# Assam University, Silchar



# Four Year Undergraduate Programme

## Implemented under NEP 2020

### Effective from the Academic Year 2023-24

## Syllabus of Bachelor of Vocation (B. Voc.)
## Information Technology
### (2nd Year)

# Programme Specific Outcome

On successful completion of the FYUG B.Voc. (Information Technology) Programme, students will be able to:

1. Acquire various skills in the field of Information Technology. This includes skills related to various office automation tools like MS Office, PowerPoint, MS Excel, etc., and their applications.
2. Gain knowledge about the fundamentals of computer systems and their working. Further students will be able to develop programming skills with programming languages C, JAVA, Python, etc. by actually designing programs in concerned laboratories.
3. Learn about digital electronics, computer networking, operating systems, and related areas both theoretically and with practice by performing rigorous experiments in the laboratories.
4. Design, develop, and implement data structures and algorithms for problem-solving in various domains by virtue of training in the laboratories.
5. Learn scripting and web development tools like PHP, JavaScript, etc., and apply these to design and develop real-world tools.
6. Equip themselves with the knowledge of financial accountancy and develop expertise in software like Tally.
7. Get exposure to the modern concepts of computing like Artificial Intelligence, Cyber Security, Animation, E-Commerce, and various Internet Technologies as part of this Programme.
8. Get training in soft skills, languages, and management through various allied courses.
9. Get industrial exposure in the field of information technology through an internship with industry.
10. Seek employment in various jobs in the Government sector as well as IT and related industries and perform various roles related to software development, testing, and maintenance.

**Table 1: Semester wise list of B. Voc. (Information Technology) DSC Course**

| Semester | Course Code | Title of The Course | Credits | L-T-P |
|---|---|---|---|---|
| I | BVIT-DSC-101 | Fundamentals of Computer Systems | 2 | 2-0-0 |
| | BVIT-DSC-102 | Office Tools and Applications | 2 | 2-0-0 |
| II | BVIT-DSC-151 | Computer Network | 2 | 2-0-0 |
| | BVIT-DSC-152 | (A) Introduction to Digital Electronics | 2 | 2-0-0 |
| | | (B) Digital Electronics Laboratory | 2 | 0-0-4 |
| III | BVIT-DSC-201 | Data Structure | 4 | 4-0-0 |
| | BVIT-DSC-202 | Database Management System | 3 | 3-0-0 |
| IV | BVIT-DSC-251 | Java Programming | 3 | 3-0-0 |
| | BVIT-DSC-252 | Operating System | 3 | 3-0-0 |
| | BVIT-DSC-253 | Operating System Laboratory | 4 | 0-0-8 |
| V | BVIT-DSC-301 | Java Script | 2 | 2-0-0 |
| | BVIT-DSC-302 | Graphic Design and Applications | 2 | 2-0-0 |
| | BVIT-DSC-303 | (A) Java Script Laboratory | 2 | 0-0-4 |
| | | (B) Graphic Design and Application Laboratory | 2 | 0-0-4 |
| VI | BVIT-DSC-351 | Web Development with PHP | 3 | 3-0-0 |
| | BVIT-DSC-352 | Introduction to Artificial Intelligence Frameworks | 2 | 2-0-0 |
| | BVIT-DSC-353 | Internet Technologies | 3 | 3-0-0 |
| | BVIT-DSC-354 | (A) Web Development with PHP Laboratory | 4 | 0-0-8 |
| | | (B) Artificial Intelligence Tools Laboratory | 4 | 0-0-8 |
| VII | BVIT-DSC-401 | (A) Digital Marketing | 2 | 2-0-0 |
| | | (B) Digital Marketing Laboratory | 3 | 0-0-6 |
| | BVIT-DSC-402 | (A) Animation and Visual Effects | 2 | 2-0-0 |
| | | (B) Animation and Visual Effects Laboratory | 3 | 0-0-6 |
| | BVIT-DSC-403 | Cyber Security | 2 | 2-0-0 |
| | BVIT-DSC-404 | Mobile Application Development Laboratory | 3 | 0-0-6 |
| VIII | BVIT-DSC-451 | Design and Analysis of Computer Algorithms | 4 | 4-0-0 |

**Table 2: Semester wise list of B. Voc. (Information Technology) DSM Course**

| Semester | Subject | Course Code | Title of The Course | Credits | L-T-P |
|---|---|---|---|---|---|
| I | BVOC-DSM-1 | BVIT-DSM-101 | (A) Programming Skills using C | 2 | 2-0-0 |
| | | | (B) Programming Skills using C Laboratory | 3 | 0-0-6 |
| II | BVOC-DSM-2 | BVIT-DSM-151 | Computer Network Laboratory | 3 | 0-0-6 |
| III | BVOC-DSM-1 | BVIT-DSM-201 | Database Management System Laboratory | 4 | 0-0-8 |
| IV | BVOC-DSM-1 | BVIT-DSM-251 | Java Programming Laboratory | 4 | 0-0-8 |
| | BVOC-DSM-2 | BVIT-DSM-252 | (A) E-Commerce | 2 | 2-0-0 |
| | | | (B) E-Commerce Laboratory | 2 | 0-0-4 |
| V | BVOC-DSM-1 | BVIT-DSM-301 | (A) Python Programming | 2 | 2-0-0 |
| | | | (B) Python Programming Laboratory | 4 | 0-0-8 |
| | BVOC-DSM-2 | BVIT-DSM-302 | (A) Financial Accounting and Tally | 2 | 2-0-0 |
| | | | (B) Financial Accounting and Tally Laboratory | 2 | 0-0-4 |
| VI | BVOC-DSM-2 | BVIT-DSM-351 | Internet Technologies Laboratory | 4 | 0-0-8 |
| VII | BVOC-DSM-1 | BVIT-DSM-401 | (A) Software Engineering | 2 | 2-0-0 |
| | | | (B) Software Engineering Laboratory | 3 | 0-0-6 |
| VIII | BVOC-DSM-2 | BVIT-DSM-451 | Multimedia | 4 | 4-0-0 |

**Table 3: Semester wise list of B. Voc. (Information Technology) SEC Course**

| Semester | Course Code | Title of The Course | Credits | L-T-P |
|---|---|---|---|---|
| I | BVIT-SEC-101 | Office Tools and Applications Laboratory | 3 | 0-0-6 |
| II | BVIT-SEC-151 | OS Installation, Internet, hardware Assembling Laboratory | 3 | 0-0-6 |
| III | BVIT-SEC-201 | Data Structure Laboratory | 4 | 0-0-8 |
| IV | - | - | - | |
| V | | Internship with Industry/ Community Engagement/ Field Study | 2 | |
| VI | - | - | - | |
| VII | - | - | - | |
| VIII | | Project | 12 | |

**Table 4: Semester wise list of B. Voc. (Information Technology) IDC Course (1st Year)**

| Semester | Course Code | Title of The Course | Credits | L-T-P |
|---|---|---|---|---|
| I | BVIT-IDC-101 | Fundamentals of Information Technology | 3 | 3-0-0 |
| II | BVIT-IDC-151 | Introduction to Web Technology | 3 | 3-0-0 |
| III | BVIT-IDC-201 | Cyber Security | 3 | 3-0-0 |

**\* NOTE:**

➢ Mathematics may be chosen as an IDC paper

➢ Evaluation method and marks distribution for combined paper i.e. Theory + Practical shall be as follows:

Theory: End Semester Examination - 35 Marks, Internal Test - 15 Marks Practical:

End Semester Examination - 35 Marks, Internal Test - 15 Marks

➢ For 2 credit paper, marks distribution shall be as follows:

End Semester Examination - 35 Marks, Internal Test - 15 Marks

➢ For papers of 35 and 50 marks, the end semester examination shall be of 2 hours duration.

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|---|---|---|
| **Semester** | : | **III** |
| **Course Type** | : | **DSC** |
| **Course Code** | : | **BVIT-DSC-201** |
| **Name of the Course** | : | **Data Structure** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **4** |
| **Contact Hours** | : | **4 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives: The course objective is to*

*1. Introduce the basic concepts and principles of data structures, including their definition, properties, and characteristics.*

*2. Familiarize students with the implementation of various data structures using programming languages, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables.*

*3. How to analyze the time and space complexity of different data structures and algorithms, enabling them to make informed decisions regarding their selection and usage.*

*4. Cover various searching and sorting algorithms, including linear search, binary search, bubble sort, insertion sort, selection sort, merge sort, quicksort, and their analysis.*

*5. Cover the concepts of hashing, hash functions, collision resolution techniques, and the implementation and applications of hash tables.*

## UNIT I
**Introduction** – Data and Information, Program Structures, Abstract Data Type, Static and Dynamic Data Structures. **Arrays:** Single and Multidimensional arrays, Representation of array in memory, address calculations, sparse arrays. **Recursion:** Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion.

## UNIT II
**Stacks:** Operation and Implementation of stack; Application of stack; Limitations of Array representation of stack; Prefix, Infix and Postfix expressions, conversion of these expressions from one to another.  **Queues:** Operation and Implementation of queue; Application of queue; Types of Queues: Priority Queue, Circular queue. **Linked List:** Introduction; Types of Linked list-Linked lists, circular lists, doubly linked lists; implementation of stack and queue using linked list.

## UNIT III
**Trees:** Introduction to Tree Structures; - Binary trees (Insertion, deletion and Traversal), threaded binary trees (Insertion, deletion and Traversal); Preorder, Inorder and Postorder tree traversal; binary search trees; AVL search trees, B-trees.

## UNIT IV

**Searching and Sorting:** Linear and Binary Search, and Comparison of Linear and Binary Search; **Sorting** – Insertion Sort, Selection Sort, Bubble Sort, Merge Sort, Quick Sort, Heap Sort; and comparison of Sorting Techniques.

## UNIT V

**Hashing:** Introduction to Hashing; Hash Table, Hash Key, Hash Function, Characteristics of Good Hash Functions, Types of Hash Functions, Collision, Resolving Collision by Open Addressing & closed Addressing: Linear probing, Quadratic probing

**Graph:** Introduction to Graph- Adjacency Matrix and List, Graph Search Algorithms-DFS, BFS,

*Course Learning Outcomes: After successful completion of the course, the students will be able to:*

1. *Demonstrate a solid understanding of various data structures, including arrays, linked lists, stacks, queues, trees and hash tables.*
2. *Develop proficiency in implementing data structures using programming languages, including creating and manipulating data structures through appropriate algorithms.*
3. *Apply analytical skills to analyze the time and space complexity of algorithms associated with different data structures, allowing for informed decision-making in algorithm selection.*
4. *Enhance critical thinking skills and problem analysis abilities by identifying the appropriate data structures and algorithms to solve given problems efficiently.*

**Text Books:**

1. Seymour Lipschutz, **Data Structures**, Schaum's Outline Series, TMH, 4th Edition, 2019.
2. Adam Drozdek, **Data Structures and Algorithms in C++**, Cengage Learning, 3rd Edition, 2012.
3. Sartaj Sahni, **Data Structures, Algorithms and Applications in C++**, Universities Press, 2nd Edition, 2011.

**Reference Books:**

1. D.S Malik, **Data Structure using C++**, Cengage Learning, Second Edition, 2010.
2. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, **Data Structures Using C and C++**, PHI, 2nd Edition, 2009.
3. Robert L. Kruse, **Data Structures and Program Design in C++**, Pearson, 3rd Edition, 1999.

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| **Semester** | : | **III** |
| **Course Type** | : | **DSC** |
| **Course Code** | : | **BVIT-DSC-202** |
| **Name of the Course** | : | **Database Management System** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **3** |
| **Contact Hours** | : | **3 Hours per week** |

| Total Marks | : | 100 |
| End Semester Marks | : | 70 (Pass Marks: 28) |
| Internal Marks | : | 30 (Pass Marks: 12) |
| End Semester Exam Time | : | 3 hours |

*Course Objectives: The course objective is to*
1. *Understand the fundamentals of databases, including definitions, types of databases and their applications in various domains*
2. *Learn data modeling techniques such as Entity-Relationship Diagrams (ERDs) and normalization to design efficient and scalable database schemas.*
3. *Understand the principles of relational databases, including tables, rows, columns, keys (primary, foreign), relationships, and constraints.*
4. *Gain proficiency in SQL for database querying, data manipulation (insertion, deletion, modification), data definition (creating tables, indexes) etc.*
5. *Learn about transaction properties (ACID), concurrency control mechanisms (locking, timestamps), and recovery techniques (undo, redo, logging) to ensure data consistency and reliability.*

## UNIT I
**Introduction to DBMS:** Database; Traditional file approach; File system vs Database management system' Characteristics of DBMS; Advantages & disadvantages of DBMS;
DBMS languages; database system architecture and data independence.
RDBMS & its terminologies; Concept of keys (primary key, alternate key, candidate key, composite key, superkey and foreign key); Fundamental integrity constraints (entity integrity, domain integrity & referential integrity).

## UNIT II
**Entity Relationship(ER) Modeling:** Entity types, relationships, constraints
**Relation data model:** Relational model concepts, relational constraints, relational algebra, relational Calculus: Tuple and Domain Calculus.

## UNIT III
**Database design:** Phases of database design, Entities & attributes, Entity type, Entity sets Relationship type, relationship sets & instances. ER diagram: naming conventions & design issues .Conversion of ER diagram into relational table.
**Database design:** Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (up to BCNF).

## UNIT IV
**Normalization**: Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF), Functional dependencies, Lossless decomposition
**Transaction Processing:** ACID properties, concurrency control (Locking, timestamps), Recovery techniques (Undo, Redo, Logging)

## UNIT V
**SQL:** SQL Data types, Creation, Insertion, Viewing, Updation, Deletion of tables, Renaming, Dropping of tables. Database Manipulation in SQL: SQL constructs SELECT command, WHERE command,

Logical operators, grouping data from tables in SQL: GROUP BY, ORDER BY, HAVING clauses. Definition & use of nested queries; Computations on table: Data Joins – Joining multiple tables, joining a table to itself.  Views Creation, Renaming the column of a view, destroys View, Security Locks

*Course Learning Outcomes: After successful completion of the course, the students will be able to:*

1. *Demonstrate a solid understanding of fundamental database concepts, including data models, schemas, keys, relationships, and database management system architectures*
2. *Demonstrate proficiency in SQL (Structured Query Language) for database querying, data manipulation, data definition, and data control operations on relational databases.*
3. *Apply database management concepts and techniques to analyze, design, and implement solutions for real-world database problems and scenarios*
4. *Evaluate and critique database designs, implementations, and performance optimizations, and propose improvements*

**Text Books:**

1. R. Elmasri, S.B. Navathe, **Fundamentals of Database Systems,** Pearson Education, 6th Edition, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, **Database System Concepts,** McGrawHill, 6th Edition,2010.

**Reference Books:**

1. C. J. Date, **An Introduction to Database Systems**, Pearson India, 8th edition, 2005.
2. R. Ramakrishanan, J. Gehrke, **Database Management Systems,** 3rd Edition, McGraw Hill,2002.

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| **Semester** | : | **IV** |
| **Course Type** | : | **DSC** |
| **Course Code** | : | **BVIT-DSC-251** |
| **Name of the Course** | : | **Java Programming** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **3** |
| **Contact Hours** | : | **3 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives: The course objective is to*
1. *Understand the basics of Java programming language syntax, including variables, data types, operators, and expressions.*

2. *Learn the principles of object-oriented programming, including classes, objects, inheritance, polymorphism, and encapsulation*
3. *Learn how to handle exceptions in Java using try-catch blocks, and understand the concept of checked and unchecked exceptions*
4. *Learn how to perform input and output operations in Java, including file handling, reading from/writing to files, and using streams.*
5. *Learn how to connect Java applications to databases using JDBC (Java Database Connectivity.*

## UNIT-I

**Introduction to Java**, Basic Features, Java Virtual Machine, Compiling and Executing a Java Program, Primitive Data Types, Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Type casting, Java Operators, Expressions, control statements, Arrays.

## UNIT-II

**Defining & Using Classes**, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection, The Finalize ( ) Method, This Keyword, Final Keyword, Polymorphism.

## UNIT III

**Inheritance Basics**, Access Control , Inheritance Types, Abstract Classes, Package, Defining Package, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes.

## UNIT-IV

**Errors**, Types of Errors, Exception Handling: -try, catch, throw, throws, Multithreaded Programming-Extends Thread class, Runnable interface , join and is alive method, I/O in Java ,Text Streams, Stream Tokenizer, Buffered Stream , Print Stream, Random Access File, The String Class ,String Buffer Class and Methods.

## UNIT-V

**Java Applets**: Introduction to Applets, Applets Programming, Layouts and Layout Manager, Container. Event handling – Event Handling Mechanisms , the design and Implementation of GUIs using the AWT controls, Swing components of Java such as labels, buttons, text fields, layout managers, menus, Choice List, Radio button, Text area etc.
Java Database Connectivity:  Establishing A Connection, Transactions with Database.

*Course Learning Outcomes:  After successful completion of the course, the students will be able to:*

1. *Demonstrate a solid understanding of fundamental programming concepts.*
2. *Apply object-oriented programming principles*
3. *Understand and apply the syntax and features of the Java programming language, including packages, access modifiers, interfaces, etc.*
4. *Demonstrate proficiency in handling exceptions in Java programs using try-catch blocks, throwing and catching exceptions*

5.  *Design and develop graphical user interfaces (GUIs) using Java Swing, including creating windows, panels, buttons, text fields, and event handling*

**Text Books:**

1.  Ken Arnold, James Gosling, David Homes, **"The Java Programming Language"**, 4th Edition, 2005.
2.  James Gosling, Bill Joy, Guy L Steele Jr, Gilad Bracha, Alex Buckley, **"The Java Language Specification, Java SE 8 Edition (Java Series)"**, Published by Addison Wesley, 2014.
1.  Joshua Bloch, **"Effective Java"**, Addison-Wesley, 2nd Edition, 2008.

**Reference Books:**

1.  Bruce Eckel, **"Thinking in Java"**, 3rd Edition, PHI, 2002.
2.  E. Balaguruswamy, **"Programming with Java"**, 4th Edition, McGraw Hill.2009.
3.  Paul Deitel, Harvey Deitel, **"Java: How to Program"**, 10th Edition, Prentice Hall, 2011.

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|---|---|---|
| **Semester** | : | **IV** |
| **Course Type** | : | **DSC** |
| **Course Code** | : | **BVIT-DSC-252** |
| **Name of the Course** | : | **Operating System** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **3** |
| **Contact Hours** | : | **3 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives:* The course objective is to
*1. To explain the main components of OS and their working.*
*2. To familiarize the operations performed by OS as a resource Manager*
*3. To impart various scheduling policies of the OS.*
*4. To teach different memory management techniques*

**UNIT I**

**Operating systems overview:** Introduction, operating system operations, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal Computers & workstations, Process management, memory management, storage management, protection and security, distributed systems.

**Operating systems structures:** Operating system services and systems calls, system programs, operating system structure, operating systems generations.

**Process Management:** System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and preemptive scheduling algorithms.

## UNIT III

**Concurrency and synchronization:** Process synchronization, critical section problem, Peterson's solution,  semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.

## UNIT IV

**Deadlocks:** System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock

**Memory Management:** Physical and virtual address space; memory allocation strategies –fixed and variable partitions, paging, segmentation, virtual memory.

## UNIT V

**File and I/O Management:** Directory structures, file operations, file allocation methods, device management.

**Protection and Security:** Policy mechanism, Authentication, Internal access Authorization.

*Course Learning Outcomes*:  *After successful completion of the course, the students will be able to:*

*1. Outline various concepts and features of Operating systems.*
*2. Compare various operating systems with respect to characteristics and features*
*3. Implement algorithms of CPU Scheduling, Memory Scheduling and disk scheduling.*
*4. Make changes in the OS configurations as per need*

**Text Books:**

1. A Silberschatz, P.B. Galvin, G. Gagne, **Operating Systems Concepts**, John Wiley Publications. 8th Edition, 2008.
2. A.S. Tanenbaum, **Modern Operating Systems**, Pearson Education, 3rdEdition, 2007.

**Reference Books:**
2. G. Nutt, Operating Systems: A Modern Perspective, Pearson Education, 2ndEdition 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles, PHI, 5th Edition, 2008.

| Semester | : | IV |
|---|---|---|
| Course Type | : | DSC |
| Course Code | : | BVIT-DSC-253 |
| Name of the Course | : | Operating System Laboratory |
| Learning level | : | Intermediate-level course |
| Credits | : | 4 |
| Contact Hours | : | 8 Hours per week |
| Total Marks | : | 100 |
| End Semester Marks | : | 70 (Pass Marks: 28) |
| Internal Marks | : | 30 (Pass Marks: 12) |
| End Semester Exam Time | : | 3 hours |

*Course Objectives: The course objective is to*

1. *To implement various CPU Scheduling Algorithms*

2. *To implement Process Creation and Inter Process Communication.*

3. *To implement Deadlock Avoidance and Deadlock Detection Algorithms*

4. *To implement Page Replacement Algorithms*

5. *To implement File Organization and File Allocation Strategies*

*This paper provides practical knowledge of Operating Systems. List of laboratory programming assignments (not limited to these):*

1. Write C programs to implement the various CPU Scheduling Algorithms
2. Implementation of Shared memory and IPC
3. Bankers Algorithm for Deadlock Avoidance
4. Implementation of Deadlock Detection Algorithm
5. Write C program to implement Threading & Synchronization Applications
6. Implementation of the following Memory Allocation Methods for fixed partition
    a. First Fit
    b. Worst Fit
    c. Best Fit
7. Implementation of Paging Technique of Memory Management
8. Implementation of the following Page Replacement Algorithms
    a. FIFO
    b. LRU
    c.  LFU
9. Implementation of the various File Organization Techniques
10. Implementation of the following File Allocation Strategies
    a. Sequential
    b. Indexed

   c. Linked

***Course outcomes:*** *After successful completion of the course, the students will be able to*

1. *Compare the performance of various CPU Scheduling Algorithms*
2. *Implement Deadlock avoidance and Detection Algorithms*
3. *Create processes and implement IPC*
4. *Analyze the performance of the various Page Replacement Algorithms*
5. *Implement File Organization and File Allocation Strategies*

# Syllabus of B. Voc. (Information Technology) DSM Courses

| | | |
|---|---|---|
| **Semester** | : | **III** |
| **Course Type** | : | **DSM** |
| **Course Code** | : | **BVIT-DSM-201** |
| **Name of the Course** | : | **Database Management System Laboratory** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **4** |
| **Contact Hours** | : | **8 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives*:
1. *Database Application Development*
2. *SQL Querying and Data Manipulation*
3. *Database Design and Implementation*
4. *Database Connectivity and Interaction*

*This paper provides practical knowledge of SQL queries. List of laboratory programming assignments (not limited to these)*:

1. Design an ER diagram for a ***BANK*** database schema. To consider that each Bank can have multiple branches and each branch can have multiple Accounts and Loans for customer. Also specify the non-weak & weak entity types, key attributes & key types, relationship types, instances, constraints and participations.

2. To study Basic SQL commands (create database, create table, use drop, insert) and execute the following queries using these commands:

   - Create a database named "Employee".
   - Use the database "Employee" and create a table ― "Empl" with attributes- "ename","ecity" ,"salary", "enumber", "eaddress", "depttname".
   - Create another table ―"Company" with attributes – "cname", "ccity", "empnumber" in the database – "Employee".

3. To study the viewing commands (select, update) and execute the following queries using these commands:
   a. Find the names of all employees who live in Delhi.
   b. Increase the salary of all employees by Rs. 5,000.
   c. Find the company names where the number of employees is greater than 10,000.
   d. Change the Company City to Gurgaon where the Company name is ―TCS.

4. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:
    a. Add an attribute named "Designation" to the table "Emp".
    b. Modify the table "Emp", Change the datatype of "salary" attribute to float.
    c. Drop the attribute "depttname" from the table "emp".
    d. Delete the entries from the table "Company" where the numbers of employees are less than 500.
5. To study the commands that involve compound conditions (and, or, in, not in, between, not between , like , not like) and execute the following queries using these commands:
    a. Find the names of all employees who live in —Gurgaon" and whose salary is between Rs. 20,000 and Rs. 30,000.
    b. Find the names of all employees whose names begin with either letter —A or —B.
    c. Find the company names where the company city is —Delhi and the number of employees is not between 5000 and 10,000.
    d. Find the names of all companies that do not end with a letter —A.
6. To study the aggregate functions (sum, count, max, min, average) and execute the following queries using these commands:
    a. Find the sum and average of salaries of all employees in the computer science department.
    b. Find the number of all employees who live in Delhi.
    c. Find the maximum and the minimum salary in the HR department.
7. To study the grouping commands ( Group by, Order By) and executes the following queries using these commands:
    a. List all employee names in descending order.
    b. Find the number of employees in each department where the number of employees is greater than 5.
    c. List all the department names where the average salary of a department is Rs.10, 000.
8. To study the commands involving data constraints and execute the following queries using the commands:
    a. Alter table —"Emp" and make — "enumber" as the primary key.
    b. Alter table — "Company" and add the foreign key constraint.
    c. Add a check constraint in the table — "Emp" such that salary has the value between 0 and Rs.1,00,000.
    d. Alter table — "Company" and add unique constraint to column cname.
    e. Add a default constraint to column ccity of Table Company with the value — "Delhi".
9. To study the commands for aliasing and renaming and execute the following queries using these commands:
    a. Rename the name of the database to "Employee1".
    b. Rename the name of table "Emp" to "Emp1".
    c. Change the name of the attribute "ename" to "empname".
10. To study the commands for joins (cross join, inner join, outer join) and execute the following queries using these commands:
    a. Retrieve the complete record of an employee and its company from both the table using joins.

b.  List all the employees working in the company „TCS‟.
11. To study the various set operations and execute the following queries using the commands:
   a.  List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
   b.  List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.
12. To study the various scalar functions and string functions (power, square, substring, reverse, upper, lower, concatenation) and execute the following queries using these commands:
   a.  Reverse the names of all employees.
   b.  Change the names of company cities to uppercase.
   c.  Concatenate name and city of the employee.
13. To study the commands for views and execute the following queries using the commands:
   a.  Create a view having ename and ecity.
   b.   In the above view change the ecity to „Delhi‟ where ename is „John‟.
   c.  Create a view having attributes from both the tables.
   d.  Update the above view and increase the salary of all employees of the IT department by Rs.1000.
14. To study the commands involving indexes and to execute the following queries:
   a.  Create an index with the attribute ename on the table employee.
   b.  Create a composite index with attributes cname and ccity on Table Company.
   c.  Drop all indexes created on Table Company.

*Course Learning Outcomes: After successful completion of the course, the students will be able to*:

1. *Write SQL queries to retrieve, update, delete, and manipulate data stored in relational databases.*
2. *Establish database connections from Java applications, handle database transactions, manage database resources, and implement error handling and exception management strategies.*

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|---|---|---|
| **Semester** | : | **IV** |
| **Course Type** | : | **DSM** |
| **Course Code** | : | **BVIT-DSM-251** |
| **Name of the Course** | : | **Java Programming Laboratory** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **4** |
| **Contact Hours** | : | **8 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives:*
1. *Java Programming Skills Development.*
2. *Object-Oriented Design and Implementation.*
3. *Data Structure and Algorithm Implementation.*
4. *Graphical User Interface (GUI) Development.*
5. *Database Application Development*

*This paper provides practical knowledge of Java Programming and SQL queries. List of laboratory programming assignments (not limited to these*):

1. Write a java program to implement the following operation at one Dimensional array
   a. Element Searching
   b. Element insertion
   c. Elements deletion.
2. Write a java program to implement each following 2D array operation
   a. Matrix Addition
   b. Matrix Subtraction
   c. Matrix Multiplication
   d. Matrix division.
3. Write a java program to implement following each type of constructor- default constructor, parameterized constructor, clone constructor.
4. Write a java program to implement method overloading.
5. Write different java programs to implement each following types of inheritance- signal level, Multi-level without super key word, Multi-level with super key word.
6. Write different java programs to implement each following types of exception handling mechanism- Try, Catch, Throw, Throws, Finally.
7. Write different java programs to implement multi-threading using runnable interface, extending thread class.
8. Develop a suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.
9. Develop a Java package with simple Stack and Queue classes. Use JavaDoc comments for documentation.
10. Write different java programs to implement various type of layout manager.
11. Write a program to demonstrate different mouse handling events like mouseClicked(),mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
12. Write a program to demonstrate different keyboard handling events.
13. Write a java program to implement database connectivity with Sql code.
14. Write a program using JDBC to perform: a) insert b) delete c) update and d) search operations.
15. Develop a multi-threaded GUI application of your choice.

*Course Learning Outcomes: After successful completion of the course, the students will be able to*:

1. *Demonstrate proficiency in Java programming by implementing various programming tasks, exercises, and projects using Java language features and libraries.*
2. *Design and develop graphical user interfaces (GUIs) for Java applications using Swing including creating interactive components and event handling.*
3. *Integrate Java applications with relational databases using JDBC (Java Database Connectivity) to perform database operations such as querying, insertion, deletion, and modification.*


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|---|---|---|
| **Semester** | : | **IV** |
| **Course Type** | : | **DSM** |
| **Course Code** | : | **BVIT-DSM-252(A)** |
| **Name of the Course** | : | **E-Commerce** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **2** |
| **Contact Hours** | : | **2 Hours per week** |
| **Total Marks** | : | **50** |
| **End Semester Marks** | : | **35 (Pass Marks: 14)** |
| **Internal Marks** | : | **15 (Pass Marks: 6)** |
| **End Semester Exam Time** | : | **2 hours** |

*Course Objectives***:** *The course objective is to enable the student to become familiar with the mechanism for conducting business transactions through electronic means.*


## UNIT I
**Introduction:** Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-commerce business models (introduction, key elements of a business model and categorizing major E-commerce business models), forces behind e-commerce; Design, Building and Launching E-Commerce Website; Outsourcing and In-house development of Website.


## UNIT II
**Security and Encryption:** Needs and concepts, the e-commerce security environment: (dimension, definition and scope of e-security), security threats in the E-commerce environment (security intrusions and braches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients).


## UNIT III
**IT Act 2000 and amendments**, Cyber Crimes, Digital Signature, Electronic Governance, Attribution, Acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital Signature certificates, duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences.
## UNIT IV

**E-payment System:** Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting, risks involved in e-payments.

## UNIT V

**Online Business Transactions:** Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications, online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment, Online shopping (Amazon, Snapdeal, Alabama, Flipkart etc.).

**Introduction to HTML**: tags and attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms

*Course Learning Outcomes: After successful completion of the course, the students will be able to*:
1. *To apply in an integrative and summative fashion the students' knowledge in all fields of business studies by drafting a website presence plan.*
2. *To understand the factors needed in order to be a successful in ecommerce*
3. *To gain the skills to bring together knowledge gathered about the different components of building a web presence*
4. *To critically think about problems and issues that might pop up during the establishment of the web presence*
5. *To apply WordPress as a content management system (CMS), Plan their website by choosing colour schemes, fonts, layouts, and more*

Text Books:
1. Kenneth C. Laudon and Carlo Guercio Traver, *E-Commerce,* Pearson Education.
2. David Whiteley, *E-commerce: Strategy, technology and Applications*, McGraw Hill Education
3. Bharat Bhaskar, *Electronic Commerce: Framework, Technology and Applications*, 4th Ed, McGraw Hill Education.

Reference Books:
1. PT Joseph, *E-Commerce: An Indian Perspective*, PHI Learning
2. T.N. Chhabra, *E-commerce*, Dhanpat Rai & Co.
3. Sushila Madan, E-Commerce, Taxmann
4. T.N. Chhabra, Hem Chand Jain, and Aruna Jain, *An Introduction to HTML*, Dhanpat Rai & Co.

| Semester | : | IV |
|---|---|---|
| Course Type | : | DSM |
| Course Code | : | BVIT-DSM-252(B) |
| Name of the Course | : | E-Commerce Laboratory |
| Learning level | : | Intermediate-level course |
| Credits | : | 2 |
| Contact Hours | : | 4 Hours per week |
| Total Marks | : | 50 |
| End Semester Marks | : | 35 (Pass Marks: 14) |
| Internal Marks | : | 15 (Pass Marks: 6) |
| End Semester Exam Time | : | 2 hours |

*Course Objectives: The course objective is to*
4. *Help students apply the theoretical concepts of E-Commerce in a practical setting. It should provide exercises and programming assignments that require students to implement and manipulate E-Commerce websites.*
5. *Helps students to understand the complete working principles of different E-commerce websites.*
6. *Enhancing students' programming skills by providing practical programming exercises.*
7. *It should encourage students to write code, debug, and test their implementations of E-commerce websites.*

*This paper provides practical knowledge of data structure. List of laboratory programming assignments (not limited to these)*:
1. Discuss Web site and write down the Good features of websites
2. Define Browser. Discuss Online and Offline Browser
3. Discuss Search Engine, its types with examples
4. Discuss HTML and other languages used for Website design
5. List out Various tags available in HTML
6. Simple exercises using HTML
7. Create a Website with minimum Details
8. List out the Web sites dealing with E-Commerce
9. Log on to Web Sites dealing with E- Commerce and list out the facilities available.
10. Trading stocks online, ordering products / journals / books etc.
11. Online, travel and tourism services
12.  Employment placement and job market,
13. Internet banking, auctions, online publishing, advertising-Online.
14. Online shopping

*Course Learning Outcomes: After successful completion of the course, the students will be able to.*
1. *Students should be able to demonstrate a solid understanding of Website and its good features, browsers, HTML tags etc.*
2. *Students should be able to implement E-commerce websites using HTML.*
3. *Students should be able to perform Internet Banking, Online publishing, online purchasing and advertising.*

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|---|---|---|
| **Semester** | : | **III** |
| **Course Type** | : | **SEC** |
| **Course Code** | : | **BVIT-SEC-201** |
| **Name of the Course** | : | **Data Structure Laboratory** |
| **Learning level** | : | **Intermediate-level course** |
| **Credits** | : | **4** |
| **Contact Hours** | : | **8 Hours per week** |
| **Total Marks** | : | **100** |
| **End Semester Marks** | : | **70 (Pass Marks: 28)** |
| **Internal Marks** | : | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | : | **3 hours** |

*Course Objectives: The course objective is to*
1. *Help students apply the theoretical concepts of data structures in a practical setting. It should provide exercises and programming assignments that require students to implement and manipulate different data structures.*
2. *Enhancing students' programming skills by providing practical programming exercises.*
3. *It should encourage students to write code, debug, and test their implementations of data structures and associated algorithms.*

*This paper provides practical knowledge of data structure. List of laboratory programming assignments (not limited to these)*:

1. Write a program in C to implement a Link list and perform addition and deletion of elements.
2. Write a program in C to implement a Stack and perform addition and deletion of elements.
3. Write a program in C to implement a Queue and perform addition and deletion of elements.
4. Write a program in C to implement a Circular Queue and perform addition and deletion of elements.
5. Write a program in C to implement a Stack using linked lists.
6. Write a program in C to implement a Queues using linked lists
7. Write a program in C to implement a tree and perform tree traversal.
8. Write a program in C to perform a Linear search
9. Write a program in C to perform a Binary search
10. Write a program in C to implement a Selection sort
11. Write a program in C to implement a Insertion sort
12. Write a program in C to implement a Bubble sort.
13. Write a program in C to implement a Merge sort
14. Write a program in C to implement a Quick Sort
15. Write a program in C to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration

*Course Learning Outcomes: After successful completion of the course, the students will be able to.*

1. *Students should be able to demonstrate a solid understanding of various data structures such as arrays, linked lists, stacks, queues, trees, graphs, and hash tables. They should be able to explain the characteristics, operations, and applications of these data structures.*
2. *Students should be able to implement data structures and associated algorithms using a programming language.*
3. *Students should be able to analyze the time and space complexity of algorithms associated with different data structures.*

## Syllabi of B. Voc. (Information Technology) IDC Courses

| | | |
|---|---|---|
| **Semester** | **:** | **III** |
| **Course Type** | **:** | **IDC** |
| **Course Code** | **:** | **BVIT-IDC-201** |
| **Name of the Course** | **:** | **Cyber Security** |
| **Learning level** | **:** | **Intermediate-level course** |
| **Credits** | **:** | **3** |
| **Contact Hours** | **:** | **3 Hours per week** |
| **Total Marks** | **:** | **100** |
| **End Semester Marks** | **:** | **70 (Pass Marks: 28)** |
| **Internal Marks** | **:** | **30 (Pass Marks: 12)** |
| **End Semester Exam Time** | **:** | **3 hours** |

*Course Objectives: The course objective is to*

1. Learn the foundations of Cyber security and the threat landscape.
2. To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
3. To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.
4. To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security.
5. To expose students to responsible use of online social media networks.
6. To systematically educate the necessity to understand the impact of cyber crimes and threats with solutions in a global and societal context.
7. To select suitable ethical principles and commit to professional responsibilities and human values and contribute value and wealth for the benefit of the society.

## UNIT I

**Introduction to Cyber Security-** Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

## UNIT II

**Cyber Crime and Cyber Law-** Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offenses, Organizations dealing with Cyber crime and Cyber security in India.

## UNIT III

**Social Media Overview and Security-** Introduction to Social networks, Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media.

## UNIT IV

**E-Commerce and Digital Payments-** Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stakeholders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. Relevant provisions of Payment Settlement Act-2007

## UNIT V

**Digital Devices Security, Tools and Technologies for Cyber Security-** Endpoint device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Antivirus, Wi-Fi security, Configuration of basic security policy and permissions.

*Course Learning Outcomes: After successful completion of the course, the students will be able to:*

1. *Understand the cyber security threat landscape.*
2. *Develop a deeper understanding and familiarity with various types of cyber-attacks, cyber-crimes, vulnerabilities and remedies thereto.*
3. *Analyze and evaluate existing legal framework and laws on cyber security.*
4. *Analyze and evaluate the digital payment system security and remedial measures against digital payment frauds.*
5. *Analyze and evaluate the importance of personal data, its privacy and security.*
6. *Analyze and evaluate the security aspects of social media platforms and ethical aspects associated with use of social media.*

**Text Books:**
1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Author Press. Edition 2010.

2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).

3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001).

4. 5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

**Reference Books:**
1. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
2. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
3. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
4. Fundamentals of Network Security by E. Maiwald, McGraw Hill.