepts with JSP</li> </ul> <p><b>Outcomes:</b> Upon the completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>• The course is designed to provide programming fundamentals using JAVA along with JSP Enterprise Programming Concepts</li> </ul>	
<b>Unit I</b>	<p><b>Introduction:</b> History, architecture and its components, Java Class File, Java Runtime Environment, The Java Virtual Machine, JVM Components, The Java API, java platform, java development kit, Lambda Expressions, Data types operators, Control Flow Statements, Iterations</p> <p><b>Classes:</b> Types of Classes, Scope Rules, Access Modifier, Instantiating Objects from A Class, Initializing the Class Object and Its Attributes, Class Methods, Method Overloading, Constructors, this Instance, super Instance, Characteristics of Members of A Class, constants, this instance, static fields of a class, static methods of a class, garbage collection</p> <p><b>Inheritance:</b> Derived Class Objects, Inheritance and Access Control, Default Base Class Constructors, this and super keywords, Abstract Classes and Interfaces, Abstract Classes, Abstract Methods, Interfaces, What Is an Interface? How Is an Interface Different from An Abstract Class, Multiple Inheritance, Default Implementation, Adding New Functionality, Method Implementation, Classes V/s Interfaces, Defining an Interface, Implementing Interfaces.</p> <p><b>Packages:</b> Creating Packages, Default Package, Importing Packages, Using A Package.</p> <p><b>Arrays:</b> Two Dimensional Arrays, Multi-Dimensional Arrays, Vectors, Adding Elements to A Vector, Accessing Vector Elements, Searching for Elements In A Vector, Working With The Size of The Vector. Java Lambda Expressions</p>	<b>15 L</b>
	<p><b>Multithreading:</b> the thread control methods, thread life cycle, the main thread, creating a thread, extending the thread class.</p> <p><b>Exceptions:</b> Catching Java Exceptions, Catching Run-Time Exceptions, Handling Multiple Exceptions, The finally Clause, The throws Clause</p>	<b>15 L</b>

<b>Unit II</b>	<p><b>Byte streams:</b> reading console input, writing console output, reading file, writing file, writing binary data, reading binary data, getting started with character streams, writing file, reading file</p> <p><b>Debugging:</b> What is Debugging, need of debugging, Steps involved in debugging, debugging strategies, Tools required to debug</p> <p><b>GIT Basics:</b> GIT overview, GIT features overview, setting up GIT, Clone and import GIT project into IDE, Clone GIT project directly from IDE</p>	
<b>Unit III</b>	<p><b>Event Handling:</b> Delegation Event Model, Events, Event classes, Event listener interfaces, Using delegation event model, adapter classes and inner classes.</p> <p><b>Abstract Window Toolkit:</b> Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas. Components – Labels, Buttons, Check Boxes, Radio Buttons, Choice Menus, Text Fields, Text, Scrolling List, Scrollbars, Panels,</p> <p><b>Swing:</b> JFrame, JTable, JScrollbar, JMenu, JTree, JTabbedPane, JToggleButton, JScrollPane</p> <p><b>Frames Layouts:</b> Flow Layout, Grid Layout, Border Layout, Card Layout</p> <p><b>JDBC:</b> Overview of RDBMS, Introduction to Call Level Interface (CLI), Introduction to JDBC, JDBC Architecture, Types of JDBC Drivers, Establishing a JDBC Connection, Using Statement, Using Prepared Statement, Using Callable Statement, Scrollable and Updatable Result Set, Inserting &amp; Fetching from BLOB Columns, Managing Transactions in JDBC, Auto Increment Columns</p>	<b>15 L</b>
<b>Unit IV</b>	<p><b>Introduction to JSP:</b> Java EE basic Concepts, JSP Architecture, JSP Standard / Implicit Objects, Request, Response, Out, config, Application, Session, Page, Page Context, exception, JSP Page Implementation Class, JSP Basics &amp; Syntax, JSP Directive Tags, Page Directive, Include Directive, JSP Action element, JSP Pagination, JSP CRUD, JSP Session Management</p>	<b>15 L</b>
<p><b>Textbook:</b></p> <ol style="list-style-type: none"> <li>1. Core Java 8 for Beginners Vaishali Shah,Sharman Shah,SPD Publisher 1st Edition</li> <li>2. Java: The Complete Reference, Herbert Schildt, McGraw Hill Publication, 9th Edition</li> <li>3. Java EE7 for Beginners, Sharanam Shah,Vaishali Shah, SPD Publisher 1st Edition</li> </ol>		

### Evaluation Scheme

[A] Evaluation scheme for Theory courses

**I. Continuous Assessment ( C.A.) - 40 Marks**

**(i) C.A.-I : Test – 20 Marks of 40 mins. duration**

**(ii) C.A.-II : Mini project- 20 Marks**

**II. Semester End Examination ( SEE)- 60 Marks**

### Semester III – Practical

<b>Course Code:</b>	<b>Practical Title: Applied Mathematics Practical (Credits : 2.5 Practicals/Week: 03)</b>
<b>SBIT301PR</b>	<ol style="list-style-type: none"><li>1. Introduction to sympy<ol style="list-style-type: none"><li>a. Symbolic Computation</li><li>b. Substitution</li><li>c. Simplify() function</li><li>d. Eval() function</li></ol></li><li>2. Matrices<ol style="list-style-type: none"><li>a. Creating matrices</li><li>b. Basic manipulation on matrices</li></ol></li><li>3. Matrices Reduction<ol style="list-style-type: none"><li>a. Matrix Determinant</li><li>b. Matrix reduction</li><li>c. Matrix eigen class</li></ol></li><li>4. Differential Equation<ol style="list-style-type: none"><li>a. Single Ordinary Differential Equation</li><li>b. Classification of Differential Equation</li></ol></li><li>5. Exact Differential Equation<ol style="list-style-type: none"><li>a. Homogeneous Differential Equation.</li><li>b. Partial Differential Equation separation of variables</li><li>c. Exact Differential Equation</li></ol></li><li>6. Integrals<ol style="list-style-type: none"><li>a. Solving Integral with integrate function</li><li>b. Integral Transformation</li></ol></li><li>7. Laplace<ol style="list-style-type: none"><li>a. Laplace Transform</li><li>b. Inverse Laplace Transform</li></ol></li><li>8. Limits<ol style="list-style-type: none"><li>a. Solving Limits</li><li>b. Series Expansion with limits</li></ol></li></ol>

#### Evaluation Scheme

**[B] Evaluation scheme for Practical courses-50 Marks**

<p><b>Course:</b> <b>SBIT302PR</b></p>	<p><b>Practical Title: Applied Data Structures and Algorithms Practical</b> <b>(Credits : 02 Practicals /Week: 03)</b></p>
	<p><b>1. Implement the following:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to store the elements in 1-D array and perform the operations like searching, sorting and reversing the elements. [Menu Driven]</li> <li>b. Read the two arrays from the user and merge them and display the elements in sorted order.[Menu Driven]</li> <li>c. Write a program to perform the Matrix addition, Multiplication and Transpose Operation. [Menu Driven]</li> </ul> <p><b>2. Implement the following for Linked List:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to create a single linked list and display the node elements in reverse order.</li> <li>b. Write a program to search the elements in the linked list and display the same</li> <li>c. Write a program to create double linked list and sort the elements in the linked list.</li> </ul> <p><b>3. Implement the following for Stack:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.</li> <li>b. Write a program to convert an infix expression to postfix and prefix conversion.</li> <li>c. Write a program to implement Tower of Hanoi problem.</li> </ul> <p><b>4. Implement the following for Queue:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.</li> <li>b. Write a program to implement the concept of Circular Queue</li> <li>c. Write a program to implement the concept of Deque</li> </ul> <p><b>5. Implement the following sorting techniques:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to implement bubble sort.</li> <li>b. Write a program to implement selection sort.</li> <li>c. Write a program to implement insertion sort.</li> </ul> <p><b>6. Implement the following data structure techniques:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to implement merge sort.</li> <li>b. Write a program to search the element using sequential search.</li> <li>c. Write a program to search the element using binary search.</li> </ul> <p><b>7. Implement the following data structure techniques:</b></p> <ul style="list-style-type: none"> <li>a. Write a program to create the tree and display the elements.</li> <li>b. Write a program to construct the binary tree.</li> <li>c. Write a program for inorder, postorder and preorder traversal of tree</li> </ul> <p><b>8. Implement the following data structure techniques:</b></p>

	<p>a. Write a program to insert the element into maximum heap. b. Write a program to insert the element into minimum heap.</p> <p><b>9. Implement the following data structure techniques:</b> a. Write a program to implement the collision technique. b. Write a program to implement the concept of linear probing.</p> <p><b>10. Implement the following data structure techniques:</b> a. Write a program to generate the adjacency matrix. b. Write a program for shortest path diagram</p>
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### Evaluation Scheme

**[B] Evaluation scheme for Practical courses-50 Marks**



<b>Course:</b> <b>SBIT303PR</b>	<b>Practical Title: Operating System Practical (Credits :2.5</b> <b>Practicals/Week:01)</b>
	<ol style="list-style-type: none"> <li>1. Implementing the Process Scheduling algorithms.</li> <li>2. Working with Vi Editor</li> <li>3. Working with Shell Programs: <ol style="list-style-type: none"> <li>1. Write script to print nos as 5,4,3,2,1 using while loop</li> <li>2. Write Script, using case statement to perform basic math operation as addition, subtraction, multiplication, division</li> <li>3. Write Script to find out biggest number from given three numbers</li> </ol> </li> <li>4. Windows OS based implementation: <ol style="list-style-type: none"> <li>a. Installation of client windows 10 in Virtual machine</li> <li>b. Installation of Windows server2016 in Virtual machine</li> <li>c. Add roles and features</li> </ol> </li> <li>5. Windows OS based implementation: <ol style="list-style-type: none"> <li>a. Disk Partitioning in MBR and GPT</li> <li>b. Server Backup</li> </ol> </li> <li>6. Windows OS based implementation: <ol style="list-style-type: none"> <li>a. Configuring Active Directory domain service</li> <li>b. Configuring, managing and installation of DNS</li> </ol> </li> <li>7. Windows OS based implementation: <ol style="list-style-type: none"> <li>a. Configuring, managing and installation of DHCP</li> <li>b. IIS Configuration and Deployment</li> </ol> </li> <li>8. Windows OS based implementation: <ol style="list-style-type: none"> <li>a. Mapping network drive</li> </ol> </li> <li>9. Practical based on Virtualization <ol style="list-style-type: none"> <li>a. Exercise on installation of VMware ESXi Server on VMware.</li> <li>b. Creating and assigning instances using ESXi server on VMware.</li> </ol> </li> <li>10. Practical based on Virtualization and Cloud <ol style="list-style-type: none"> <li>a. Creating an EC2 instance on AWS</li> <li>b. Configuration of db in AWS.</li> <li>c. Creation of S3 bucket with single IAM user in AWS</li> </ol> </li> </ol>

### Evaluation Scheme

**[B] Evaluation scheme for Practical courses-50 Marks.**



<b>Course:</b> <b>SBIT304PR</b>	<b>Practical Title: Databases and Transactions Practical</b> <b>(Credits : 2.5 Practicals/Week: 03)</b>
	<ol style="list-style-type: none"> <li>1. Create relational database structure from ERD.</li> <li>2. Importing and exporting data from CSV and XML files.</li> <li>3. SQL basic operations: <ol style="list-style-type: none"> <li>a. Implementing DQL on Dual table</li> <li>b. DDL and DML to implement Education system.</li> </ol> </li> <li>4. SQL basic operations with keys and constraints: <ol style="list-style-type: none"> <li>a. SET operations</li> <li>b. Aggregate functions</li> <li>c. Order by</li> <li>d. Group by</li> <li>e. sequence</li> </ol> </li> <li>5. Joins, subqueries and nested subqueries.</li> <li>6. Controlling user access. <ol style="list-style-type: none"> <li>a. Create users, sessions.</li> <li>b. Privileges</li> </ol> </li> <li>7. Introduction to PL/SQL: <ol style="list-style-type: none"> <li>a. Declaring Variables</li> <li>b. Writing Executable Statements</li> <li>c. Writing Control Structures</li> <li>d. Working with Composite Data Types</li> </ol> </li> <li>8. Cursors and Exceptions PL/SQL: <ol style="list-style-type: none"> <li>a. Create cursors for the education and hospital system.</li> <li>b. Handle exceptions.</li> </ol> </li> <li>9. Subprograms: <ol style="list-style-type: none"> <li>a. Create functions in the education system.</li> <li>b. Create stored procedures on hospital systems and hospital systems.</li> </ol> </li> <li>10. Packages to contain functions and procedures.</li> <li>11. Triggers <ol style="list-style-type: none"> <li>a. Basic Triggers.</li> <li>b. Operation on Triggers</li> <li>c. Compound Triggers.</li> </ol> </li> <li>12. Locks. <ol style="list-style-type: none"> <li>a. Implementing shared locks</li> <li>b. Implementing exclusive locks</li> </ol> </li> </ol>

### Evaluation Scheme

**[B] Evaluation scheme for Practical courses-50 Marks**

<b>Course Code:</b> <b>SBIT305PR</b>	<b>Practical Title: Core Java with JSP Practical</b> <b>(Credits : 2.5 Practicals/Week: 03)</b>
	<ol style="list-style-type: none"> <li><b>1. Java Basics</b> <ol style="list-style-type: none"> <li>a. Write a Java program that takes a number as input and prints its multiplication table upto 10.</li> <li>b. Write a Java program to display the following pattern.  *****  ****  ***  **  *</li> <li>c. Write a Java program to print the area and perimeter of a circle</li> </ol> </li> <li><b>2. Use of Operators</b> <ol style="list-style-type: none"> <li>a. Write a Java program to add two binary numbers.</li> <li>b. Write a Java program to convert a decimal number to binary number and vice c. versa.</li> <li>c. write a Java program to reverse a string.</li> </ol> </li> <li><b>3. Java Data Types</b> <ol style="list-style-type: none"> <li>a. Write a Java program to count the letters, spaces, numbers and other characters of string</li> <li>b. Implement Java function that calculates the sum of digits for a given char array consisting of the digits '0' to '9'. The function should return the digit sum as a</li> <li>c. Fid the smallest and largest element from the array</li> </ol> </li> <li><b>4. Methods and Constructors</b> <ol style="list-style-type: none"> <li>a. Designed a class SortData that contains the method asec() and desc().</li> <li>b. Designed a class that demonstrates the use of constructor and destructor</li> <li>c. Write a java program to demonstrate the implementation of abstract class.</li> </ol> </li> <li><b>5. Inheritance</b> <ol style="list-style-type: none"> <li>a. Write a java program to implement single level inheritance.</li> <li>b. Write a java program to implement method overriding</li> <li>c. Write a java program to implement multiple inheritance</li> </ol> </li> <li><b>6. Packages and Arrays</b> <ol style="list-style-type: none"> <li>a. Create a package, Add the necessary classes and import the package in java</li> <li>b. Write a java program to add two matrices and print the resultant matrix</li> <li>c. Write a java program for multiplying two matrices and print the product for the same</li> </ol> </li> <li><b>7. Vectors and Multithreading</b> <ol style="list-style-type: none"> <li>a. Write a java program to implement the vectors</li> <li>b. Write a java program to implement thread life cycle</li> <li>c. Write a java program to implement multithreading.</li> </ol> </li> <li><b>8. File Handling</b> <ol style="list-style-type: none"> <li>a. Write a java program to open a file and display the contents in the console window</li> <li>b. Write a java program to copy the contents from one file to other file.</li> <li>c. Write a java program to read the student data from user and store it in the file.</li> </ol> </li> </ol>

	<p>d. Setting GIT environment for project.</p> <p><b>9. GUI and Exception Handling</b></p> <p>a. Design a AWT program to print the factorial for an input value</p> <p>b. Design an AWT program to perform various string operations like reverse string</p> <p>c. Write a java program to implement exception handling</p> <p><b>10. GUI Programming.</b></p> <p>a. Design an AWT application that contains the interface to add student information</p> <p>b. Design a Swing application to implement JTabbedPane, Jtree, TMenu.</p> <p>c. Design swing application to generate result marks sheet</p> <p><b>11. Implement the following JSP applications.</b></p> <p>a. Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.</p> <p>b. Develop a simple JSP application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender-radio button).</p> <p>c. Create a registration and login JSP application to register and authenticate the user.</p>
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**[B] Evaluation scheme for Practical courses-50 Marks**