# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020
Bachelor of Technology(CSE with Specialization in Information and Cyber Security)
SEMESTER-IV(2024-2028)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| ML307 | BS | Environmental Management and Sustainability | 60 | 20 | 20 | 0 | 0 | 4 | 0 | 0 | 4 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

## COURSE OBJECTIVES:

The student will have ability to:

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

## SYLLABUS

### UNIT I — 10 HOURS

**Introduction to Environment Pollution and Control:**

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

### UNIT II — HOURS

**Climate Change and Environmental Challenges:**

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

### UNIT III — 9 HOURS

**Environmental Management and Sustainable Development:**

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management,

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Water Conservation, Energy Conservation)

**UNIT IV** **8 HOURS**

**Environmental Acts**:

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981:Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits.

**UNIT V** **7 HOURS**

**Role of Individuals, Corporate and Society:**

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of TajMahal. Uttarakhand flash floods.

**TEXTBOOKS:**


1. Rogers, P.P., Jalal, K.F., Boyd, I.A. *An Introduction to Sustainable Development*, Earthscan.
2. Kalam, A.P.J., *Target 3 Billon: Innovative Solutions Towards Sustainable Development*, Penguin Books


**REFERENCE:**


1. Kaushik A. and Kaushik, *Perspectives in Environmental Studies*, New Delhi: New Age International Publishers.
2. Dhameja, S.K., *Environmental Studies*, S.K. Kataria and Sons, New Delhi
3. Bharucha E., *Environmental Studies for Undergraduate Courses*, New
4. Delhi: University Grants Commission.
5. Wright R.T., *Environmental Science: towards a sustainable future*, New Delhi: PHL Learning Private Ltd.
6. Rajagopalan R., *Environmental Studies*, New York: Oxford University Press.

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| BTCS401N | DCC | Data Base Management Systems | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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## COURSE OBJECTIVES:

The student will have ability to:

1. To differentiate among the various database system according to their function.
2. To understand the process to develop database model and database design.
3. To understand managing a database using Structured Query Language.
4. To expand an understanding of necessary DBMS concepts such as: Database Transactions, Database Security, Integrity, Concurrency.
5. To understand and build a straightforward database system and show competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Construct conceptual data models by identifying the entities and relationships.
2. Evaluate the normality of a logical data model, and correct any anomalies.
3. Develop physical data models for relational database management systems.
4. Implement relational databases using a RDBMS.
5. Work as a valuable member of a database design and implementation team.

## SYLLABUS

### UNIT I — 10 HOURS

**Introduction:** Concept & Overview of DBMS, Three Schema Architecture of DBMS, Database Approach v/s Traditional File Accessing Approach, Advantages of Database Systems, Data Models, Schema and Instances, Data Independence, Data Base Language and Interfaces, Functions of DBA and Designer, Database Users.

**Entity-Relationship Model:** Basic concepts, Design Issues, Mapping Constraints, Keys, Entity- Relationship Diagram, Weak Entity Sets and Extended E-R features. ER Diagram to Relational Table conversion.

### UNIT II — 9 HOURS

**Relational Model:** Structure of Relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Joins and its type. Integrity Constraints. Referential Integrity, Intension and Extension.

### UNIT III — 8 HOURS

**SQL and PL/SQL:** SQL commands, Set operations, Aggregate Functions, Null Values, Domain Constraints, Assertions, Views, Nested Sub Queries, Stored Procedures and Triggers, Database Security, Application development using PLSQL.

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**Relational Database Design:** Functional Dependency, Database Anomalies, Normalization and its forms, Multi-Valued Dependencies, 4NF, Join Dependency, 5NF.

## UNIT IV 7 HOURS

**Transaction and Concurrency Control:** Physical Data Structures, Query Optimization, Transaction Model properties, State Serializability, Concurrency control protocols, Multiple Granularities, Granularity of Data Item. Multi version schemes, Database Recovery Methods, Recovery in Multi-Database System and Database Backup and Recovery from Catastrophic Failure.

## UNIT V 8 HOURS

**File Organization and Index Structure:** File & Record Concept, Placing file records on Disk, Types of Records, Types of Single-Level Index, Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree. Mongo DB, NoSQL types, Features and tools.

## TEXTBOOKS:

1. Henry F. Korth and Silberschatz Abraham, *Database System Concepts*, Mc.GrawHill, 6th Ed., 2015.
2. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, McGraw- Hill Education, 2003.

## REFERENCE:

1. Kahate, Atul, *Introduction to Database Management Systems*, Pearson Education India, 2006.
2. C J Date, *An Introduction to Database System*, Pearson Educations, 8th Edition, 2004.
3. Ivan Bayross, *SQL, PL/SQL - The Programming Language of Oracle*, BPB Publications 4th Revised Edition, 2010.
4. Elmasri, Navathe, *Fundamentals of Database Systems*, Pearson Educations 7th Edition, 2016.
5. Seema Kedar, *Database Management System*, Technical Publications, 2009.
6. Rajiv Chopra, *Database Management System (DBMS) A Practical Approach*, Kindle Edition, S Chand (December 1, 2010), 2017.

## LIST OF PRACTICALS

1. Design a Database and create required tables. For e.g. Bank, College Database.
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for table and record handling like implementing INSERT statement, using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements and DROP, ALTER statements.
4. Write the queries for Retrieving Data from a Database Using the WHERE clause, using Logical Operators in the WHERE clause , Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause, Using

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| **BTCS401N** | **DCC** | **Data Base Management Systems** | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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Aggregate Functions and Combining Tables Using JOINS.

5. Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role. Using GRANT and REVOKE operations.
11. Develop a small application for a patient admitted in a hospital which has capability of inserting, deleting, updating, and the patient record. The application should also be able to search the patient's record by its id.

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| BTCS302N | DCC | Analysis & Design of Algorithms | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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## COURSE OBJECTIVES:

The student will have ability to:

1. To learn the algorithm analysis techniques.
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand the limitation of algorithm power.
4. To understand different algorithm design techniques.

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Define the basic concepts of algorithms and analyze the performance of algorithms.
2. Explain different standard algorithm design techniques, namely, divide & conquer, greedy, dynamic programming, backtracking and branch & bound.
3. Demonstrate standard algorithms for fundamental problems in Computer Science.
4. Design algorithms for a given problem using standard algorithm design techniques.
5. Analyze and compare the efficiency of various algorithms of a given problem.
6. Identify the limitations of algorithms in problem solving.
7. To identify the types of problem, formulate, analyze and compare the efficiency of algorithms.

## SYLLABUS

### UNIT I — 10 HOURS

**Algorithms Designing:** Algorithms, Analyzing Algorithms, Asymptotic Notations, Heap Sort, Sorting and Searching Algorithms and their Analysis in terms of Space and Time Complexity.

**Divide and Conquer:** General Method, Binary Search, Merge Sort, Quick Sort, Selection Sort, Strassen's Matrix Multiplication Algorithms.

### UNIT II — 9 HOURS

**Greedy Method:** General Method, fractional Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Tree - Prim's and Kruskal's algorithm, Single Source Shortest Paths.

### UNIT III — 8 HOURS

**Dynamic Programming:** General Method, Optimal Binary Search Trees, O/1 Knapsack, multistage graph, Traveling Salesperson Problem, All Pairs Shortest Paths.

### UNIT IV — 7 HOURS

**Backtracking:** General Method, 8-Queens Problem, Graph Coloring, Hamiltonian Cycles, sum of Subsets.
Branch and Bound: General Method, O/1 Knapsack Problem, Traveling Salesperson Problem.

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## UNIT V 8 HOURS

**NP Hard and NP Complete Problems:** Basic Concepts, Cook's Theorem, NP Hard Graph and NP Scheduling Problems, Some Simplified NP Hard Problems.

## TEXTBOOKS:

1. Ellis Horowitz and Sartaj Sahni, *Fundamental of Computer Algorithms*, 2nd Edition, Galgotia Publication, 2001.
2. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest, *Introduction to Algorithms*, 3rd Ed., MIT Press. 2009.

## REFERENCE:

1. Donal E Knuth, *Fundamentals of Algorithms: The Art of Computer Programming*, Vol l, 3rd Ed., Pearson Education, 1997.
2. Goodman, S.E. & Hedetnieni, *Introduction to Design and Analysis of Algorithm*, Tata McGraw Hill, 1977.
3. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, *Algorithms*, Tata McGraw Hill, 2006.
4. J.E Hopcroft, J.D Ullman, *Design and analysis of algorithms*, TMH Publication.

## LIST OF PRACTICALS

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for minimum spanning trees using Kruskal's algorithm.
6. Write a program for minimum spanning trees using Prim's algorithm.
7. Write a program for single sources shortest path algorithm.
8. Write a program for Floyd-Warshal algorithm.
9. Write a program for traveling salesman problem.
10. Write a program for Hamiltonian cycle problem.

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| BTDSE410N | DSC | Fundamental of Information Security | 60 | 20 | 20 | 0 | 0 | 2 | 0 | 2 | 3 |

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## COURSE OBJECTIVES:

The student will have ability to:

1. Understand fundamentals of Information Security.
2. Understand the social impact of Information Security.
3. Understand the security parameters of Information.
4. Understand various techniques used to provide security.

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. To understand the basics of Information Security.
2. To understand the basics of DBMS Security.
3. To understand the basics of Operating System Security.
4. To understand the security policies in networks.
5. To understand impact of Information Security Services in Virtual World.

## SYLLABUS

### UNIT I — 10 HOURS

**Overview of Information Security:** Introduction, Critical Characteristics of Information, Principles of Information Security: Confidentiality, Integrity, and Availability; Security violation and threats; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

### UNIT II — 9 HOURS

**Access Control Models:** Discretionary, mandatory, roll-based, and task-based models, unified models, access control algebra, temporal and spatio-temporal models. **Security Policies and Standards:** Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards.

### UNIT III — 8 HOURS

**Security Systems Design:** Design principles, representing identity, control of access and information flow, confinement problem. Security Assurance: Building systems with assurance, formal methods, evaluating systems.

### UNIT IV — 8 HOURS

Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security. Data privacy and security, introduction to digital forensics, enterprise security specification.

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### UNIT V 7 HOURS

**Case Study:** Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows. Database Security: Security Architecture, Enterprise security, Database auditing.

### TEXTBOOKS:

1. Security Engineering, Ross Anderson.
2. Computer Security: Art and Science,M. Bishop, Pearson Education.
3. Information Security: Principles and Practice, M. Stamp.

### REFERENCE:

1. Security in Computing, C.P. Pfleeger, S.L. Pfleeger, J. Margulies.
2. Secure Programming HOWTO, David Wheeler.
3. Browser Security Handbook, Michael Zalewski
4. Handbook of Database Security, M. Gertz, S. Jajodia

### LIST OF PRACTICALS

1. Study of different wireless network components and features of any one of the Mobile Security Apps.
2. Study of the features of firewall in providing network security and to set Firewall Security in Windows.
3. Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome).
4. Study of different types of vulnerabilities for hacking websites/Web Applications.
5. Analysis of the Security Vulnerabilities of E-commerce services
6. Analysis of the security vulnerabilities of E-Mail Applications
7. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
8. Analysis of the Sniffing and Spoofing tools and attacks.
9. Study of Web-Based Password Capturing.
10. Study of the Anti-Intrusion Technique.

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| BTICS401M | SEC | Ethical Hacking Lab-I | 0 | 0 | 0 | 30 | 20 | 0 | 0 | 2 | 1 |

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## COURSE OBJECTIVES:

The student will have ability to:

1. To understand the different Vulnerabilities in network and system.
2. To learn different Tools and Technique to Hack into the System.

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understand Security Architecture.
2. Understand Vulnerability assessment Technique.
3. Summarize tools and techniques to carry out a penetration testing.
4. Interpretation of intruders escalating privileges.
5. Apply the techniques for real world problems in the domain.

## SYLLABUS

### UNIT I — 10 HOURS

**Security Architecture:** Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security mechanism, Fundamental Security Design Principles, Attack Surface and Attack trees, A Model for Network Security. Introduction to Cybercrime, Cybercrime and Information Security, Classification of Cybercrimes.

### UNIT II — 9 HOURS

**Vulnerability Assessment**: Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services .Use of NMAP Tool. Case study: Network Security Monitoring. Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. UNIX: The Quest for Root, Remote Access vs Local access, Remote access, Local access, after hacking root.

### UNIT III — 8 HOURS

**Attack Plan**: Introduction to Cyber offence, How Criminal plan the attack, Social Engineering, Cyber stalking, Cybercafé and cybercrime, Botnets: The fuel of cybercrime, Attack vector, cloud computing. Cybercrime: Mobile and Wireless devices, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Security Challenges Posed by Mobile Devices, Registry Setting for Mobile Devices, Authentication Service Security, Attack on Mobile Phones.

**8 HOURS**

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### UNIT IV

**Penetration Testing:** Malware threats, penetration testing by creating backdoors Tools and Methods Used in Cybercrime, Proxy Server and Anonymizers, Phishing and Identity Theft, Password Cracking, Keylogger and Spyware, Virus and Worms, Trojan Horse and Backdoors, Steganography DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attack on Wireless Networks. Use of Tool Nessus

### UNIT V 7 HOURS

**Hacking Techniques:** Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, Brute-Force Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.

### TEXTBOOKS:


1. "Cryptography and Network Security", William Stallings, 2nd Edition, Pearson Education Asia
2. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata McGraw Hill Publishers, 2010.
3. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.


### REFERENCE:


1. Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education.
2. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR
3. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
4. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press
5. "Building Internet Firewalls", Elizabeth D. Zwicky, Simon Cooper, D. Brent Chapman, 2nd Edition, Oreilly.
6. http://nptel.ac.in/
7. Stuart McClure, Joel Scambray and Goerge Kurtz, ―Hacking Exposed Network Security Secrets & Solutions‖, 5th Edition, Tata McGraw Hill Publishers, 2010.
8. RafayBaloch, ―A Beginners Guide to Ethical Hacking.
9. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, ―Gray Hat Hacking The Ethical Hackers Handbook‖, 3rd Edition, McGraw-Hill Osborne Media paperback (January 27, 2011).


### LIST OF PRACTICALS

1. Installation of Kali Linux.
2. Introduction to NMAP Tool.
3. Basic NMAP Feature.
4. Host discovery using NMAP.

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Bachelor of Technology(CSE with Specialization in Information and Cyber Security)

SEMESTER-IV(2024-2028)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| **BTICS401M** | **SEC** | **Ethical Hacking Lab-I** | **0** | **0** | **0** | **30** | **20** | **0** | **0** | **2** | **1** |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

5. Vulnerability assessment: Using Nessus
6. Malware threats, penetration testing by creating backdoors.
7. Study of tools for Packet sniffing.
8. Creating Virus for different systems.
9. Study of Password cracking tools.