



UNITED INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

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Periyanaickenpalayam, Coimbatore – 641020



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING **(CYBER SECURITY)**

QUESTION BANK

II YEAR

EVEN SEMESTER

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INDEX

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Prepared by

Verified by

Recommended by

Approved by

PRINCIPAL

24CBPC401- CYBER SECURITY

UNIT I

INTRODUCTION

Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.

Q.No	Question	CO	BTL	Marks
PART-A				
1	What is Phishing?	1	UN	2
2	What is the CIA triangle?	1	UN	2
3	How does Cybercrime affect businesses?	1	UN	2
4	Define Availability.	1	RE	2
5	List the elements of Cyber Crime.	1	RE	2
6	Why do Cyber Criminals commit Identity Theft?	1	UN	2
7	How do Cyber Criminals use the Dark Web?	1	UN	2
8	Mention the deepfake tools.	1	RE	2
9	How does Cyber Law deal with Cyber Espionage or Cyber Warfare?	1	UN	2
10	What is Phishing?	1	UN	2

PART-B				
1	Discuss the provisions of the Indian IT Act 2000. How does the IT Act address cybercrimes such as hacking, identity theft, and cyber terrorism?	1	UN	16
2	Explain the Classification of Cyber Crime with an example.	1	UN	16
3	Discuss the cybercrime and punishment according to Indian Act.	1	UN	16
4	Explain the importance of regular software updates in preventing Cyber Attacks.	1	UN	16
5	Analyse the Global Perspective on Cyber Crime with suitable example.	1	AN	16
6	Compare and Analyze the different types of Cyber Criminals.	1	AN	16

UNIT II

ATTACKS AND COUNTERMEASURES

OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks – Security Breach – Types of Malicious Attacks – Malicious Software – Common Attack Vectors – Social engineering Attack – Wireless Network Attack – Web Application Attack – Attack Tools – Countermeasures

Q.No	Question	CO	BTL	Marks
PART-A				
1	What is OSWAP and list their roles?	2	UN	2
2	What is a security breach?	2	UN	2
3	What is malicious software?	2	UN	2
4	Define attack vector in cybersecurity.	2	RE	2
5	What is a social engineering attack?	2	UN	2
6	Define wireless network attack.	2	RE	2
7	What is a web application attack? Give an example.	2	UN	2
8	Define vulnerability and give a few examples.	2	RE	2
9	What is a Distributed Denial-of-Service (DDoS) attack?	2	UN	2
10	What is OSWAP and list their roles?	2	UN	2
PART-B				
1	Explain the OSWAP and its role in detail.	2	UN	16
2	Discuss the different types of malicious attacks and their impact with suitable example.	2	UN	16

3	Explain the common causes of security breaches, and how can they be prevented.	2	UN	16
4	Elaborate the malicious software and its types.	2	UN	16
5	Discuss about the common attack vectors with suitable example.	2	UN	16
6	Explain in detailed notes on social engineering attack with real world example.	2	UN	16

UNIT III

RECONNAISSANCE

Harvester – Whois – Netcraft – Host – Extracting Information from DNS – Extracting Information from E-mail Servers – Social Engineering Reconnaissance; Scanning – Port Scanning – Network Scanning and Vulnerability Scanning – Scanning Methodology – Ping

Sweeper Techniques – Nmap Command Switches – SYN – Stealth – XMAS – NULL – IDLE – FIN Scans – Banner Grabbing and OS Fingerprinting Techniques.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define harvester.	3	RE	2
2	Define Whois.	3	RE	2
3	State the Netcraft.	3	RE	2
4	Mention the purpose of using the Host command in network reconnaissance.	3	RE	2
5	How can the information be extracted from DNS?	3	UN	2
6	What is the process of extracting information from email servers during a reconnaissance attack?	3	UN	2
7	Define IDLE scan.	3	RE	2
8	What is the purpose of port scanning?	3	UN	2
9	Mention the scanning methodology.	3	RE	2
10	List out the Ping Sweep technique.	3	RE	2
PART-B				
1	Distinguish between extracting information from DNS with email servers.	3	AN	16
2	Analyze the different types of scanning and explain in detail.	3	AN	16

3.	Elaborate the Nmap command switches with an example.	3	UN	16
4	Write detailed notes on OS finger printing techniques with real time example.	3	UN	16
5	Elaborate the ping sweer techniques with examples.	3	UN	16
6	Write short notes on scanning methodology and their types.	3	UN	16

UNIT IV

INTRUSION DETECTION

Host -Based Intrusion Detection – Network -Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honey pots – Example System Snort.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define ethical hacking.	4	RE	2
2	What is foot-printing in ethical hacking?	4	UN	2
3	Mention two passive foot printing techniques.	4	RE	2
4	Define network scanning.	4	RE	2
5	List two common enumeration techniques.	4	RE	2
6	Define system hacking.	4	RE	2
7	What is a Trojan horse?	4	UN	2
8	Define packet sniffing.	4	RE	2
9	Mention two tools used for sniffing network traffic	4	RE	2
10	What is email tracking in cyber investigations?	4	UN	2
PART-B				

1	Write short notes on Host Based Intrusion Detection.	4	UN	16
2	Discuss in detail about the NBID.	4	UN	16
3	Explain the Intrusion Detection exchange format with suitable example.	4	UN	16
4	Describe Snort as an intrusion detection system. How does it help in identifying and preventing security threats in a network?	4	UN	16
5	Explain the different types of Honey pots and their roles in cybersecurity.	4	UN	16
6	How does Snort detect intrusions? Explain how Snort uses signatures and rules to identify malicious activities?	4	UN	16

UNIT V

INTRUSION PREVENTION

Firewalls and Intrusion Prevention Systems: Need for Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Basing – Firewall Location and Configurations – Intrusion Prevention Systems – Example Unified Threat Management Products.

Q.No	Question	CO	BTL	Marks
PART-A				
1	State the need of firewalls.	5	RE	2
2	Define firewall.	5	RE	2
3	What is an access policy in firewalls?	5	UN	2
4	List the types of firewalls.	5	RE	2
5	State the concept of Firewall Basing.	5	RE	2
6	What are the different locations where a firewall can be configured in a network?	5	UN	2
7	What is an Intrusion Prevention System (IPS)? Give example.	5	UN	2
8	What is the Unified Threat Management?	5	UN	2
9	How do firewalls help in preventing unauthorized access to a network?	5	UN	2
10	What is the role of a firewall in managing traffic flow within a network?	5	UN	2
PART-B				

1	Analyze the importance of firewall.	5	AN	16
2	Describe the different types of firewalls with an example and write their advantages.	5	UN	16
3	Explain the key characteristics of firewalls in detail.	5	UN	16
4	Explain the concept of an access policy in a firewall. Why is it important to define access policies in cyber security?	5	UN	16
5	Elaborate the firewall location and configure it.	5	UN	16
6	Analyze the importance of Intrusion Prevention Systems (IPS) with an example.	5	AN	16

24CBPC402
OPERATING SYSTEMS WITH SECURITY

UNIT I

OPERATING SYSTEM OVERVIEW

Computer-System Organization – Architecture – Operating-System Operations – Resource Management– Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – SystemCalls–System Services–Why Applications Are Operating System Specific–Operating-System Design and Implementation-Operating-System Structure– Building and Booting an Operating System

Q.No	Question	CO	BTL	Marks
PART A				
1	What is computer system architecture?	1	RE	2
2	How does system architecture affect operating system design?	1	UN	2
3	What are the main operations performed by an operating system?	1	RE	2
4	How do operating-system operations manage hardware and software resources?	1	UN	2
5	Define resource management in an operating system.	1	RE	2
6	How does an operating system allocate CPU and memory resources among processes?	1	UN	2
7	What is the purpose of security and protection in an operating system?	1	RE	2
8	How does an operating system enforce access control to protect resources?	1	UN	2
9	What is a distributed system?	1	RE	2
10	How do distributed operating systems manage resources across multiple machines?	1	UN	2
PART B				

1	Explain the key components of computer system architecture and how they influence operating system design.	1	UN	16
2	Apply operating system operations and resource management strategies to a multi-user environment to optimize CPU and memory utilization.	1	AP	16
3	Analyze the mechanisms used by operating systems to ensure security and protection, and evaluate how distributed operating systems manage resources and security across multiple nodes.	1	AN	16
4	Apply knowledge of kernel data structures and OS services to explain how system calls manage processes, memory, and I/O in an operating system.	1	AP	16
5	Explain the role of system calls and system services, and why applications are often specific to a particular operating system.	1	UN	16
6	Analyze the design and structure of an operating system and assess the steps involved in building and booting an operating system.	1	AN	16

UNIT II

PROCESS MANAGEMENT

Process Concept –Process Scheduling –Operation on Processes, Inter-process Communication –Threads –Overview–Multithreading models –Threading issues;CPU Scheduling –Scheduling criteria, Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery

Q.No	Question	CO	BTL	Marks
PART A				
1	What is a process in operating systems?	2	RE	2
2	How does a process differ from a program?	2	UN	2
3	Define process scheduling.	2	RE	2
4	Why is process scheduling important in a multi-tasking system?	2	UN	2
5	What is inter-process communication (IPC)?	2	RE	2
6	How do threads improve the performance of a multi-threaded application?	2	UN	2
7	List any two CPU scheduling criteria.	2	RE	2
8	How does the choice of a CPU scheduling algorithm affect system performance?	2	UN	2
9	What is the critical-section problem?	2	RE	2
10	How do mutex locks and semaphores prevent race conditions?	2	UN	2

PART B				
1	Explain the concept of a process, its life cycle, and the various operations that can be performed on processes.	2	UN	16
2	Apply different CPU scheduling algorithm to a given set of processes and determine average waiting time and turnaround time.	2	AP	16
3	Analyze the need for inter-process communication and multithreading, comparing different threading models and addressing common threading issues.	2	AN	16
4	Apply synchronization mechanisms such as mutex locks, semaphores, critical regions, and monitors to solve the critical-section problem in a multi-threaded environment.	2	AP	16
5	Explain the system model, characterize deadlocks, and outline the necessary conditions for a deadlock to occur.	2	UN	16
6	Analyze different deadlock handling techniques, including prevention, avoidance, detection, and recovery, with suitable examples.	2	AN	16

UNIT III

MEMORY MANAGEMENT AND FILE SYSTEMS

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management

Q.No	Question	CO	BTL	Marks
PART A				
1	Define main memory.	3	RE	2
2	What is swapping in memory management?	3	RE	2
3	What is meant by contiguous memory allocation?	3	RE	2
4	Differentiate between paging and segmentation.	3	UN	2
5	Define virtual memory.	3	RE	2
6	What is meant by demand paging?	3	RE	2
7	What is thrashing?	3	RE	2
8	Why is kernel memory allocation required?	3	UN	2
9	What is HDD scheduling?	3	RE	2
10	List the different file allocation methods.	3	RE	2

PART B				
1	Explain the role of main memory management in an operating system, focusing on swapping and contiguous memory allocation techniques.	3	UN	16
2	Explain the working of paging and segmentation and show how address translation is carried out in each case.	3	UN	16
3	Analyze the virtual memory system with respect to demand paging, page replacement algorithms, page allocation strategies, and the causes and impact of thrashing.	3	AN	16
4	Explain the necessity of allocating kernel memory and examine the methods used for kernel memory allocation.	3	UN	16
5	Explain various HDD scheduling algorithms and compare their performance in a mass storage system.	3	UN	16
6	Analyze file system organization covering file concepts, access methods, directory structures, sharing and protection, directory implementation, allocation methods, and free space management.	3	AN	16

UNIT IV

VIRTUAL MACHINES AND SECURITY IN OPERATING SYSTEMS

Virtual Machines – History, Building Blocks, Types of Virtual Machines and their Implementations, UNIX Security – UNIX Protection System – UNIX Authorization – UNIX Security Analysis – UNIX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization – Windows Security Analysis – Windows Vulnerabilities – Introduction to Security Kernels

Q.No	Question	CO	BTL	Marks
PART A				
1	Define a virtual machine.	4	RE	2
2	What are the building blocks of a virtual machine?	4	RE	2
3	What are the different types of virtual machines?	4	RE	2
4	What is the UNIX protection system?	4	RE	2
5	What is meant by UNIX authorization?	4	RE	2
6	What is UNIX security analysis?	4	RE	2
7	What are UNIX vulnerabilities?	4	RE	2
8	What is the Windows protection system?	4	RE	2
9	What is meant by Windows authorization?	4	RE	2
10	What is a security kernel?	4	RE	2

PART B				
1	Explain the history and evolution of virtual machines, and describe the main building blocks of a virtual machine.	4	UN	16
2	Compare and contrast the different types of virtual machines and their implementations with suitable examples.	4	AP	16
3	Analyze the concept of UNIX security, including protection systems and authorization mechanisms, and evaluate its effectiveness against common vulnerabilities.	4	AN	16
4	Compare UNIX and Windows security in terms of protection systems, authorization mechanisms, and security analysis.	4	AP	16
5	Examine Windows vulnerabilities and assess the security measures used to prevent attacks.	4	AN	16
6	Explain the concept of security kernels and analyze their role in providing trusted computing and system security.	4	UN	16

UNIT V

SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS

Security Goals– Trust and Threat Model – Access Control Fundamentals –Protection System –Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning’s Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – ClarkWilson Integrity

Q.No	Question	CO	BTL	Marks
PART A				
1	Define security goals in operating systems.	5	RE	2
2	What is a trust and threat model?	5	RE	2
3	Define access control and its fundamental principles.	5	RE	2
4	What is a protection system in an OS?	5	RE	2
5	What is a reference monitor and its function?	5	RE	2
6	Define a secure operating system.	5	RE	2
7	What is information flow in security systems?	5	RE	2
8	Define Bell-LaPadula model	5	RE	2
9	Define Biba integrity model	5	RE	2
10	What is the Clark-Wilson integrity model?	5	RE	2

PART B				
1	Explain the fundamental security goals of an operating system and explain the trust and threat model with examples.	5	UN	16
2	Explain access control fundamentals and the role of protection systems and reference monitors in enforcing security.	5	UN	16
3	Explain a secure operating system and explain the assessment criteria used to evaluate its security.	5	UN	16
4	Analyze information flow in secure systems and discuss information flow secrecy models, including Denning's lattice model and Bell-LaPadula model.	5	AN	16
5	Examine information flow integrity models, including Biba integrity model, low-water mark integrity, and Clark-Wilson integrity, and compare their approaches to maintaining data integrity.	5	AN	16
6	Apply different integrity and secrecy models in operating system security and discuss their applicability in modern secure systems.	5	AP	16

24CBPC403 - DATABASE DESIGN WITH SECURITY

UNIT I

INTRODUCTION TO DATABASE AND RELATIONAL DATABASES

Introduction to Databases-Conceptual Model-Conceptual Design using ERD - Entity, Weak Entity- Relationships, Attributes and Keys, Roles and Constraints- Relational Model, Constraints and Database Schema -Data Models – Relational Data Models – Relational Algebra – Mapping ER Models to Relations.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define a database.	1	RE	2
2	What is the purpose of a conceptual model in database design.	1	RE	2
3	State what is meant by an entity.	1	RE	2
4	Identify the role of a primary key in a relation.	1	RE	2
5	Explain why weak entities require identifying relationships.	1	UN	2
6	Explain the role of attributes in an ER diagram.	1	UN	2
7	Define relational model.	1	RE	2
8	Explain database schema with an example.	1	UN	2
9	List out the relational algebra operations.	1	RE	2
10	Explain the need for mapping ER models to relational tables.	1	UN	2

PART-B				
1	Explain the components of the ER model with suitable examples.	1	UN	16
2	Describe conceptual database design with the help of ER diagrams.	1	UN	16
3	Discuss the relational model along with its integrity constraints.	1	UN	16
4	Illustrate the various data models used in database systems with examples.	1	UN	16
5	Design an ER diagram for a real-world application (University Course Registration System) and convert it into a relational schema.	1	AP	16
6	Apply appropriate relational algebra operations on real-world database application. Demonstrate the use of selection, projection, union, set difference, Cartesian product, join, and division operations.	1	AP	16

UNIT II

DATABASE DESIGN

Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define functional dependency.	2	RE	2
2	What is non-loss decomposition?	2	RE	2
3	What is the First Normal Form (1NF)?	2	RE	2
4	What is the Second Normal Form(2NF)?	2	RE	2
5	What is Boyce-Codd Normal Form(BCNF)?	2	RE	2
6	What is a multi-valued dependency?	2	RE	2
7	Define Fifth Normal Form (5NF).	2	RE	2
8	Differentiate between multi valued dependency and join dependency.	2	UN	2
9	What is dependency preservation in normalization?	2	RE	2
10	How normalization reduces redundancy?	2	RE	2

PART – B				
1	Describe functional dependencies with appropriate examples.	2	UN	16
2	Discuss dependency preservation and non-loss decomposition in database design.	2	UN	16
3	What is the need for Normalization? Outline first normal form, second normal form and third normal form with an example	2	UN	16
4	Discuss briefly about Boyce-Codd normal form and Fourth Normal Form.	2	UN	16
5	Analyze how multivalued dependencies affect database design and normalization.	2	AN	16
6	Discover the difference between multivalued dependency and join dependency with suitable examples.	2	AN	16

UNIT III

TRANSACTION MANAGEMENT

Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels
 Precedence graphs - Concurrency Control – Need for Concurrency – Lock-Based Protocols –
 Deadlock Handling – Recovery System – Failure Classification – Recovery Algorithm.

Q.No	Question	CO	BTL	Marks
PART-A				
1	What is a transaction in a database?	3	RE	2
2	Define ACID properties	3	RE	2
3	What is serializability?	3	RE	2
4	What is a transaction isolation level?	3	RE	2
5	Why is concurrency control needed?	3	RE	2
6	What is a lock in a database?	3	RE	2
7	What is failure classification in a recovery system?	3	RE	2
8	Define deadlock in a database.	3	RE	2
9	State the types of failures in DBMS.	3	RE	2
10	What is Recovery algorithm?	3	RE	2

PART-B				
1	Explain Transaction Concepts and the importance of ACID properties in database systems.	3	UN	16
2	Describe concurrency control and lock-based protocols used in databases.	3	UN	16
3	Illustrate serializability and its types with suitable examples.	3	UN	16
4	Discuss in detail about Deadlock Avoidance, deadlock detection and deadlock prevention in database system.	3	UN	16
5	Analyze different types of failures in a database system and examine how recovery systems and recovery algorithms handle each failure.	3	AN	16
6	Examine recovery systems and recovery algorithms for handling database failures.	3	AN	16

UNIT IV

SQL AND DATABASE SECURITY

Introduction to SQL and SQL Data Definition- Primary Data Types and Advanced Data Types like CLOB, BLOB- Specifying Constraints in SQL - Basic Retrieval Queries, Insert, Delete, Update and Schema Change Statements in SQL - Advanced SQL Queries, Specifying General Constraints - Additional Features of SQL - classification of SQL and PL/ SQL. Need for database security – SQL Injection Attacks – The Injection Technique – SQL Attack Avenues and Types

Q.No	Question	CO	BTL	Marks
PART-A				
1	Why is database security important?	4	UN	2
2	What are the features of SQL?	4	UN	2
3	What is the injection technique in SQLi?	4	UN	2
4	Differentiate between SQL and PL/SQL.	4	UN	2
5	List out the types of SQL injection attacks.	4	UN	2
6	Define blind SQL injection.	4	RE	2
7	What is an error-based SQL injection?	4	UN	2
8	What is a union-based SQL injection?	4	UN	2
9	List out the SQL Injection Attacks.	4	UN	2
10	List the common avenues of SQL Injection Attacks.	4	UN	2
PART-B				

1	Execute SQL queries to retrieve and manipulate data from database tables.	4	AP	16
2	Implement SQL-based techniques to prevent SQL injection attacks in database systems.	4	AP	16
3	Analyze different types of SQL injection	4	AN	16
4	Examine the security vulnerabilities present in SQL-based systems.	4	AN	16
5	Develop a secure SQL-based application framework to prevent SQL injection attacks.	4	CR	16
6	Design a comprehensive set of security measures to protect a database system.	4	CR	16

UNIT V

ACCESS CONTROL AND ENCRYPTION

Database Access Control – SQL based access definition – Cascading Authorizations – Role- based access control – Inference – Database encryption - Distributed Databases – Data Fragmentation – Replication.

Q.No	Question	CO	BTL	Marks
PART-A				
1	What is database access control?	5	RE	2
2	What is SQL-based access definition?	5	RE	2
3	Define cascading authorizations.	5	RE	2
4	What is role-based access control (RBAC)?	5	RE	2
5	What is inference in database security?	5	RE	2
6	Define role based access control.	5	RE	2
7	What is Database encryption?	5	RE	2
8	Differentiate between Database and Distributed Database.	5	UN	2
9	What is Data Fragmentation?	5	RE	2
10	Define Replication.	5	RE	2
PART-B				

1	Explain databases access control mechanism.	5	UN	16
2	Describe the concept of SQL-based access control with examples.	5	UN	16
3	Implement role-based access control to manage user permissions in a database.	5	AP	16
4	Apply suitable control techniques to prevent inference attacks in a database system.	5	AP	16
5	Examine the role of data encryption and various techniques used in database system.	5	AN	16
6	Analyse fragmentation and replication strategies used in distributed databases.	5	AN	16

24CBPC404

CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

INTRODUCTIONS AND NUMBER THEORY

Computer security concepts-OSI security architecture-Security attacks-Security services
Security mechanism-Model for network security-Classical encryption techniques: substitution techniques, transposition techniques, Rotor machine, Steganography-Prime numbers-Fermat's and Euler's Theorem-Testing for primality-The Chinese remainder theorem

Q.No	Question	CO	BTL	Marks
1	Define confidentiality.	1	RE	2
2	Define integrity.	1	RE	2
3	Define Authentication, Nonrepudiation, Availability and Access control.	1	RE	2
4	Compare active and passive attacks.	1	UN	2
5	List the components involved in network security (i.e. Model for network security).	1	RE	2
6	What do you mean by substitutional technique?	1	RE	2
7	Differentiate block cipher and stream cipher.	1	UN	2
8	Connect the given text "anna university" into cipher text using Rail fence technique.	1	UN	2
9	State Fermat's theorem.	1	RE	2
10	Define Euler's totient function.	1	RE	2

PART-B

1	Explain OSI security architecture model with a neat diagram.	1	AN	16
2	Discuss the rules to be followed in the Playfair method. Encrypt the word “Network security” with the keyword “crypto” using the Playfair method.	1	AP	16
3	(i) Describe the various security mechanisms. (ii) Explain the cease cipher and monoalphabetic cipher	1	AN	8 8
4	Describe (i) Playfair Cipher (ii) Rail fence Cipher (iii) Vignere.	1	AN	16
5	Perform encryption and decryption using Hill cipher for the following: Message PEN and key ACTIVATED.	1	AP	16
6	Explain the network security model and its important parameters with a neat block diagram.	1	AN	16

UNIT II

BLOCK CIPHERS AND ENCRYPTION STANDARDS

Block cipher and Data Encryption Standard–Advanced Encryption Standards: Finite field arithmetic–AES structure–AES transformation functions–AES key expansion–AES implementation–Block cipher operation: Multiple Encryption and triple DES–Electronic Codebook–Cipher Block Chaining Mode–Cipher Feedback Mode–Output Feedback Mode Counter Mode–Pseudorandom Number Generation–Stream cipher–RC4.

PART-A

Q.No	Question	CO	BTL	Marks
1	Give the 5 modes of operations of block cipher.	2	RE	2
2	Compare DES and AES.	2	UN	2
3	Define a finite field?	2	RE	2
4	List the 4 different stages of AES.	2	RE	2
5	State one weakness of RC4.	2	RE	2
6	Difference between a block cipher and a stream cipher?	2	UN	2
7	List the key sizes supported by AES.	2	UN	2
8	What is the purpose of Sub Bytes transformation?	2	UN	2
9	Name the two algorithms used in RC4.	2	RE	2
10	What is an Initialization Vector (IV)?	2	UN	2

PART-B

1	Explain the Explain the Advanced Encryption Standard (AES) algorithm with neat diagram. Describe its structure, transformation functions and key expansion process.	2	AN	16
2	Describe the DES algorithm with neat diagram and the steps	2	AN	16
3	Explain different block cipher modes of operation: Electronic Codebook (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB) and Counter (CTR) modes with diagrams.	2	AN	16
4	Explain the key generation, encryption and decryption of SDES algorithm in detail	2	AN	16
5	Explain about the RC4 algorithm with a neat diagram?	2	AN	16
6	Explain finite field arithmetic used in AES. Describe addition and multiplication operations in GF(2).	2	UN	16

UNIT III
PUBLIC KEY CRYPTOGRAPHY

Public key cryptography: Principles of public key cryptosystems-The RSA algorithm Diffie Hellman Key exchange-ElGamal cryptosystem- Elliptic curve arithmetic-Elliptic curve cryptography-Pseudorandom Number Generation Based on an Asymmetric Cipher.

PART-A

Q.No	Question	CO	BTL	Marks
1	Define public key cryptography.	3	RE	2
2	What is meant by public key and private key?	3	RE	2
3	Name the mathematical problem on which RSA is based.	3	RE	2
4	What is the role of Euler's totient function in RSA?	3	UN	2
5	Define Diffie-Hellman key exchange.	3	RE	2
6	What is the discrete logarithm problem?	3	RE	2
7	What is ElGamal cryptosystem?	3	RE	2
8	Write the general equation of an elliptic curve used in cryptography.	3	RE	2
9	What is point addition in elliptic curve arithmetic?	3	UN	2
10	What is pseudorandom number generation based on asymmetric cipher?	3	UN	2

PART-B

1	Explain the principles of public key cryptosystems with suitable examples.	3	UN	16
2	Explain the RSA algorithm with key generation, encryption and decryption processes.	3	AP	16
3	Explain Elliptic Curve Cryptography (ECC) and discuss why it is preferred over conventional public key cryptosystems.	3	UN	16
4	Explain the Diffie–Hellman key exchange algorithm with a neat diagram and working steps.	3	AP	16
5	Given prime number $q=17$, Primitive root $a=6$, private key of A, $X_A=5$, message $m=13$, random number $k=10$. Perform encryption & decryption using Elgamal cryptosystem	3	AN	16
6	Analyze the differences between RSA and Elliptic Curve Cryptography (ECC) in terms of key size, computational efficiency and security strength.	3	AN	16

UNIT IV

MESSAGE AUTHENTICATION AND DIGITAL SIGNATURES

Cryptographic Hash Functions-Message Authentication Code-Digital signature-Key management and distribution-user authentication.

PART-A

Q.No	Question	CO	BTL	Marks
1	Define a cryptographic hash function.	4	RE	2
2	State any two properties of a secure hash function.	4	RE	2
3	What is Message Authentication Code (MAC)?	4	RE	2
4	Differentiate between hash function and MAC.	4	UN	2
5	What is a digital signature?	4	RE	2
6	What is key management?	4	RE	2
7	What is meant by key distribution?	4	RE	2
8	Mention any two applications of digital signatures.	4	UN	2
9	Define user authentication.	4	RE	2
10	What is two-factor authentication?	4	UN	2

PART-B

1	Explain cryptographic hash functions and discuss their security properties and applications.	4	UN	16
2	Explain the construction and working of Message Authentication Code (MAC) with a suitable example.	4	AP	16
3	Explain digital signatures and describe how they provide authentication, integrity and non-repudiation.	4	UN	16
4	Compare cryptographic hash functions and Message Authentication Codes (MAC) with respect to purpose and security.	4	AN	16
5	Explain key management and key distribution techniques used in cryptographic systems.	4	AP	16
6	Analyze different user authentication techniques and discuss their strengths and weaknesses.	4	AN	16

UNIT V

NETWORK AND INTERNET SECURITY

Transport level security-Wireless network security-Electronic Mail security: PGP, S/MIME–IP security–Intruders–Malicious software–Firewalls.

PART-A

Q.No	Question	CO	BTL	Marks
1	What is Transport Layer Security (TLS)?	5	RE	2
2	State any two security services provided by TLS.	5	RE	2
3	What is wireless network security?	5	RE	2
4	Mention any two threats in wireless networks.	5	RE	2
5	Explain the concept of Pretty Good Privacy (PGP) and how it is used to secure email communication.	5	UN	2
6	Describe S/MIME and explain its role in providing secure electronic mail services.	5	UN	2
7	Explain the purpose of IP security (IPsec).	5	UN	2
8	What is an intruder in computer security?	5	RE	2
9	Explain malicious software (malware).	5	UN	2
10	What is a firewall?	5	RE	2

PART-B

1	Explain the Transport Layer Security (TLS) protocol and describe the TLS handshake process.	5	UN	16
2	Explain wireless network security mechanisms and discuss the security issues in wireless networks.	5	AP	16
3	Explain IP security (IPsec) architecture and describe AH and ESP protocols with suitable diagrams.	5	AP	16
4	Explain electronic mail security and describe the working principles of PGP and S/MIME.	5	UN	16
5	Analyze different types of intruders and malicious software and discuss their impact on system security.	5	AN	16
6	Analyze firewall technologies and compare different types of firewalls used in network security.	5	AN	16

24CBPC405 WEB TECHNOLOGY

UNIT I

WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP
Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls – CSS3 –
Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define WWW.	1	RE	2
2	What is HTTP?	1	RE	2
3	List any two web clients.	1	RE	2
4	What is HTML5?	1	RE	2
5	State the purpose of CSS.	1	RE	2
6	Explain HTTP request message.	1	UN	2
7	Explain HTTP response message.	1	UN	2
8	Differentiate web client and web server.	1	UN	2
9.	Explain CSS inheritance.	1	UN	2
10	Explain Bootstrap framework.	1	UN	2

PART-B				
1	Explain the architecture of WWW and HTTP request–response cycle with diagram.	1	UN	16
2	Discuss HTML5 features and control elements with suitable examples.	1	UN	16
3	Explain CSS3 concepts such as cascading, inheritance, transformations and animations.	1	UN	16
4	Analyze the role of Bootstrap framework in responsive web design.	1	AN	16
5	Explain client–server communication in web applications.	1	UN	16
6	Design a sample webpage using HTML5 and CSS3 concepts.	1	AP	8

UNIT II

CLIENT SIDE PROGRAMMING

Java script: An introduction to Java Script – Java Script DOM Model – Exception Handling – Validation Built in objects – Event Handling – DHTML with Java Script – JSON introduction – Syntax – Function Files.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define JavaScript.	2	RE	2
2	What is DOM?	2	RE	2
3	List any two built-in objects in JavaScript.	2	RE	2
4	What is JSON?	2	RE	2
5	Define event handling.	2	RE	2
6	Explain JavaScript validation.	2	UN	2
7	Explain DOM model.	2	UN	2
8	Explain exception handling in JavaScript.	2	UN	2
9	Explain DHTML.	2	UN	2
10	Explain JSON syntax.	2	UN	2

PART-B				
1	Explain JavaScript architecture and execution model.	2	UN	16
2	Discuss JavaScript DOM model and event handling with examples.	2	UN	16
3	Explain form validation techniques using JavaScript.	2	AP	16
4	Illustrate the use of DHTML in creating a dynamic web page by applying its features.	2	AP	16
5	Explain exception handling and built-in objects in JavaScript.	2	UN	16
6	Explain JSON syntax and its role in web applications.	2	UN	16

UNIT III

SERVER SIDE PROGRAMMING

Servlets – Java Script Architecture – Servlet Life Cycle – Form GET and POST actions – SessionHandling – Understanding Cookies – Database Connectivity: JDBS - **PHP:** Declaring Variables, Datatypes, Operators, Control structures, Functions, Creating a simple web page using PHP.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define servlet.	3	RE	2
2	List servlet life cycle methods.	3	RE	2
3	What is GET method?	3	RE	2
4	What is POST method?	3	RE	2
5	Define cookies.	3	RE	2
6	Explain servlet life cycle.	3	UN	2
7	Differentiate GET and POST.	3	UN	2
8	Explain session handling.	3	UN	2
9	Explain JDBC.	3	UN	2
10	Explain PHP control structures.	3	UN	2

PART-B				
1	Explain Servlets architecture and Servlets life cycle with diagram.	3	UN	16
2	Differentiate GET and POST methods with examples.	3	UN	16
3	Explain session management techniques using cookies and sessions.	3	UN	16
4	Analyze the role of JDBC in database connectivity.	3	AN	16
5	Explain PHP syntax, control structures and functions.	3	UN	16
6	Develop a simple PHP-based dynamic web application.	3	AP	16

UNIT IV

XML AND WEBSERVICES

Representing web data – XML – XML Documents and Vocabularies – XML Namespaces – Transforming XML documents – XPATH – XQUERY – Introduction to AJAX – Web services:

Concepts – Writing java Web Service and Web Service client – WSDL – XML Schema – Introduction to SOAP and REST.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define XML.	4	RE	2
2	What is XML namespace?	4	RE	2
3	Define XPATH.	4	RE	2
4	What is AJAX?	4	RE	2
5	Define SOAP.	4	RE	2
6	Explain XML schema.	4	UN	2
7	Explain XQUERY.	4	UN	2
8	Explain AJAX working.	4	UN	2
9	Explain REST web service.	4	UN	2
10	Explain WSDL.	4	UN	2

PART-B				
1	Explain XML document structure and namespaces with examples.	4	UN	16
2	Discuss XML schema and transformation techniques.	4	UN	16
3	Explain XPATH and XQUERY with examples.	4	UN	8
4	Analyze AJAX working and its advantages.	4	AN	16
5	Explain SOAP and REST web services with comparison.	4	UN	16
6	Design a simple Java-based web service and client.	4	AP	16

UNIT V

WEB SECURITY AND OTHER TECHNOLOGIES

Security Threats: cross site scripting, SQL injection – Two factor authentication – Web application authentication – password based authentication – Authorization fundamentals – Introduction to technologies: JSON, Angular JS, React, Node .JS, JQuery and MangoDB.

Q.No	Question	CO	BTL	Marks
PART-A				
1	Define XSS attack.	5	RE	2
2	What is SQL injection?	5	RE	2
3	Define two factor authentication.	5	RE	2
4	Define authorization.	5	RE	2
5	What is Node.js?	5	RE	2
6	Explain password based authentication.	5	UN	2
7	Explain SQL injection attack.	5	UN	2
8	Explain AngularJS.	5	UN	2
9	Explain React.	5	UN	2
10	Explain MongoDB.	5	UN	2

PART-B				
1	Explain web security threats such as XSS and SQL injection.	5	UN	16
2	Analyze authentication mechanisms used in web applications.	5	AN	16
3	Explain authorization fundamentals and access control models.	5	UN	16
4	Discuss two-factor authentication and its advantages.	5	UN	16
5	Analyze modern web technologies like Angular, React and Node.js.	5	AN	16
6	Explain MongoDB architecture and its use in webapplications	5	UN	16

24ESBS401 ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

UNIT I

ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Environment: Definition, scope and importance of the environment.

Ecosystem: Definition, structure and function of an ecosystem (Forest ecosystem and River ecosystem) – producers, consumers and decomposers - Ecological succession.

Biodiversity: Introduction, Definition and Types – values of biodiversity – threats to biodiversity-habitat loss and poaching of wildlife, case study of man-wildlife conflicts – conservation of biodiversity

Q.No	Question	CO	BTL	Marks
PART A				
1	What is an ecosystem and what are the components of ecosystem?	1	RE	2
2	What are biotic and abiotic components of an ecosystem?	1	RE	2
3	What do you mean natural resources? Give examples.	1	RE	2
4	What are food chains and food webs and give its significance?	1	RE	2
5	Define Ecological succession.	1	RE	2
6	Differentiate between endangered and endemic species.	1	UN	2
7	Define primary succession and secondary succession	1	RE	2
8	Define key stone species with suitable example.	1	RE	2
9	List out the effect of habitat loss on biodiversity.	1	RE	2
10	What are the major causes of man-wildlife conflict?	1	RE	2

PART B				
1	What is an ecosystem? Describe the structure and function of an ecosystem.	1	UN	16
2	Explain the values and threats to the biodiversity	1	UN	16
3	“India is a mega diversity nation”–Discuss.(8) Brief biodiversity hotspots in India(8)	1	UN	16
4	Explain the conservation of biodiversity.	1	UN	16
5	Discuss the endangered and endemic species of India.	1	AN	16
6	Explain the stages in ecological succession using appropriate terminology.	1	UN	16

UNIT II

ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT

Pollution - definition –causes, effects and control measures of (a) air pollution (b) water pollution- Solid and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS)

Q.No	Question	CO	BTL	Marks
PART A				
1	Differentiate between primary and secondary air pollutants.	2	UN	2
2	Define photochemical smog.	2	RE	2
3	What are point and non -point sources of water pollution?	2	RE	2
4	Define e-waste management.	2	RE	2
5	Write the objectives of environmental acts.	2	UN	2
6	Define hazardous waste management.	2	RE	2
7	What are the effects of noise pollution?	2	RE	2
8	Write any two causes and sources of soil pollution.	2	UN	2
9	List out sources of toxic pollutants in water?	2	RE	2
10	Define OHASMS.	2	RE	2

PART B				
1	Describe the role of individual in the prevention of pollution. Explain the sources, effect and control methods of noise pollution.	2	UN	16
2	Demonstrate with a flow sheet and explain the steps involved in Solid waste management.	2	AN	16
3	What is OHASMS? Explain it with any one case study	2	UN	16
4	Write about one of the industrial waste water treatment techniques, support with a neat schematic diagram	2	UN	16
5	Discuss the causes and effects of i)Air pollution ii)Water pollution	2	UN	16
6	Give a comparative account of urban and industrial wastes in terms of their sources, characteristics and management and disposal methods.	2	AN	16

UNIT III

NATURAL RESOURCES

Forest resources-use and over-exploitation, deforestation, Water resources- use and over utilization of surface and ground water, drought, Dams benefits and problems, Food resources-changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, role of an individual in conservation of natural resources

Q.No	Question	CO	BTL	Marks
PART A				
1	Define sustainable forestry	3	RE	2
2	Mention any two causes of over-exploitation of forests	3	RE	2
3	What are the effects of dams on tribal communities?	3	UN	2
4	What is water logging?	3	RE	2
5	Define overgrazing.	3	RE	2
6	What is meant by soil erosion?	3	RE	2
7	What is desertification?	3	RE	2
8	Write any two adverse effects caused by overgrazing.	3	UN	2
9	What are the types of agriculture?	3	RR	2
10	What are the preventive measures for protecting natural resources?	3	UN	2

PART B				
1	Explain in detail the role of an individual in the conservation of natural resources.	3	UN	16
2	Briefly explain the major causes of deforestation. Discuss its consequences and suggest measures to overcome it.	3	AN	16
3	Write a brief note on the environmental impacts of modern agriculture with reference to: (i) Fertilizers (ii) Pesticides	3	UN	16
4	Elaborate the changes caused by modern agriculture and overgrazing.	3	AN	16
5	Explain over-utilization of surface water and groundwater.	3	UN	16
6	Discuss the various factors influencing soil degradation.	3	AN	16

UNIT IV

SUSTAINABILITY AND MANAGEMENT

Development, GDP, Sustainability- concept, needs and challenges-millennium development - indicators and intervention areas -Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study

Q.No	Question	CO	BTL	Marks
PART A				
1	What is GDP?	4	RE	2
2	Write any four millennium development goals.	4	UN	2
3	Define carbon credit.	4	RE	2
4	What are the sources of carbon foot print?	4	RE	2
5	Define environmental management.	4	RE	2
6	Mention any five important needs of sustainability.	4	UN	2
7	Write some advantages of carbon credits.	4	UN	2
8	Mention some effects of climate change.	4	UN	2
9	Write any 4 millennium development goals.	4	UN	2
10	Define Sustainability.	4	RE	2

PART B

1	Write brief notes on (i) Millennium Development Goals (ii) Sustainability protocols.	4	UN	16
2	What is environmental management? Explain the various steps of environmental management.	4	UN	16
3	Analyse the of concept, goal and aim of sustainable development.	4	AN	16
4	What are the causes, effects and possible solutions of climate change? What is carbon credit? Explain the types and merits.	4	UN	16
5	Explain the sources, causes and remedy measures of carbon foot print.	4	UN	16
6	Analyze the sustainable development indicators.	4	AN	16

UNIT V

SUSTAINABILITY PRACTICES

Sustainable targets and goals (STG), Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Sustainable transports, Sustainable urbanization- Socio-economical and technological change.

Q.No	Question	CO	BTL	Marks
PART A				
1	What is zero waste and R concept?	5	RE	2
2	Define circular economy.	5	RE	2
3	What are the key elements of ISO14000?	5	RE	2
4	Mention the objectives of EIA.	5	UN	2
5	What is green engineering?	5	RE	2
6	What is meant by energy cycles?	5	RE	2
7	What is sustainable urbanization?	5	RE	2
8	Define carbon sequestration.	5	RE	2
9	How do you calculate energy efficiency?	5	UN	2
10	What are the harmful effects of carbon emission?	5	RE	2

PART B

1	Explain the various steps to achieve zero waste? Mention advantages and disadvantages of zero waste.	5	UN	16
2	Determine the concept and advantages of R concept.	5	AN	16
3	What are green materials? Explain important green building materials. (8) What is sustainable transport? Discuss the key elements of sustainable transport.(8)	5	UN	16
4	What is sustainable urbanization? Explain the rules to develop sustainable urban.	5	AN	16
5	Write notes on socio-economical change on sustainable urbanization.	5	UN	16
6	Explain methods of achieving energy efficiency.	5	UN	16

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