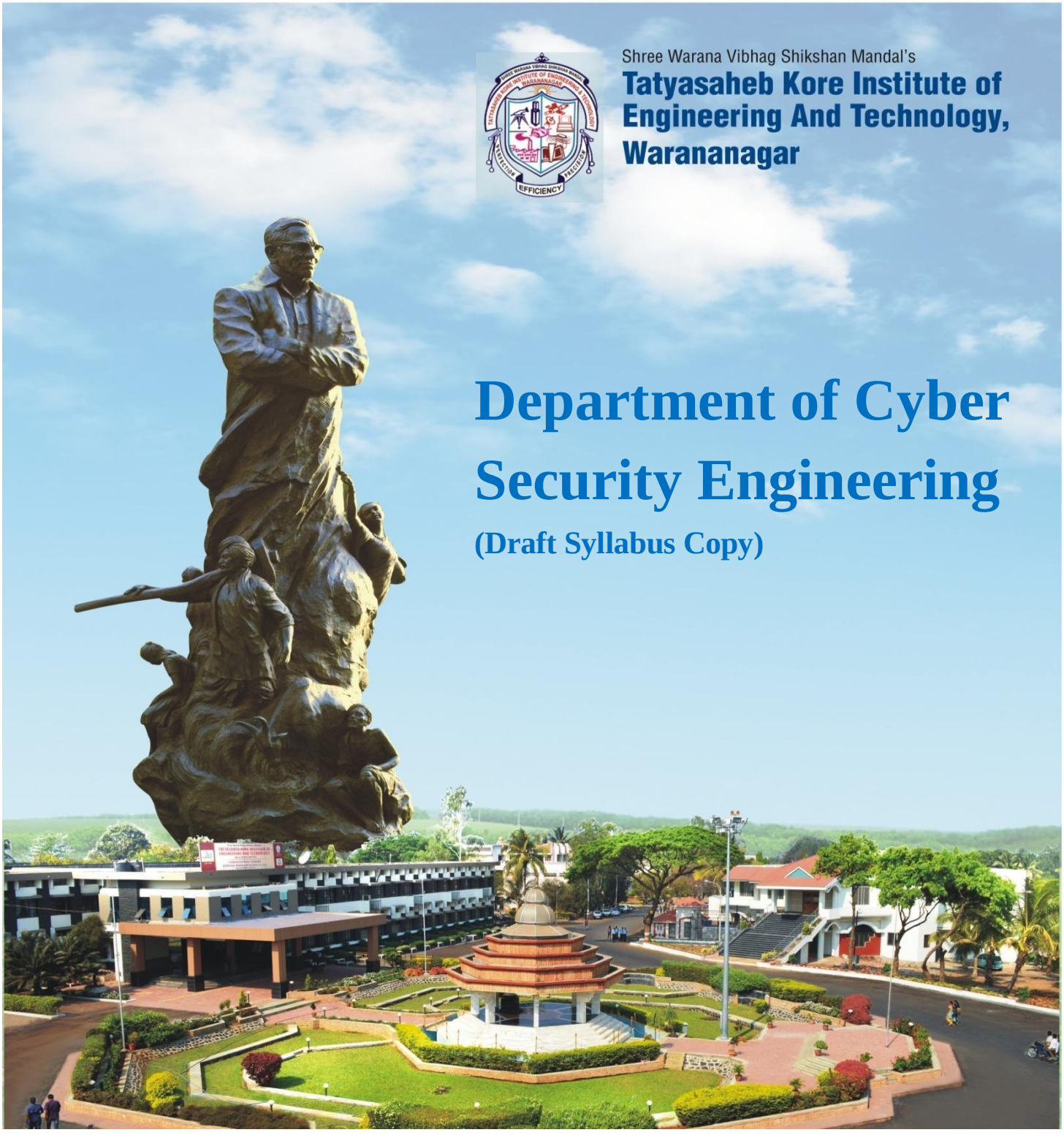
Shree Warana Vibhag Shikshan Mandal's
Tatyasaheb Kore Institute of Engineering And Technology, Warananagar
Department of Cyber Security Engineering
(Draft Syllabus Copy)

# Department of Cyber Security Engineering

## Vision

To become a center of excellence in the field of Cyber Security and to develop ethical cyber security professionals.

## Mission

- To develop engineering graduates with high degree of processional excellence
- To excel in academics and research through contemporary and real world problems
- To enhance graduate employability through work based learning in social entrepreneurship
- To encourage industrial and nationally recognized institutes collaboration

## Program Educational Objectives (PEOs)

**Graduates will be,**

- Apply core knowledge of cyber security and modern technologies to design, develop, and manage secure computing systems that address real-world challenges
- Pursue higher education, research, or entrepreneurial ventures with a strong foundation in cyber security principles and analytical skills.
- Demonstrate professionalism, effective communication, and ethical responsibility in addressing legal and societal aspects of cyber security.
- Collaborate effectively in multidisciplinary and multicultural teams to develop secure solutions for diverse domains.
- Exhibit leadership and contribute meaningfully to the protection of information infrastructure and national security.

## Program Specific Outcomes (PEOs)

**Graduate will be able to**

- Graduates will be able to identify, analyze, and develop secure solutions to real-world problems by applying the principles of cyber security and secure software development lifecycle.
- Graduates will be capable of evaluating and implementing cyber security measures considering societal, ethical, and legal perspectives in the protection of digital assets.

## Quality Policy

- To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.

## Department of Cyber Security Engineering

### Program Outcomes (POs)

**The students after successfully completing this programme will have ability to:**

- **PO1: Engineering Knowledge**:
  Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem Analysis**:
  Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3: Design/Development of Solutions**:
  Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4: Conduct Investigations of Complex Problems**:
  Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5: Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6: The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- **PO7: Environment and Sustainability**:
  Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8: Ethics**:
  Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9: Individual and Team Work**:
  Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10: Communication**:
  Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11: Project Management and Finance**:
  Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12: Life-long learning**:
  Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Cyber Security Engineering

# Abbreviations

| Sr. No. | Acronym | Definition |
|---|---|---|
| 1 | ISE | In-Semester Examination |
| 2 | ISE-I | In-Semester Examination-I |
| 3 | ISE-II | In-Semester Examination-II |
| 4 | ESE | End Semester Examination |
| 5 | ISA | In-Semester Assessment (Term Work) |
| 6 | L | Lecture |
| 7 | T | Tutorial |
| 8 | P | Practical |
| 9 | CH | Contact Hours |
| 10 | C | Credit |

## Course Categories

| Sr. No. | Acronym | Definition |
|---|---|---|
| 1 | BSC | Basic Science Course |
| 2 | HSC | Humanity Science Course |
| 3 | ESC | Engineering Science Course |
| 4 | PCC | Professional Core Course |
| 5 | OEC | Open Elective Course |
| 6 | MC | Mandatory Course |
| 7 | PEC | Professional Elective Course |
| 8 | PW | Project Work (Mini and Major Project) |
| 9 | II | Industrial Internship |

## Course/ Subject Code

| C | S | | 3 | 0 | 1 |
|---|---|---|---|---|---|
| Branch Code | | | Semester | Course Number | |

## Course Term work and POE Code

| C | S | | 3 | 0 | 1 | T / P / A |
|---|---|---|---|---|---|---|
| Branch Code | | | Semester | Course Number | | T- Term work<br>P- POE<br>A- Audit Course |

# Second Year B. Tech.

# in

# Cyber Security Engineering

## Syllabus Structure under Autonomous Status of TKIET, Warananagar

**Semester-III**

**(To be implemented from Academic Year 2025 - 26)**

**Credit Scheme**

# Semester-III

**(To be implemented from Academic Year 2025 - 26)**

**Credit Scheme**

| Sr. No | Category | Sub-Category | Course Code | Course Title | Teaching Scheme | | | | | Examination & Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | C | CH | Component | Marks | Min Marks for Passing | |
| 1 | Program Core Course | PCC | 25UG-PCC-CS301 | Foundation of Cyber Security | 3 | -- | -- | 3 | 3 | ISE | 40 | 16 | 40 |
| | | | | | | | | | | ESE | 60 | 24 | |
| 2 | | PCC | 25UG-PCC-CS302 | Computer Networks | 2 | -- | -- | 2 | 2 | ISE | 40 | 16 | 40 |
| | | | | | | | | | | ESE | 60 | 24 | |
| 3 | | PCC | 25UG-PCC-CS303 | Software Engineering | 2 | -- | -- | 2 | 2 | ISE | 40 | 16 | 40 |
| | | | | | | | | | | ESE | 60 | 24 | |
| 4 | | PCC | 25UG-PCC-CS304 | Database Management System | 3 | -- | -- | 3 | 3 | ISE | 40 | 16 | 40 |
| | | | | | | | | | | ESE | 60 | 24 | |
| 5 | Multi-Disciplinary Course | MDM-1 | 25UG-MDM1-CS305 | Foundation of Cyber Security | 2 | -- | -- | 2 | 2 | ISA (TW) | 50 | 20 | 20 |
| 6 | Humanities Social Science and Management | Entrepreneurship/Economics/ Mgmt. Course | 25UG-EEC1-CS306 | Entrepreneurship Management | 2 | -- | -- | 2 | 2 | ISA (TW) | 50 | 20 | 20 |
| 7 | | Value Education Course | 25UG-VEC1-CS307 | Professional Ethics and Human Values | 2 | -- | -- | 2 | 2 | ISA (TW) | 25 | 10 | 10 |
| 8 | Experiential Learning Courses | Community Engg Project (CEP/FP) | 25UG-CEP-CS308 | Field Project | 1 | -- | 2 | 2 | 3 | ISA (TW) | 50 | 20 | 20 |
| 9 | Program Core Courses | PCC | 25UG-PCC-CS301P | Foundation of Cyber Security Lab | -- | -- | 2 | 1 | 2 | ISA (TW) | 25 | 10 | 30 |
| | | | | | | | | | | ESE (POE) | 50 | 20 | |
| 10 | | PCC | 25UG-PCC-CS302P | Computer Networks Lab | -- | -- | 2 | 1 | 2 | ISA (TW) | 25 | 10 | 30 |
| | | | | | | | | | | ESE (POE) | 50 | 20 | |
| 11 | | PCC | 25UG-PCC-CS304P | Database Management System Lab | -- | -- | 2 | 1 | 2 | ISA(TW) | 25 | 10 | 30 |
| | | | | | | | | | | ESE(POE) | 50 | 20 | |
| | | | | | **17** | **-** | **8** | **21** | **25** | **--** | **800** | **320** | **320** |

## Department of Cyber Security Engineering

### Guidelines for Course conduction and Evaluation in S.Y.B.Tech.(CS) Sem- III

1. A Moodle course structure is created for each course in the curriculum.
2. All the course teachers will upload course material, activities and assignments on moodle
3. All the students will be given a separate login credential on Moodle to access the contents in it.
4. The term work (ISA) will be assessed and evaluated as per the criteria defined in course contents.
5. ISE – I & ISE – II will of 40 Marks each: Average of Two ISEs will be considered to qualify.
6. **Minimum marks required to qualify for ISE : 16 out of 40 marks**
7. **Minimum marks required to qualify for TW: 10 out of 25 marks**
8. **Minimum marks required to qualify for TW: 20 out of 50 marks**
9. Completions of Audit Course activities are mandatory.

### End Semester Examination (ESE- Theory):

| | |
|---|---|
| 1. | It will be conducted for 60 marks having 2 hours duration. |
| 2. | Each Topic should have equal weightage. |
| 4. | Theory Paper should contain the Theoretical as well as analytical questions. |
| 5. | Minimum passing marks to be scored in ESE-T: 24 out of 60 marks |

# Second Year B. Tech. in

## Cyber Security Engineering

**Third (III) Semester Detailed Syllabus**

## Second Year B. Tech (CS) (Semester – III)
## 25UG-PCC-CS301: Foundation of Cyber Security

| Teaching Scheme Lectures: | Credits : | Examination Scheme |
|---|---|---|
| 03 Hrs / Week | 03 | **ESE:** 60 Marks<br>**ISE:** 40 Marks |

**Course Description:**

This is a foundational course designed to equip students with the essential principles, practices, and tools used to protect digital systems and information. The course focuses on the core aspects of cyber threats, vulnerabilities, risk management, and defense mechanisms. Students will explore real-world cyber attacks, understand how security breaches occur, and learn strategies to prevent and mitigate such incidents.

| **Prerequisites:** | **1.** Basic knowledge of Computer & Operating system |
|---|---|

**Course Objectives:**

1. To develop core concepts & principals of Cyber Security.
2. To prepare students for familiarize with common types of cyber-attacks.
3. To give the knowledge to the students about operating system.

**Course Outcomes:**

| COs | At the end of successful completion of the course the student will be able to | Blooms Taxonomy |
|---|---|---|
| CO1 | Analyze common attacks and describe appropriate prevention, detection and response techniques. | Analyze |
| CO2 | Identify and evaluate legal, ethical, and professional issues in cyber security, including cybersecurity policies, standards, and laws. | Apply |
| CO3 | Demonstrate foundational knowledge of cryptographic techniques and their applications in securing data transmission and storage. | Understand |
| CO4 | Understand and explain the scope of cyber security, including the CIA triad and the nature of cyber threats and vulnerabilities. | Understand |

**Course Contents**

| Unit-I | Introduction to Cyber Security | 08 Hours |
|---|---|---|

Definition and scope of Cyber Security, CIA Triad – Confidentiality, Integrity, and Availability, Types of threats: Internal, External, Intentional, Unintentional, Cyber-attack surfaces and vectors, Cyber security vs. Information security vs. Network security, Overview of security principles and best practices.

| Unit-II | Cyber Threats & Attacks | 08 Hours |
|---|---|---|

Malware types: Virus, Worms, Trojans, Ransomware, Spyware, Phishing, Pharming, and Social Engineering attacks, Denial of Service (DoS) and Distributed DoS (DDoS), Man-in-the-Middle (MitM) attacks, SQL Injection, Cross-site scripting (XSS), Case studies of real-world cyber attacks.

| Unit-III | Network & System Security | 07 Hours |
|---|---|---|

Basics of network architecture: LAN, WAN, IP addressing, protocols, Firewalls, IDS and IPS: Functions and configurations, Securing servers and endpoints, Authentication mechanisms: Passwords, Multi-factor Authentication (MFA), Biometrics, Operating system hardening and patch management.

| Unit-IV | Cryptography Fundamentals | 05 Hours |
|---|---|---|

Importance of cryptography in cyber security, Symmetric vs. Asymmetric encryption (AES, DES, RSA), Hashing algorithms: MD5, SHA family, Digital signatures and certificates.

| Unit-V | Security Policies, Standards, and Risk Management | 07 Hours |
|---|---|---|

| | | |
|---|---|---|
| Security policy lifecycle and components, Information security standards: ISO/IEC 27001, NIST, OWASP Top 10, Risk assessment and mitigation strategies, Business continuity and disaster recovery planning, Security awareness and training programs. | | |
| **Unit-VI** | **Legal, Ethical, and Professional Issues** | **07 Hours** |
| Cyber laws and regulations (Indian IT Act, GDPR overview), Intellectual Property Rights (IPR) and digital rights management, Ethical hacking: Definition, scope, and limitations, Roles and responsibilities of cyber security professionals. | | |

| Course delivery methods | Assessment methods |
|---|---|
| 1. Black Board Teaching<br>2. Power Point Presentation | 1. Internal Assessment<br>2. Assignment, Tutorial<br>3. Quiz |

**Text Books:**

1. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, Latest Edition.
2. Chuck Easttom, Computer Security Fundamentals, Pearson Education, Latest Edition.

**Reference Books:**

1. Behrouz A. Forouzan, Cryptography and Network Security, McGraw Hill Education.
2. Mark Ciampa, Security+ Guide to Network Security Fundamentals, Cengage Learning.
3. Pankaj Agarwal, Cyber Security Essentials, Dreamtech Press.
4. Raef Meeuwisse, Cybersecurity for Beginners, Cyber Simplicity.

**CO-PO Mapping:**

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | -- | 1 | 1 | -- | -- | -- | -- | -- | -- | 1 |
| CO2 | 3 | 2 | -- | 1 | -- | -- | -- | -- | -- | -- | -- | 1 |
| CO3 | 3 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CO4 | 3 | -- | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| CO5 | 3 | -- | 2 | -- | 2 | -- | 1 | -- | -- | -- | 1 | -- |

1-Low, 2-Medium, 3-High

----------END----------

## Second Year B. Tech(CS) (Semester – III)
## 25UG-PCC-CS302: Computer Networks

| Teaching Scheme | Credits : | Examination Scheme |
|---|---|---|
| **Lectures:** 02 Hrs /Week | 02 | **ESE:** 60 Marks<br>**ISE:** 40 Marks |

**Course Description:**

This course introduces the fundamental principles of computer networking, focusing on the design, functioning, and protocols of networked communication systems. It covers OSI and TCP/IP models, IP addressing, subnetting, switching, routing, and network applications such as DNS and HTTP.

| **Prerequisites:** | Basic knowledge of Computer Fundamentals |
|---|---|

**Course Objectives:**

1. Understand the fundamental concepts, architecture, and components of computer networks.
2. Analyse the functions and protocols of each layer in the OSI and TCP/IP models.
3. Apply knowledge of networking concepts to design simple networks and solve related problems.
4. Evaluate network performance and identify potential vulnerabilities in communication systems.

**Course Outcomes:**

| COs | At the end of successful completion of the course the student will be able to | Blooms Taxonomy |
|---|---|---|
| CO1 | Understand the fundamental concepts, models, and architecture of computer networks. | Understand |
| CO2 | Apply IP addressing and subnetting techniques in network configuration tasks. | Understand |
| CO3 | Analyze network performance, detect issues, and suggest improvements. | Apply |

**Course Contents**

| Unit-I | Introduction to Computer Networks | 08 Hours |
|---|---|---|
| Definition, goals, and applications of networks, Types of networks: LAN, MAN, WAN, PAN, Network topologies, hardware, and transmission media, Protocols and standards, Network architecture: OSI and TCP/IP models | | |
| **Unit-II** | **Physical Layer** | **04 Hours** |
| Transmission media: Guided and unguided, switching techniques: Circuit, packet, message, Digital transmission: Encoding schemes, Multiplexing: FDM, TDM, WDM, Error detection: Parity, CRC, Hamming Code | | |
| **Unit-III** | **Data Link Layer** | **08 Hours** |
| Framing and error control, Flow control: Stop-and-Wait, Sliding Window, Medium Access Control (MAC): ALOHA, CSMA/CD, CSMA/CA, Ethernet (IEEE 802.3), Wireless LAN (802.11), Switching: Store-and-forward, Cut-through | | |
| **Unit-IV** | **Network Layer** | **05 Hours** |
| IPv4 and IPv6 addressing, Subnetting and super netting, Routing concepts: Static vs. Dynamic, Routing algorithms: Distance Vector, Link State, Protocols: IP, ICMP, ARP, RARP | | |
| **Unit-V** | **Transport Layer** | **07 Hours** |
| Process-to-process delivery, TCP and UDP: Header, features, comparison, Congestion control and Quality of Service (QoS), Flow control and buffering, Port numbers and sockets | | |
| **Unit-VI** | **Application Layer** | **07 Hours** |
| Domain Name System (DNS), Email: SMTP, POP, IMAP, World Wide Web: HTTP, HTTPS, File Transfer Protocol (FTP), Network security basics: Firewalls, proxies | | |

**Text Book:**

1. Andrew S. Tanenbaum, Computer Networks, Pearson Education.
2. Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill Education.

**Reference Books:**

1. William Stallings, Data and Computer Communications, Pearson Education.
2. Kurose & Ross, Computer Networking: A Top-Down Approach, Pearson.

**CO-PO Mapping:**

| PO CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | -- | 1 | -- | -- | -- | -- | -- | -- | -- | 1 |
| CO2 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 |
| CO3 | 3 | -- | -- | 1 | 1 | -- | -- | -- | -- | -- | 1 | 1 |

1-Low, 2-Medium, 3-High

----------**END**----------

**Second Year B. Tech(CS) (Semester – III)**

**25UG-PCC-CS303: Software Engineering**

| **Teaching Scheme** | **Credits :** | **Examination Scheme** |
|---|---|---|
| **Lectures:** 02 Hrs / Week | 02 | **ESE:** 60 Marks<br>**ISE:** 40 Marks |

**Course Description:**

This course provides fundamentals of Software Development Life Cycle (SDLC), principles of software engineering practices and introductory concepts of software project management.

| **Prerequisites:** | Basic knowledge of programming in any language |
|---|---|

**Course Objectives:**

1. To understand software process models and importance of Software Development Life Cycle (SDLC).
2. To learn of software requirements gathering and analysis process and prepare SRS (Software Requirement Specification) document.
3. To understand the different software design and architectural styles.
4. To learn different software testing approaches and software quality management.

**Course Outcomes:**

| **COs** | **At the end of successful completion of the course the student will be able to** | **Blooms Taxonomy** |
|---|---|---|
| **CO1** | Describe various software engineering concepts, Software Development Process Models (SDPMs) | **Remember** |
| **CO2** | Interpret the structure and essential sections of Software Requirement Specifications (SRS) documents | **Understand** |
| **CO3** | Describe different architectural views and identify software architecture for a given problem | **Understand** |
| **CO4** | Design and demonstrate Software system or applications using SRS document. | **Apply** |
| **CO5** | Identify different software testing techniques and understand standards related to software reliability and quality management. | **Understand** |

**Course Contents**

| **Unit-I** | **Introduction to Software Engineering** | **05 Hours** |
|---|---|---|

Cost, Schedule & Quality, Scale and Change, Software Processes: Process & Project, **Software Development Process Models**: Waterfall model, Prototyping, Iterative Development, Rational Unified Process, Time boxing Model, Extreme programming and agile software development, Using process models in a project, Project Management Process

| **Unit-II** | **Software Requirement Engineering** | **05 Hours** |
|---|---|---|

Requirement Gathering and Analysis, Software Requirement Specification (SRS)

**Case Study 2.1**

- Gather the requirements for automation of the office work at CSE department

**Case Study 2.2**

- Study the SRS of Library Management Software. Write SRS in IEEE format for given Project Statement

**Case Study 2.3**

Study the functional and non-functional requirements of Library Management Software (or any software) Identify the important functional and non-functional requirement for given Project Statement

| **Unit-III** | **Software Architecture** | **05 Hours** |
|---|---|---|

| | | |
|---|---|---|
| Role of Software Architecture, Architecture View, Component and Connector View, Architecture styles for Component and Connector View, Evaluating Architectures. Project Planning: Sliding Window Planning, Software Project Management Plan (SPMP) Document, COCOMO Model. Project Scheduling: WBS, Activity Networks, PERT, Gantt Charts. **Case Study 3.1** Prepare SPMP document for allocated problem. | | |
| **Unit-IV** | **Software Design** | **08 Hours** |
| Design Concepts, Function Oriented Design: Structure Charts, Structured Design Methodology, An Example. Object Oriented Design: OO Concepts, Unified Modeling Language (UML), A Design Methodology, Examples. Detailed Design, Verification, Metrics<br>**Case Study 4.1**<br>Study the design of Library Software / or any project statement | | |
| **Unit-V** | **Coding and Testing** | **05 Hours** |
| Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Program Analysis Tools, Integration Testing, System Testing<br>**Case Study 5.1**<br>Study of Automation Testing Tool: Selenium | | |
| **Unit-VI** | **Software Reliability and Quality Management** | **08 Hours** |
| Software Reliability, Software Quality, ISO 9000, SEI Capability Maturity, Model, Six Sigma | | |

| Course Delivery Method | Course Assessment Method |
|---|---|
| 1. Chalk and board<br>2. Presentation Slides<br>3. Pre recorded Video lectures | 1. Internal assessment<br>2. Problem Solving<br>3. Topic wise Quizzes |

**Text Book:**

1. William Stallings, Operating Systems: Internals and Design Principles, Pearson.
2. Jason Eckert, Linux+ Guide to Linux Certification, Cengage.

**Reference Books:**

1. Michael Palmer, Guide to Operating Systems Security, Course Technology.
2. Simson Garfinkel & Gene Spafford, Practical Unix and Internet Security, O'Reilly.
3. Mark E. Russinovich, Windows Internals, Microsoft Press.

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | 1 | 1 | - | 1 | 1 | 2 | 1 | - | 1 |
| CO2 | 2 | 2 | 3 | 1 | 1 | - | - | 1 | - | 1 | - | 1 |
| CO3 | 1 | 1 | 2 | - | 1 | - | - | - | - | 1 | - | - |
| CO4 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | 2 | - | - | 1 |

1-Low, 2-Medium, 3-High

----------END----------

**Second Year B. Tech(CS) (Semester – III)**

**25UG-PCC-CS304: Database Management System**

| **Teaching Scheme** | **Credits** | **Examination Scheme** |
|---|---|---|
| **Lectures :** 03 Hrs / Week | 03 | **ESE:** 60 Marks<br>**ISE:** 40 Marks |

Course Description:

This course introduces the principles of database systems, focusing on data modeling, relational databases, SQL, transaction processing, and security aspects. Emphasis is placed on how databases are integral to cybersecurity, including data integrity, access control, and secure database design.

| **Prerequisites:** | Basic programming knowledge (C/C++) |
|---|---|

**Course Objectives:**

1. Understand the fundamentals of DBMS and data models.
2. Design ER models and map them to relational schemas.
3. Develop SQL queries and use advanced database functionalities.
4. Analyze the concepts of normalization and indexing.
5. Evaluate transaction management, concurrency control, and recovery methods.

**Course Outcomes:**

| **COs** | **At the end of successful completion of the course the student will be able to** | **Blooms Taxonomy** |
|---|---|---|
| **CO1** | Describe database models and architecture | **Understand** |
| **CO2** | Create ER diagrams and relational schemas | **Apply** |
| **CO3** | Write SQL queries including DDL, DML, and DCL | **Apply** |
| **CO4** | Apply normalization and indexing techniques | **Analyze** |
| **CO5** | Explain transaction processing, concurrency, and recovery | **Evaluate** |

**Course Contents**

| **Unit-I** | **Introduction to DBMS** | **06 Hours** |
|---|---|---|

Characteristics and advantages of DBMS over file systems, Database system architecture, Data models: Hierarchical, Network, Relational, Object-Oriented, Schema, instance, data independence, Database languages: DDL, DML, DCL, TCL, Database users and roles, Overview of data storage and query processing.

| **Unit-II** | **Entity-Relationship (ER) Modeling** | **06 Hours** |
|---|---|---|

Basic concepts: entities, attributes, entity sets, Relationships, relationship sets, participation constraints, Keys: candidate key, primary key, Enhanced E-R Model: generalization, specialization, aggregation, Mapping ER diagrams to relational schemas

| **Unit-III** | **Relational Model and SQL** | **06 Hours** |
|---|---|---|

Structure of relational databases, Relational algebra: selection, projection, union, set difference, Cartesian product, rename, joins, Basic SQL queries: SELECT, INSERT, UPDATE, DELETE, Nested queries, aggregate functions, grouping, Views and indexes, Integrity constraints: primary key, foreign key, not null, unique, check

| **Unit-IV** | **Normalization and Indexing** | **07 Hours** |
|---|---|---|

| | | |
|---|---|---|
| Purpose of normalization, Functional dependencies, First, Second, Third Normal Form (1NF, 2NF, 3NF), Boyce-Codd Normal Form (BCNF), Multivalued dependencies and Fourth Normal Form (4NF), Indexing: single-level and multi-level indexes, Hash-based and B+ tree indexes | | |
| **Unit-V** | **Transaction Management and Concurrency Control** | **07 Hours** |
| Concept of transactions and ACID properties, Transaction states, Serializability: conflict and view, Concurrency control: locking mechanisms, deadlocks, Timestamp ordering, Recovery system: log-based recovery, checkpoints | | |
| **Unit-VI** | **Storage and File Organization** | **07 Hours** |
| Storage hierarchy and storage media, Buffer management and block storage, File organization: heap, sorted, hashed files, RAID structures, Basics of query evaluation and optimization (selection, join strategies), Disk scheduling and access methods | | |

| Course delivery methods | Assessment methods |
|---|---|
| 1. Black Board Teaching<br>2. Power Point Presentation | 1. Internal Assessment<br>2. Assignment<br>3. Quiz |

**Text Books**

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education.
2. Abraham Silberschatz, Henry Korth, Database System Concepts, McGraw Hill.

Reference Books

1. Thomas Connolly & Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management, Pearson.
2. S. Sumathi, S. Esakkirajan, Fundamentals of Relational Database Management Systems, Springer.
3. Godbole & Atul Kahate, Database Security: Concepts, Approaches, and Challenges, McGraw Hill.

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | -- | -- | -- | -- | -- | -- | -- | 1 | -- | -- |
| CO2 | 3 | 3 | 2 | -- | 1 | -- | -- | -- | -- | 1 | -- | -- |
| CO3 | 3 | 3 | 3 | 1 | 1 | -- | -- | -- | -- | 1 | -- | -- |
| CO4 | 3 | 2 | 3 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| CO5 | 3 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- |
| CO6 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | -- | -- | -- | -- |

1-Low, 2-Medium, 3-High

----------END----------

| Second Year B. Tech(CS) (Semester – III)<br>25UG-PCC-CS301P: Foundation of Cyber Security Lab | | |
|---|---|---|
| **Practical:** 02 Hrs / Week | **Credits :**<br>01 | **Examination Scheme**<br>**ISA:** 25 Marks<br>**POE:** 50 Marks |

## Experiment List:

| Experiment No | Problem Statement | Blooms Taxonomy |
|---|---|---|
| **Experiment No 1** | Introduction to Kali Linux and Security Tools | **Apply** |
| **Experiment No 2** | Performing Port Scanning using Nmap | **Apply** |
| **Experiment No 3** | Packet Sniffing and Analysis using Wireshark | **Apply** |
| **Experiment No 4** | Creating and Analyzing Hashes (MD5/SHA256) in Python | **Apply** |
| **Experiment No 5** | Implementing Symmetric and Asymmetric Encryption (AES, RSA) | **Apply** |
| **Experiment No 6** | Configuring a Basic Firewall and IDS/IPS | **Apply** |
| **Experiment No 7** | Simulating a Phishing Attack in a Controlled Environment | **Apply** |
| **Experiment No 8** | Using OpenVAS or Nessus for Vulnerability Assessment | **Apply** |
| **Experiment No 9** | Password Cracking using John the Ripper or Hydra | **Apply** |
| **Experiment No 10** | Ethical Hacking – Exploiting a Vulnerable Web App using DVWA | **Apply** |

----------**END**----------

**Second Year B. Tech(CS) (Semester – III)**

**25UG-PCC-CSE302P : Computer Networks Lab**

| **Teaching Scheme Practical:** | **Credits :** | **Examination Scheme** |
|---|---|---|
| 02 hrs/Week | 01 | **ISA:** 25 Marks<br>**POE:** 50 Marks |

**Course Contents**

| | | |
|---|---|---|
| **Experiment -1** | Setup and Configure a Simple Network using Hubs, Switches, and Routers | **Cisco Packet Tracer** |
| **Experiment - 2** | Demonstrate Different Network Topologies (Bus, Star, Ring) | **Cisco Packet Tracer** |
| **Experiment - 3** | Simulate the OSI Model Layers using Network Simulation Software | **Wireshark, Cisco Packet Tracer** |
| **Experiment - 4** | Compare the OSI and TCP/IP Models with Real-world Examples | **Wireshark** |
| **Experiment - 5** | Implement Unicast, Multicast, and Broadcast Addressing in a Network | **Cisco Packet Tracer** |
| **Experiment – 6** | Perform Bit, Byte, and Character Stuffing for Data Framing | **Custom Python Scripts** |
| **Experiment - 7** | Implement CRC and Checksum for Error Detection | **MATLAB, Custom Python Scripts** |
| **Experiment – 8** | Demonstrate Hamming Code for Error Correction | **MATLAB, Custom Python Scripts** |
| **Experiment – 9** | Implement Stop-and-Wait and Sliding Window Protocols for Flow Control | **Cisco Packet Tracer, Custom Python Scripts** |
| **Experiment - 10** | Configure and Analyze Routing Protocols (Distance Vector, Link State) | **Cisco Packet Tracer, GNS3** |
| **Experiment – 11** | Setup and Test UDP and TCP Connections, Including Port Addressing | **Wireshark, Cisco Packet Tracer** |
| **Experiment – 12** | Configure and Test Application Layer Protocols (DHCP, DNS, HTTP) | **Cisco Packet Tracer** |

----------**END**----------

| Second Year B. Tech(CS) (Semester – III)<br>25UG-PCC-CSE304P: Database Management System Lab | | |
|---|---|---|
| **Teaching Scheme Practical:**<br>02 hrs/Week | **Credits :**<br>01 | **Examination Scheme**<br>**ISA:** 25 Marks<br>**POE:** 50 Marks |

| Course Contents | | |
|---|---|---|
| **Experiment -1** | Installation and setup of MySQL/PostgreSQL | **Understand** |
| **Experiment – 2** | Creating tables and defining constraints | **Apply** |
| **Experiment – 3** | ER model to relational schema conversion | **Apply** |
| **Experiment – 4** | SQL queries (SELECT, JOIN, GROUP BY) | **Apply** |
| **Experiment -5** | Implementing views and indexes | **Apply** |
| **Experiment -6** | Writing transactions with COMMIT/ROLLBACK | **Apply** |
| **Experiment -7** | Demonstrating concurrency issues | **Apply** |
| **Experiment -8** | Implementing GRANT and REVOKE commands | **Apply** |

----------**END**----------

**Second Year B. Tech (CS) (Semester – III)**

**25UG-MDM1-CS305: Foundation of Cyber Security**

| **Teaching Scheme Lectures:** | **Credits :** | **Examination Scheme** |
|---|---|---|
| 02 Hrs / Week | 02 | **ISA:** 50 Marks |

**Course Description:**

This is a foundational course designed to equip students with the essential principles, practices, and tools used to protect digital systems and information. The course focuses on the core aspects of cyber threats, vulnerabilities, risk management, and defense mechanisms. Students will explore real-world cyber attacks, understand how security breaches occur, and learn strategies to prevent and mitigate such incidents.

| **Prerequisites:** | **1.** Basic knowledge of Computer & Operating system |
|---|---|

**Course Objectives:**

4. To develop core concepts & principals of Cyber Security.
5. To prepare students for familiarize with common types of cyber-attacks.
6. To give the knowledge to the students about operating system.

**Course Outcomes:**

| **COs** | **At the end of successful completion of the course the student will be able to** | **Blooms Taxonomy** |
|---|---|---|
| **CO1** | Analyze common attacks and describe appropriate prevention, detection and response techniques. | **Analyze** |
| **CO2** | Identify and evaluate legal, ethical, and professional issues in cyber security, including cybersecurity policies, standards, and laws. | **Apply** |
| **CO3** | Demonstrate foundational knowledge of cryptographic techniques and their applications in securing data transmission and storage. | **Understand** |
| **CO4** | Understand and explain the scope of cyber security, including the CIA triad and the nature of cyber threats and vulnerabilities. | **Understand** |

**Course Contents**

| **Unit-I** | **Introduction to Cyber Security** | **08 Hours** |
|---|---|---|

Definition and scope of Cyber Security, CIA Triad – Confidentiality, Integrity, and Availability, Types of threats: Internal, External, Intentional, Unintentional, Cyber-attack surfaces and vectors, Cyber security vs. Information security vs. Network security, Overview of security principles and best practices.

| **Unit-II** | **Cyber Threats & Attacks** | **08 Hours** |
|---|---|---|

Malware types: Virus, Worms, Trojans, Ransomware, Spyware, Phishing, Pharming, and Social Engineering attacks, Denial of Service (DoS) and Distributed DoS (DDoS), Man-in-the-Middle (MitM) attacks, SQL Injection, Cross-site scripting (XSS), Case studies of real-world cyber attacks.

| **Unit-III** | **Network & System Security** | **07 Hours** |
|---|---|---|

Basics of network architecture: LAN, WAN, IP addressing, protocols, Firewalls, IDS and IPS: Functions and configurations, Securing servers and endpoints, Authentication mechanisms: Passwords, Multi-factor Authentication (MFA), Biometrics, Operating system hardening and patch management.

| **Unit-IV** | **Cryptography Fundamentals** | **05 Hours** |
|---|---|---|

Importance of cryptography in cyber security, Symmetric vs. Asymmetric encryption (AES, DES, RSA), Hashing algorithms: MD5, SHA family, Digital signatures and certificates

| **Unit-V** | **Security Policies, Standards, and Risk Management** | **07 Hours** |
|---|---|---|

| | | |
|---|---|---|
| Security policy lifecycle and components, Information security standards: ISO/IEC 27001, NIST, OWASP Top 10, Risk assessment and mitigation strategies, Business continuity and disaster recovery planning, Security awareness and training programs | | |
| **Unit-VI** | **Legal, Ethical, and Professional Issues** | **07 Hours** |
| Cyber laws and regulations (Indian IT Act, GDPR overview), Intellectual Property Rights (IPR) and digital rights management, Ethical hacking: Definition, scope, and limitations, Roles and responsibilities of cyber security professionals | | |

| Course delivery methods | Assessment methods |
|---|---|
| 1. Black Board Teaching<br>2. Power Point Presentation | 1. Internal Assessment<br>2. Assignment<br>3. Quiz |

**Text Books**

1. William Stallings, Network Security Essentials: Applications and Standards, Pearson Education, Latest Edition.
2. Chuck Easttom, Computer Security Fundamentals, Pearson Education, Latest Edition.

**Reference Books**

1. Behrouz A. Forouzan, Cryptography and Network Security, McGraw Hill Education.
2. Mark Ciampa, Security+ Guide to Network Security Fundamentals, Cengage Learning.
3. Pankaj Agarwal, Cyber Security Essentials, Dreamtech Press.
4. Raef Meeuwisse, Cybersecurity for Beginners, Cyber Simplicity.

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | -- | 1 | -- | -- | -- | -- | -- | 1 | -- | -- | 1 |
| CO2 | 2 | 2 | -- | 2 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO3 | 2 | 3 | 2 | 1 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO4 | 2 | 3 | 2 | -- | 1 | -- | -- | -- | 2 | -- | -- | 2 |

1-Low, 2-Medium, 3-High

----------**END**----------

**Second Year B. Tech(CS) (Semester – III)**

**25UG-EEC1-CS306: Entrepreneurship Management**

| **Teaching Scheme** | **Credits** | **Examination Scheme** |
|---|---|---|
| **Lectures :** 02 Hrs / Week | 02 | **ISA:** 25 Marks |

Course Description:

This course introduces students to Entrepreneurship Management, focusing on starting and managing small businesses. Topics include characteristics of successful entrepreneurs, the role of small-scale industries in economic development, institutional support, business planning, feasibility studies, and forms of industrial ownership. Practical and theoretical insights prepare students for entrepreneurial challenges and opportunities.

| **Prerequisites:** | **1.** Communication Skills |
|---|---|

**Course Objectives:**

1. Understand the characteristics, qualities, and functions of an entrepreneur.
2. Analyze the role of Small Scale Industries (SSIs) in economic development.
3. Identify and evaluate various sources of institutional support for SSIs.
4. Develop a comprehensive project report, including feasibility studies and planning.

**Course Outcomes:**

| **COs** | **At the end of successful completion of the course the student will be able to** | **Blooms Taxonomy** |
|---|---|---|
| **CO1** | Recall the characteristics, qualities, and functions of an entrepreneur. | **Remember** |
| **CO2** | Understand the role of Small Scale Industries (SSIs) and their impact on economic development. | **Understand** |
| **CO3** | Identify and compare various sources of institutional support available for SSIs. | **Analyze** |
| **CO4** | Develop comprehensive project reports including feasibility studies and detailed planning. | **Apply** |
| **CO5** | Examine and compare different forms of industrial ownership, identifying their advantages and disadvantages. | **Analyze** |

**Course Contents**

| **Unit-I** | **Entrepreneurship** | **06 Hours** |
|---|---|---|

Characteristics of Entrepreneur, Qualities of an Entrepreneur, Functions of an Entrepreneur ,Types of Entrepreneur Development of Entrepreneurship, Stages in Entrepreneurial Process, Role of Entrepreneur in Economic development, Entrepreneurship in India , Barriers of Entrepreneurship, Women Entrepreneurs

| **Unit-II** | **Small Scale Industry** | **06 Hours** |
|---|---|---|

Objectives of SSIs, Scope of SSIS, Role of SSI in Economic Development, Advantages of SSIs, Steps to Start a SSI, Government Policy towards SSI, World Trade Organisation (WTO), All India Institutions, State Level Institutions, Fund-Based Institutions, Ancillary Industry and Tiny Industry, Ancillary Industry

| **Unit-III** | **Institutional Support** | **06 Hours** |
|---|---|---|

Institutions to assist SSI, State Small Industries Development Corporation (SSIDC),Small Scale Industries Board (SSIB), District Industries Centers (DICs) / Single Window Concept, Technical Consultancy Organizations (TCOs), Small Industries Service Institutes (SISIs), Industrial Credit and Investment Corporation of India Ltd. (ICICI), National Small Industries Corporation (NSIC),Small Industries Development Organization(SIDO), Industrial Development Bank of India (IDBI)

| Unit-IV | Preparation of Project | 07 Hours |
|---|---|---|
| Project Identification, Project Selection, Project report-Need and Significance, Contents of Project Report, Project Formulation, Specimen of a Project Report | | |
| **Unit-V** | **Business Opportunities** | **07 Hours** |
| Identification of Business Opportunities, Sources of Business Ideas, Market Feasibility Study, Technical Feasibility Study, Financial Feasibility Study, Social Feasibility Study | | |
| **Unit-VI** | **Industrial Ownership** | **07 Hours** |
| Sole proprietorship, Advantages of Sole Proprietorship, Disadvantages of Sole Proprietorship, Definition and Meaning of Partnership, Characteristics of Partnership, Kinds of Partners, Partnership Agreement or Partnership Deed, Registration of Partnership Firm, Rights, Duties and Liabilities of Partners. | | |

| Course delivery methods | Assessment methods |
|---|---|
| 1. Black Board Teaching<br>2. Power Point Presentation | 1. Internal Assessment<br>2. Assignment<br>3. Quiz |

| Text Books |
|---|
| 1. Management and Entrepreneurship N.V.R. Naidu, T Krishna Rao |
| **Reference Books** |
| 1. Entrepreneurship Development and Small Business Enterprises - Poornima M. Charantimath, Pearson<br>2. Small Scale Industries in India: Problems and Prospects - B.S. Bodla, Sultan Chand & Sons |

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | -- | 1 | -- | -- | -- | -- | -- | 1 | -- | -- | 1 |
| CO2 | 2 | 2 | -- | 2 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO3 | 2 | 3 | 2 | 1 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO4 | 2 | 3 | 2 | -- | 1 | -- | -- | -- | 2 | -- | -- | 2 |

1-Low, 2-Medium, 3-High

----------**END**----------

## Second Year B. Tech(CS) (Semester – III)

## 25UG-VEC1-CS307: Professional Ethics & Human Values

| Teaching Scheme | Credits | Examination Scheme |
|---|---|---|
| **Lectures :** 02 Hrs / Week | 02 | **ISA:** 25 Marks |

**Course Description:**

To inculcate moral, ethical, and social values in future professionals.

**Prerequisites:**

**Course Objectives:**

1. To inculcate moral, ethical, and social values in future professionals.
2. To sensitize students towards human values and ethics in professional and personal life.
3. To develop an understanding of ethical decision-making in the context of cybersecurity.

**Course Outcomes:**

| COs | At the end of successful completion of the course the student will be able to | Blooms Taxonomy |
|---|---|---|
| CO1 | Understand the importance of ethics and human values in professional life. | Understand |
| CO2 | Analyze ethical dilemmas and apply frameworks to make sound decisions. | Analyze |
| CO3 | Appreciate cultural, societal, and global responsibilities of a cybersecurity engineer. | Apply |
| CO4 | Practice ethical behavior and communication in personal and professional domains. | Analyze |

**Course Contents**

| Unit-I | Introduction to Ethics and Values | 06 Hours |
|---|---|---|
| Definition and types of values, Ethics: Meaning, nature, and scope, Human values vs. Professional ethics. | | |
| **Unit-II** | **Moral Development and Ethical Theories** | **06 Hours** |
| Kohlberg's theory of moral development, Utilitarianism, Deontology, Virtue ethics, Application to cyber ethics. | | |
| **Unit-III** | **Engineering and Professional Ethics** | **06 Hours** |
| Responsibilities of a cybersecurity professional, Professional conduct, loyalty, and accountability, IEEE/ACM Code of Ethics. | | |
| **Unit-IV** | **Social Responsibility and Ethics in Tech** | **07 Hours** |
| Impact of technology on society and environment, Ethical challenges in AI, cybersecurity, and surveillance, Whistleblowing and intellectual honesty. | | |
| **Unit-V** | **Ethical Decision-Making and Case Studies** | **07 Hours** |
| Framework for ethical analysis, Real-world case studies: Edward Snowden, Facebook–Cambridge Analytica, Ethics in workplace behavior and communication. | | |
| **Unit-VI** | **Conflict Resolution and Ethical Leadership** | **07 Hours** |

| |
|---|
| Conflict of interest and ethical dilemmas, Building ethical organizations, Role of empathy and compassion in leadership. |

| Course delivery methods | Assessment methods |
|---|---|
| 1. Black Board Teaching<br>2. Power Point Presentation | 1. Internal Assessment<br>2. Assignment<br>3. Quiz |

| Text Books |
|---|
| 1. R.R. Gaur, R. Sangal, G.P. Bagaria – A Foundation Course in Human Values and Professional Ethics, Excel Books.<br>2. Govindarajan M., Natarajan S., Senthil Kumar V.S. – Engineering Ethics, Prentice Hall of India. |
| **Govindarajan M., Natarajan S., Senthil Kumar V.S. – Engineering Ethics, Prentice Hall of India.** |
| 1. Mike Martin, Roland Schinzinger – Ethics in Engineering, McGraw Hill.<br>**2.** Deborah Johnson – Computer Ethics, Pearson Education. |

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | -- | 1 | -- | -- | 3 | -- | -- | 1 | -- | -- | 1 |
| CO2 | 2 | 2 | -- | 2 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO3 | 2 | 3 | 2 | 1 | 2 | -- | -- | -- | -- | -- | -- | 1 |
| CO4 | 2 | 3 | 2 | -- | 1 | -- | -- | 2 | 3 | 2 | -- | 2 |

1-Low, 2-Medium, 3-High

**----------END----------**

**Second Year B. Tech(CS) (Semester – III)**

**25UG-CEP-CS308: Field Project**

| **Teaching Scheme** | **Credits** | **Examination Scheme** |
|---|---|---|
| **Lectures :** 01 Hrs / Week<br>**Practical:** 2 Hrs/Week | 03 | **ISA:** 50 Marks |

Course Description:

The Field Project aims to expose students to real-world applications of computer science by solving practical problems in industry, academia, or community settings. Students will engage in collaborative, interdisciplinary work to apply technical, analytical, and communication skills for solving real-life problems.

| **Prerequisites:** | Basic Programming Knowledge (C/C++) |
|---|---|

**Course Objectives:**

1. Understand students to real-life technical or social challenges and environments.
2. Apply foundational computing knowledge to solve actual problems.
3. Analyse teamwork, communication, documentation, and presentation skills.
4. Understand innovation, critical thinking, and social responsibility through hands-on experience.

**Course Outcomes:**

| **COs** | **At the end of successful completion of the course the student will be able to** | **Blooms Taxonomy** |
|---|---|---|
| **CO1** | Identify and define real-world problems relevant to computing. | **Understand** |
| **CO2** | Design feasible solutions using computing techniques. | **Apply** |
| **CO3** | Develop a prototype or system in a team environment. | **Apply** |
| **CO4** | Demonstrate communication and project documentation skills. | **Analyze** |

**Course Contents**

| Course Contents | | |
|---|---|---|
| **Activity** | Content | **Bloom,s Taxonomy** |
| **Activity 1** | Identifying the area of Field Project : Students must choose the area to solve different kinds of problems | Understand |
| **Activity 2** | Problem Identification : Students must identity the problem to solve from chosen area. | Understand |
| **Activity 3** | Visit to Field : Students must visit the chosen area. | Apply |
| **Activity 4** | First Presentation : Student must present the identified problem statement (Synopsis) | Apply |
| **Activity 5** | Requirement Analysis : Students must analyse the requirement for identified problem | Analysis |
| **Activity 6** | Second Presentation: Student must present on Field Project | Apply |
| **Activity 7** | Design the modules for field project. (Flowchart and Algorithms) | Apply |
| **Activity 8** | Report Preparation and Final Presentation : Student Must Present their field work in front of panel of examiner | Understand |

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