



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Information Technology**  
**Choice Based Credit System (CBCS) in Light of NEP-2020**  
**Bachelor of Technology (CSE with Specialization in Information and**  
**Cyber Security)**  
**Semester-IV (2021-2025)**

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM 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 Educational Objectives (CEOs):**

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 (COs):**

The 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.

**Unit I: Introduction to Environment Pollution and Control**

**10HRS**

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

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**Unit II: Climate Change and Environmental Challenges**

**9HRS**

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

**Unit III: Environmental Management and Sustainable Development**

**8HRS**

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, Water Conservation, Energy Conservation)

**Unit IV: Environmental Acts**

**7HRS**

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

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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: Role of Individuals, Corporate and Society**

**8HRS**

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 Taj Mahal. Uttarakhand flash floods

**TEXTBOOKS:**

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

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

**REFERENCES:**

1. R. Rajagopalan (2006). Environmental Studies. Oxford University Press.
2. M. Anji Reddy (2006). Textbook of Environmental Sciences and Technology. BS Publication.
3. Richard T. Wright (2008). Environmental Science: towards a sustainable future. PHL Learning Private Ltd. New Delhi.
4. Gilbert M. Masters and Wendell P. Ela. (2008). Environmental Engineering and science. PHI Learning Pvt Ltd.
5. Daniel B. Botkin & Edwards A. Keller (2008). Environmental Science Wiley INDIA edition.
6. Anubha Kaushik (2009). Environmental Studies. New age international publishers.

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**Course Educational Objectives (CEOs):**

**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 (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The 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.

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### Syllabus:

#### UNIT I

**10HRS**

**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

**9HRS**

**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.

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### UNIT III

**8HRS**

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

### UNIT IV

**7HRS**

**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

**8HRS**

**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.

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1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.GrawHill, 6<sup>th</sup> Edition, 2015.
2. Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson Educations 7th Edition, 2016.
3. SeemaKedar, Database Management System, Technical Publications, 2009.
4. Rajiv Chopra, Database Management System (DBMS) A Practical Approach. Kindle Edition, S Chand (December 1, 2010), 2017.

**References:**

1. Raghu Ramakrishnan and Johannes Gehrke “Database Management Systems” McGraw- Hill Education, 2003.
2. Kahate, Atul “Introduction to Database Management Systems” Pearson Education India, 2006.
3. C J Date, “An Introduction to Database System”, Pearson Educations, 8th Edition, 2004
4. Ivan Bayross, “SQL, PL/SQL - The Programming Language of Oracle”, BPB Publications 4<sup>th</sup> Revised Edition, 2010.

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**List of Practical:**

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 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, the patient record. The application should also be able to search the patients record by its id.

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BTCS402N	DCC	Software Engineering and Project Management	60	20	20	30	20	3	0	2	4

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**Course Educational Objectives (CEOs):**

The student will have ability to:

1. Get the knowledge of basic software engineering methods and practices.
2. Define software requirements and requirement engineering.
3. Apply approaches for various design and their principle.
4. Explore testing in various domain.
5. Development of significant teamwork and project-based experience.

**Course Outcomes (COs):**

The students will be able to:

1. Compare various software process models and identify where these models are applicable.
2. Define and analyze software project management, the framework, and the dimensions of software project management.
3. Comprehend System modeling using UML.
4. Identify software testing strategies by using testing tools.
5. Analyze software risks and risk management strategies.

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**Syllabus:**

**UNIT I**

**10HRS**

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, unified process. Agile development-Agile Process, Extreme Programming.

**UNIT II**

**9HRS**

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioural models, data models, object models, structured methods.

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### UNIT III

**8HRS**

Design Engineering: Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements  
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modelling, Use Case Diagrams, Class Diagrams, Interaction Diagrams, State chart Diagrams, Activity Diagrams, Package Diagrams, Component Diagrams, Deployment Diagrams

### UNIT IV

**7HRS**

Software Implementation: - Structured coding Techniques, Coding Styles, Standards and Guidelines, Documentation Guidelines-Modern Programming Language Features: Type Checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.  
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, Object oriented software, Web Apps-validation testing, system testing, the art of debugging.

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**Cyber Security)**  
**Semester-IV (2021-2025)**

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
BTCS402N	DCC	Software Engineering and Project Management	60	20	20	30	20	3	0	2	4

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;  
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**UNIT V**

**8HRS**

Metrics for Process and Products: Software measurement, metrics for software quality. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

MAINTENANCE: Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering

**Textbooks:**

1. Software Engineering, A practitioner’s Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
4. Pankaj Jalote, ”An Integrated Approach to Software Engineering”, Narosa Pub, 2005.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

5. Richard H. Thayer, "Software Engineering & Project Management", Wiley India

**References:**

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning.

**List of Practical:**

1. Study and compare the SDLC models.
2. Prepare a SRS document in line with the IEEE recommended standards.
3. Study Requirement Engineering of project.

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4. Study the UML drawing tools.
5. Draw the Entity relationship diagram of a project.
6. Draw the data flow diagrams at level 0 and level 1.
7. Draw use case diagram in argo UML.
8. Draw activity diagram in argo UML.
9. Draw class diagram in argo UML.
10. Draw the component diagram in argo UML.
11. Draw sequence diagram in argo UML.
12. Draw collaboration diagram in argo uml.
13. Use testing tool such as junit.
14. Using configuration management tool-libra.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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BTCS403N	SEC	Fundamentals of Design Thinking	60	20	20	30	20	1	0	2	2

**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 Educational Objectives (CEOs):**

**The student will have ability to:**

1. To learn the concepts of Business Process Management.
2. To emphasizing the concepts of reuse, ease of maintenance, and high-quality development strategies.
3. To create a simple case and a business process definition (BPD) from business requirements.

**Course Outcomes (COs):**

The students will be able to:

1. To implement business process management (BPM).
2. List and describe the phases in the BPM lifecycle Procedure.
3. Explore process modeling and creating applications.
4. Understand what came before Design Thinking
5. Learn how design thinking is introduced in an organization
6. Learn how it built upon previous approaches
7. Understand the whole overview of the whole approach to design thinking
8. Understand the principles, loop, and keys

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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**Syllabus:**

**UNIT I**

**10HRS**

**INTRODUCTION TO BUSINESS PROCESS &AS-IS BUSINESS PROCESS**

Define business process management (BPM), List and describe the phases in the BPM lifecycle procedure, Define process modelling., Describe how to use IBM Business Process Manager to accomplish process modelling goals, Explain how to create and modify process applications in the Process Centre, Create a process application, Explain case management, Describe the purpose and function of Blue works Live, Create a business process definition (BPD) from the process and nested process tasks and responsible.

**UNIT II**

**9HRS**

**MODELING PROCESS**

List and describe gateways as they are used in Process Designer, List and describe intermediate event types in Process Designer, model a business process escalation path with an attached timer intermediate event, Describe the Playback 0 validation goals and requirements, validate that a process model meets Playback 0 goals and Requirements.

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**Semester-IV (2021-2025)**

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### UNIT III

**8HRS**

#### ENTERPRISE DESIGN THINKING

Understand what came before Design Thinking, identify who did what to bring it about, learn how it built upon previous approaches, get an overview of the whole approach to design thinking, Understand the principles, loop, and keys, determine what is most important.

### UNIT IV

**7HRS**

#### ENTERPRISE DESIGN THINKING –7 KEY HABITS, THE LOOP, USER RESEARCH

Learn 7 key habits of effective thinker's design, avoid common anti-patterns, optimize for success with these habits, Understand the importance of iteration, learn how to observe, reflect, & make, get ready to drill down & do tomorrow, Understand the importance of user research, appreciate empathy through listening, Learn key methods of user research.

### UNIT V

**8HRS**

#### ENTERPRISE DESIGN THINKING – MAKE, USER FEEDBACK: -

Understand how Make fits into the Loop, learn how to leverage Observe information, Learn Ideation, Storyboarding, & Prototyping, understand user feedback and the Loop, Learn the different types of user feedback, learn how to carry out getting feedback.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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**Textbooks:**

1. Kathryn Christopher, Design Thinking in Engineering, Kendall/Hunt Publishing Co ,U.S. 2019.
2. David West and Rebecca Rinker Design Thinking: The Key to Enterprise Agility, Innovation, and Sustainability Author's Press International , 2017.

**References:**

1. Design Thinking for Dummies 1st Edition, Writing is designing: Words and the User.
2. Experience, The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable, Innovation Methods, 1st Edition, Design Thinking in Play: An Action Guide for Educators
3. Roger L. Martin Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Review Press (26 October 2009)

**List of Practical:**

1. Design your first discovery map in blueworks live study of process life cycle.
2. Designing process model in blueworks live.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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3. Explore adding and viewing process details in blueworks live
4. Design enterprise thinking - listening.
5. Design enterprise thinking - hmw
6. Design enterprise thinking - user research
7. Design enterprise thinking – reflect
8. Design enterprise thinking – ideation
9. Design enterprise thinking – storyboarding
10. Design enterprise thinking - crafting hills
11. Design enterprise thinking – prototyping.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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<b>BTDSE410N</b>	<b>DSE</b>	<b>Fundamental of Information Security</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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**Course Educational Objectives (CEOs):**

Student will have ability:

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 (COs):**

Students will be able:

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.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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<b>BTDSE410N</b>	<b>DSE</b>	<b>Fundamental of Information Security</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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## SYLLABUS

### UNIT I

**HRS 10**

**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

**HRS 9**

**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

**HRS 8**

**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.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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#### UNIT IV

**HRS 8**

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.

#### UNIT V

**HRS 7**

**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.

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**Bachelor of Technology (CSE with Specialization in Information and**  
**Cyber Security)**  
**Semester-IV (2021-2025)**

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**REFERENCES:**

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 Experiments:**

1. Analysis of security in Unix/Linux.
2. Administration of users, password policies, privileges, and roles

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**Bachelor of Technology (CSE with Specialization in Information and**  
**Cyber Security)**  
**Semester-IV (2021-2025)**

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<b>BTDSE411N</b>	<b>DSE</b>	<b>Principles of Distributed Systems</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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**Course Educational Objectives (CEOs):**

**The student will have ability to:**

1. Observe the principles, architectures, algorithms, and programming models used in distributed system.
2. Analyze state-of-the-art distributed system, such as Google File System.
3. Model and implement sample distributed system.
4. Summarize the functionality of Distributed System.

**Course Outcomes (COs):**

The students will be able to:

1. Understand architecture and communication systems in Distributed Systems.
2. Understand synchronization and various election algorithms in Distributed Systems.
3. Discuss different Distributed File System.
4. Evaluate Distributed Shared Memory.
5. Analyze various consistency and replication protocols and methods.
6. Understand various types of Distributed Systems.
7. Determine performance evaluation of various types of Distributed System.

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**Bachelor of Technology (CSE with Specialization in Information and Cyber Security)**  
**Semester-IV (2021-2025)**

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
<b>BTDSE411N</b>	<b>DSE</b>	<b>Principles of Distributed Systems</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;  
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**Syllabus:**

**UNIT I**

**10HRS**

**Characterization of Distributed System:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models, Fundamental Models.

**UNIT II**

**9HRS**

**Time and Global States:** Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems

**UNIT III**

**8HRS**

**Inter Process Communication:** Introduction, the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication

**Distributed Computing Paradigms:** Basic Message Passing Model – The Client Server, Message Passing, RPC basics, RPC implementation, RPC communication and issues, Remote Procedure Call Model – RPC in conventional languages and in Java - The Distributed Objects – The Collaborative Application

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**Semester-IV (2021-2025)**

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			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
<b>BTDSE411N</b>	<b>DSE</b>	<b>Principles of Distributed Systems</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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#### UNIT IV

**7HRS**

**Distributed File Systems:** File system, DFS- definition, Characteristics, Goals, File Service Architecture.

**Name Services:** Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

**Distributed Shared Memory:** Introduction, Design and Implementation Issues, Sequential Consistency, Release Consistency, , Other Consistency Models.

#### UNIT V

**8HRS**

**Transactions and Concurrency Control:** Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

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**Semester-IV (2021-2025)**

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
<b>BTDSE411N</b>	<b>DSE</b>	<b>Principles of Distributed Systems</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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**Textbooks:**

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 3rd Edition 2017, PHI.

**References:**

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 5<sup>th</sup> Edition. 2017.
2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, hapman&Hall/CRC, Taylor & Fransis Group, 2014.
3. P. K. Sinha, Distributed Operating Systems: Concepts and Design, IEEE press 3<sup>rd</sup> Edition, 2009
4. M. Singhal and N. G. Shivaratri, Advanced Concepts in Operating Systems, McGraw-Hill, 2011.

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**Semester-IV (2021-2025)**

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			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
<b>BTDSE412N</b>	<b>DSE</b>	<b>Information Storage and Management</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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**Course Educational Objectives (CEOs):**

1. An ability to understand various storage architecture & technologies.
2. An ability to understand various technologies used to provide backup & recovery.
3. An ability to understand various techniques used to provide security.
4. Ability to identify information storage system requirements.
5. An ability to develop policy for information storage system.
6. An ability to develop policy for backup& recovery.

**Course Outcomes (COs):**

On completion of the course students will be able to:

1. Describe & apply storage technologies.
2. Identify storage technologies that provide cost effective IT solution for medium to large scale businesses & data centers.
3. Manage Virtual Server & Storage between Remote locations.
4. Design analysis and manage clusters of resources

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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<b>BTDSE412N</b>	<b>DSE</b>	<b>Information Storage and Management</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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### Syllabus:

#### UNIT-I

Introduction: Digital data and its types, Information storage, Key characteristics of data center, Evolution of computing platforms. Introduction to storage technology: Data Proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information life Cycle Management, Data categorization.

#### UNIT II

**Storage System Architecture:** Intelligent disk subsystems overview, Contrast of integrands modular array, Component Architecture of Intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

#### UNIT III

**Introduction to network storage:** JBOD, DAS, NAS, SAN & CAS evolution and comparison, Applications, Elements, Connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

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**Semester-IV (2021-2025)**

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<b>BT DSE412N</b>	<b>DSE</b>	<b>Information Storage and Management</b>	<b>60</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

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#### UNIT IV

**Hybrid storage solutions and virtualization:** memory, network, server, storage & appliances. Data centre concepts & requirements, Backup and disaster recovery. Industry Management standards, standard framework applications, Key management metrics.

#### UNIT-V

**Information storage on clouds:** concept of cloud, cloud computing, storage on cloud, Cloud benefits, Cloud computing evolution. Application & services on cloud, cloud service providers, cloud deployment models, Essential characteristics of cloud computing.

#### Textbooks:

1. G.Somasundaram & Alok Shrivastava editors, ISM: Storing, Managing, and Protecting Digital Information; Wiley India

#### Reference Books:

1. Saurabh; Cloud Computing: Insight into New era Infrastructure; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, ISESI, INFINIBAND and FCOE, Wiley India.
3. Sosinsky, Cloud Computing Bible, Wiley India.

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**Semester-IV (2021-2025)**

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			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
BTIT407N	DCC	Advanced Java Programming	0	0	0	30	20	0	0	2	1

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**Course Educational Objectives (CEOs):**

**The student will have ability to:**

1. Understand HTML Tags.
2. Understand Database connectivity and sql queries in java.
3. Design and develop Web applications using servlet and JSP.
4. Understand how to work with JavaBeans.
5. Designing applications using pre-built frameworks.

**Course Outcomes (COs):**

The students will be able to:

1. learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
2. Design new applications using object-oriented methodologies.
3. Create dynamic web pages, using Servlets and JSP.
4. Make a reusable software component, using Java Bean.
5. Design Data base connectivity program for simple problems.

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**Semester-IV (2021-2025)**

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<b>BTIT407N</b>	<b>DCC</b>	<b>Advanced Java Programming</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

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**Syllabus:**

**UNIT I**

**10HRS**

Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Java Utilities (java.util Package) Event-Driven Programming in Java, Event- Handling Process, Event Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling.

**UNIT-II**

**6HRS**

**Servlets:** Basics of Web, MVC in Server-side Programming, Servlet API, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Working with Apache Tomcat Server, Steps to create a servlet in Tomcat, Deployment descriptor. Servlet Request: Various Servlet Request methods for form data and HTTP header data.

**UNIT-III**

**8HRS**

**Session Tracking:** Purpose and need of Session Tracing. Approaches to session tracking: Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA servlet API.

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**Bachelor of Technology (CSE with Specialization in Information and**  
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**Semester-IV (2021-2025)**

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<b>BTIT407N</b>	<b>DCC</b>	<b>Advanced Java Programming</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

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#### UNIT-IV

**6HRS**

**Database Connectivity and Servlet Collaboration:** Database drivers, JDBC, API for Querying with database, API for updating the database. Servlet collaboration: Methods of Request Dispatcher interface: forward, Include. Send redirect.

#### UNIT-V

**8HRS**

**Java Server Pages:** Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements: - Scrip let Tag, expression tag, declaration tag. 9 Implicit Object: out, request, response, config, application, session, page context, page, and Exception. Directives: - page directive, include directive, taglib; Exception Handling, Action Elements, JSTL, Custom tags.

#### Textbooks:

1. Herbert Schildt, “J2EE The Complete Reference Java”, Ninth Edition, McGraw Hill, 2017

#### References:

1. Bert Bates, Kathy Sierra, “Headfirst Java”, 2nd Edition, O’ Reilly, 2005
2. Advanced Java 2 Plateform, How to program, 2<sup>nd</sup> edition, Harvey.M.Dietel, Prentice Hall.

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**Semester-IV (2021-2025)**

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<b>BTIT407N</b>	<b>DCC</b>	<b>Advanced Java Programming</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

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**List of Practical:**

1. A html program for creating text box, check box, radio button, list, submit button.
2. A html program for Student registration page.
3. WAP in Servlets to get and display value from an HTML page.
4. A program to execute select query using JDBC.
5. A program to update customer information.
6. A simple servlet that just generates plain text.
7. A program to display cookie id.
8. A program for session tracking.
9. Write a program showing Database connectivity.
10. Write a program showing Simple database Operation (CRUD).
11. WAP in JSP to get and display value from an HTML page
12. A program for display student result by JSP page

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**Semester-IV (2021-2025)**

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			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
BTICS408N	SEC	Ethical Hacking Lab-I	0	0	0	30	20	0	0	2	1

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**Course Educational Objectives (CEOs):**

The student will have ability:

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

**Course Outcomes (COs):**

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.

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**Semester-IV (2021-2025)**

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BTICS408N	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;

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**Syllabus:**

**UNIT I Security Architecture:**

**HRS 10**

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 Vulnerability Assessment:**

**HRS 9**

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 Attack Plan:**

**HRS 8**

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

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**Semester-IV (2021-2025)**

COURSE CODE	CATEGORY	COURSE NAME	TEACHING&EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			ENDESEM University Exam	Two Term Exam	Teachers Assessment*	ENDESEM University Exam	Teachers Assessment*				
<b>BTICS408N</b>	<b>SEC</b>	<b>Ethical Hacking Lab-I</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**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.

in Mobility, Security Challenges Posed by Mobile Devices, Registry Setting for Mobile Devices, Authentication Service Security, Attack on Mobile Phones.

**UNIT IV Penetration Testing:**

**HRS 8**

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 Hacking Techniques:**

**HRS 7**

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.

**Text Books:**

1. “Cryptography and Network Security”, William Stallings, 2nd Edition, Pearson Education Asia

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BTICS408N	SEC	Ethical Hacking Lab-I	0	0	0	30	20	0	0	2	1

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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.

**References:**

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. Rafay Baloch, —A Beginners Guide to Ethical Hacking..

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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 Experiment:**

1. Installation of Kali Linux.
2. Introduction to NMAP Tool.
3. Basic NMAP Feature.
4. Host discovery using NMAP
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.
10. Basic Future of Nessus.
11. Hacking wireless networks
12. Hacking into System through Vulnerability.

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