



NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE - 52

DEPARTMENT OF CSE (CYBER SECURITY)

Details of courses where syllabus revision was carried out in (Cyber Security)

S.NO	DEPARTMENT	SEM	COURSE CODE	COURSE NAME	% OF CHANGE
1	CSE(Cyber Security)	II & III	22CCC05	Computer Networks	100%
2	CSE(Cyber Security)	II & III	22CCC07	Operating Systems and Security	100%
3	CSE(Cyber Security)	II & IV	22CCC09	Security Software Engineering	100%
4	CSE(Cyber Security)	II & IV	22CCC10	Database Security	100%
LABORATORY COURSE DETAILS					
1	CSE(Cyber Security)	II & III	22CCP05	Computer Networks Laboratory	100%
2	CSE(Cyber Security)	II & IV	22CCP05	Database Security Laboratory	100%

HEAD OF DEPARTMENT

22CCC05 - COMPUTER NETWORKS
(Common to 22AIC12, 22CSC06, 22CCC05, 22CIC09 and 22ITC07)

L	T	P	C
3	0	0	3

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To understand the concepts of data communications	1.1	The students will be able to gain knowledge on Data Communication Concepts
2.0	To impart the fundamental concepts of Data Link Layer	2.1	The students will be able to use services of the Data Link Layer.
3.0	To gain exposure about Addressing and Routing Protocols	3.1	The students will be able to work with network addressing and Routing Protocols.
4.0	To get knowledge about services in Transport Layer	4.1	The students will be able to apply Transport Layer protocols.
5.0	To learn about Application Layer functionalities	5.1	The students will be able to work with Application layer protocols

UNIT I - INTERNET AND DATA COMMUNICATIONS	(9)
Internet - Network Edge - Network of Networks - Data communication Components - Data representation and Data flow - Networks - Protocols and Standards - OSI model - TCP/IP protocol suite - Physical Layer: Multiplexing - Transmission Media.	
UNIT II - DATA LINK LAYER	(9)
Framing - Error Control: Introduction - Block coding - Linear block codes - Cyclic codes - Checksum - Media Access Control: Random Access - CSMA/CD, CDMA/CA - Controlled Access - Wired LANs - Wireless LANs.	
UNIT III - NETWORK LAYER	(9)
IPV4 - IPV6 - ICMP - Transition from IPV4 to IPV6 - Routing Algorithm: Distance-Vector Routing, Link-State Routing, Path-Vector Routing - Unicast Routing protocols - Multicast Routing protocols.	
UNIT IV - TRANSPORT LAYER	(9)
Process to Process Communication - User Datagram Protocol - Transmission Control Protocol - SCTP - Congestion Control - Quality of Service.	
UNIT V - APPLICATION LAYER	(9)
Domain Name System - Standard Application: WWW and HTTP, FTP, Electronic Mail, TELNET - Firewalls - Network Management System - SNMP.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking with TCP/IP Protocol Suite", 6th Edition, McGraw-Hill, 2022.

REFERENCES:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, 2017.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 8th Edition, Pearson Education, 2020.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	-	3	-	-	3	-	3	3	3	-	3	3	3
2	3	3	3	-	3	-	-	-	3	-	-	3	3	3
3	3	3	3	3	3	-	-	-	3	3	-	3	3	3
4	3	3	3	2	3	-	-	-	3	3	-	3	3	3
5	3	3	3	2	3	-	-	-	3	3	-	3	3	3
CO (W.A)	3	3	3	2.3	3	3		3	3	3		3	3	3



PRINCIPAL
Nandha Engineering College
(Autonomous)
Erode - 638 052.

22CCP04 - COMPUTER NETWORKS LABORATORY
(Common to 22CSP05, 22CCP04, 22CIP06 and 22ITP05)

L	T	P	C
0	0	4	2

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To know the connectivity of systems with different types of cables	1.1	The students will be able to connect a system with various topologies
2.0	To work with addressing protocols	2.1	The students will be able to apply addressing protocols
3.0	To gain knowledge about the working of routing algorithms	3.1	The students will be able to implement various routing algorithms
4.0	To learn socket programming	4.1	The students will be able to program using Sockets
5.0	To use analyzing tools to analyze the performance of protocols in different layers in computer networks	5.1	The students will be able to use Analyzer tools

LIST OF EXPERIMENTS:

1. Study of Color coding Jack RJ45 and do the following Cabling works in a network
 - a. Cable Crimping
 - b. Standard Cabling
 - c. Cross Cabling and
 - d. Establish a LAN connection using three systems using any topology.
2. Configure IP Address in a system in LAN (TCP/IP Configuration) and Implement the client server communication using socket connection
3. Write a program for transferring a file between nodes in a network.
4. Perform CRC computation
5. By varying the number of frames, design the Sliding Window Protocol
6. Simulation of ARP/RARP
7. Display the routing table for the nodes in a network using Distance Vector Routing (DVR) algorithm.
8. Write a program for downloading a file from HTTP server
9. Develop a client that contacts a given DNS server to resolve a given host name.
10. Configure a Network topology using Packet tracer software
11. Study of Network simulator (NS) and Simulation of any one of routing protocol using NS2.

TOTAL (P:60) : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS SOFTWARE :

HARDWARE:

Standalone desktops 60 Nos., Jack RJ45 connectors

SOFTWARE:

C / C++ / Java / Equivalent Compiler

Network simulator like Ethereal / NS2 / NS3 / Glomosim / OPNET/ 60 Equivalent.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	3	-	-	-	-	-	-	-	3	3	3
2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
3	3	3	3	3	-	-	-	-	-	3	-	3	3	3
4	3	3	3	2	-	-	-	-	-	3	-	3	3	3
5	3	3	3	2	3	-	-	-	-	3	-	3	3	3
CO (W.A)	3	3	3	2.6	3	-	-	-	-	3	-	3	3	3

22CCC10-DATABASE SECURITY

		L	T	P	C
		3	0	0	3
PREREQUISITE : Nil					
Course Objectives		Course Outcomes			
1.0	To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram.	1.1	The student will be able to apply concept modeling and design database schemas based on the conceptual model.		
2.0	To study the principles of database normalization techniques, improve integrity via data transform, and minimize redundancy.	2.1	The student will be able to gain knowledge about how to organize data efficiently and reduce data anomalies in relational database designs.		
3.0	To know the fundamental concepts of transaction processing with ACID, concurrency control techniques , recovery system and handle failures	3.1	The student will be able to demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.		
4.0	To understand the need of security in database and how to safeguard databases against potential threats.	4.1	The student will be able to implement run transactions and estimate the procedures for controlling the consequences of concurrent data access.		
5.0	To learn how to secure database by employing encryption techniques and access control mechanism.	5.1	The student will be able to understand and handle security issues in database and gain knowledge about access control techniques.		

UNIT I	RELATIONAL DATABASES	(9)
Data Models - Relational Data Models - Relational Algebra - Structured Query Language - Entity-Relationship Model-Mapping ER Modelsto Relations-Distributed Databases-Data Fragmentation -Replication.		
UNIT II	DATABASE DESIGN	(9)
ER Diagrams - 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		
UNIT III	TRANSACTION MANAGEMENT	(9)
Transaction Concepts-ACID Properties-Serializability-Transaction Isolation Levels-Concurrency Control- Need for Concurrency -Lock-Based Protocols - Deadlock Handling -Recovery System - Failure Classification-Recovery Algorithm.		
UNIT IV	DATABASE SECURITY	(9)
Need for database security - SQL Injection Attacks- The Injection Technique - SQLi Attack Avenues and Type		
UNIT V	ACCESS CONTROL AND ENCRYPTION	(9)
Database Access Control - SQL based access definition Cascading Authorizations - Role-based access control-Inference- Database encryption		
TOTAL(L:45):45PERIODS		

TEXT BOOKS:

1. Abraham Silberschatz, Henry F.Korth, S.Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.
2. Ramez Elmasri, Shamkant B.Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
3. William Stallings, Lawrie Brown "Computer Security: Principles and Practice", Fourth Edition, Pearson 2019.

REFERENCES:

1. C.J.Date, A.Kannanand S.Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.
3. Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	3	3	-	-	-	-	1	3	3	3	1	2
2	1	1	1	3	1	-	-	-	1	2	1	3	2	3
3	2	1	2	1	1	-	-	-	2	1	1	3	1	1
4	3	1	3	1	-	-	-	-	2	1	2	1	2	2
5	3	1	1	2	2	-	-	-	2	2	2	3	2	2
CO (W.A)	2	1	2	2	1	-	-	-	2	2	2	3	2	2



PRINCIPAL
Nandha Engineering College
(Autonomous)
Erode - 638 052.

22CCP07-DATABASE SECURITY LABORATORY

	L	T	P	C
	0	0	4	2

PREREQUISITE: NIL

Course Objectives		Course Outcomes	
1.0	To learn and implement important commands in SQL.	1.1	The student will be able to apply databases with different types of key constraints.
2.0	To learn the usage of nested and joint queries.	2.1	The student will be able to implement simple and complex SQL queries using DML and DCL commands.
3.0	To Understand functions, procedures and procedural extension of database.	3.1	The student will be able to realize database design using 3NF and BCNF.
4.0	To understand attacks on database and to learn to defend against the attacks on databases.	4.1	The student will be able to implement advanced features such as stored procedures and triggers.
5.0	To learn to store and retrieve encrypted data in database.	5.1	The student will be able to understand secure database and mitigate attacks on database.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), in set rows , update and delete rows using SQL DD Land DML commands.
2. Create set of tables, add foreign key constraints and in corporate ferentialin tegrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the data base table sand explore sub queries and simple join operations.
5. Query the data base tables and explore natural, e qui and outer joins.
6. Write user defined functions and store d procedures in SQL.
7. Execute comp le x transactions and realize DC Land TCL commands.
8. Write SQLT riggers for insert, delete, and update operations in data base table.
9. Use SQLito authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQL I attacks given in the previous exercise

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. 33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0

Mapping of COs with POs/PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	2	1	3	1	1	-	2	2	1	2	2	3
2	2	2	2	1	3	1	1	-	2	2	2	2	2	3
3	2	2	3	1	3	1	2	-	2	2	2	2	2	3
4	2	3	3	2	3	1	2	-	2	2	3	3	3	3
5	3	3	3	2	3	1	1	-	2	1	3	3	3	3
CO (W.A)	2	2	3	1	3	1	1	-	2	2	2	2	2	3

22CCP07-DATABASE SECURITY LABORATORY

	L	T	P	C
	0	0	4	2

PREREQUISITE: NIL

Course Objectives		Course Outcomes	
1.0	To learn and implement important commands in SQL.	1.1	The student will be able to apply databases with different types of key constraints.
2.0	To learn the usage of nested and joint queries.	2.1	The student will be able to implement simple and complex SQL queries using DML and DCL commands.
3.0	To Understand functions, procedures and procedural extension of database.	3.1	The student will be able to realize database design using 3NF and BCNF.
4.0	To understand attacks on database and to learn to defend against the attacks on databases.	4.1	The student will be able to implement advanced features such as stored procedures and triggers.
5.0	To learn to store and retrieve encrypted data in database.	5.1	The student will be able to understand secure database and mitigate attacks on database.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), in set rows , update and delete rows using SQL DD Land DML commands.
2. Create set of tables, add foreign key constraints and in corporate ferentialin tegrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the data base table sand explore sub queries and simple join operations.
5. Query the data base tables and explore natural, e qui and outer joins.
6. Write user defined functions and store d procedures in SQL.
7. Execute comp le x transactions and realize DC Land TCL commands.
8. Write SQLT riggers for insert, delete, and update operations in data base table.
9. Use SQLito authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQL I attacks given in the previous exercise

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. 33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0

Mapping of COs with POs/PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	2	1	3	1	1	-	2	2	1	2	2	3
2	2	2	2	1	3	1	1	-	2	2	2	2	2	3
3	2	2	3	1	3	1	2	-	2	2	2	2	2	3
4	2	3	3	2	3	1	2	-	2	2	3	3	3	3
5	3	3	3	2	3	1	1	-	2	1	3	3	3	3
CO (W.A)	2	2	3	1	3	1	1	-	2	2	2	2	2	3

22CCC07 - OPERATING SYSTEMS AND SECURITY

		L	T	P	C
		3	0	2	4
PREREQUISITE : NIL					
Course Objectives		Course Outcomes			
1.0	To understand the basic concepts of Operating Systems.	1.1	The students will be able to gain knowledge on the concepts of Operating Systems.		
2.0	To explore the process management concepts including scheduling, synchronization, threads and deadlock.	2.1	The students will be able to acquire knowledge on process management concepts.		
3.0	To understand the memory, file and I/O management activities of OS.	3.1	The students will be able to manage the memory, file systems.		
4.0	To learn the secure systems model.	4.1	The students will be able to protect the systems by secure models.		
5.0	To learn how security is implemented in various operating systems.	5.1	The students will be able to gain security exposure in various operating systems.		

UNIT I - OPERATING SYSTEM OVERVIEW	(9)
Computer-System Organization-Architecture-Operating-System Operations-Resource Management - Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services-System Calls-System Services-Why Applications Are Operating-System Specific - Operating-System Design and Implementation - Operating-System Structure -Building and Booting an Operating System.	
UNIT II - PROCESS MANAGEMENT	(9)
Process Concepts - Process Scheduling - Operation on Processes, Inter- process Communication - Threads - Overview Multi threading models - Threading issues; CPU Scheduling criteria, Scheduling algorithms; Process Synchronization - Critical section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; deadlock. System model, Deadlock characterization, Method for handling deadlock, Dead lock prevention, Deadlock avoidance, Detection, Recovery.	
UNIT III - MEMORY MANAGEMENT AND FILE SYSTEMS	(9)
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.	

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCES:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology - Cengage Learning, New Delhi, 2008.
5. Mohammad Tehranipoor, Cliff Wang, "Introduction to Hardware, Security and Trust, book", Springer, 2012.
6. Gerardus Blokdyk, Security Focused Operating System A Complete Guide-2020 Edition, 5STARCOoks, ISBN: 9781867373353, 2020.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	3	2	3	-	-	3	-	3	3	3	3
2	3	3	2	2	2	2	-	-	2	-	3	3	3	3
3	3	3	3	2	1	2	-	-	2	-	3	3	3	3
4	3	3	3	2	1	2	-	-	2	-	3	3	3	3
5	3	3	3	3	2	2	-	-	2	-	3	3	3	3
CO (W.A)	3	2.8	2.6	2.4	1.6	2.2	-	-	2.2	-	3	3	3	3


PRINCIPAL**Nandha Engineering College**

Approved (Autonomous) by Academic Council

Erode - 638 052.

22CCC09-SECURE SOFTWARE ENGINEERING

	L	T	P	C
	3	0	0	3

PREREQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To learn the fundamentals concepts, principles, and terminology related to software Engineering process models and also their applications.	1.1	The student will be able to gain software Engineering process models.
2.0	To study the principle for implementation of UML to visualize, design and communicate software system along with skills acquired to create comprehensive SRD.	2.1	The student will be able to implement UML, and Software Requirements Document (SRD).
3.0	To learn architect and implement robust security measures, ensuring resilient software solutions that protect sensitive data.	3.1	The student will be able to appropriate software architectures and patterns to carry out high level design.
4.0	To learn effective testing strategies by various tools and methodologies through evaluation and validation of software systems.	4.1	The student will be able to test the software quality.
5.0	To learn how to identify, assess, and mitigate project risks while ensuring the delivery of superior quality software products.	5.1	The student will be able to identify the quality of the product.

UNIT I - Introduction to Software Engineering	(9)
The evolving role of software - changing nature of software -software myths - A Generic view of process: Software engineering- a layered technology - a process framework -the capability maturity model integration (CMMI) - process patterns - process assessment -personal and team process models -Process models: The waterfall model- incremental process models - evolutionary process models - the unified process.	
UNIT II - Software Requirements	(9)
Functional and non-functional requirements - user requirements - system requirements - interface specification - the software requirements document. Requirements engineering process: Feasibility studies - requirements elicitation and analysis - requirements validation - requirements management. System models: Context models -behavioral models - data models - object models - structured methods .	
UNIT III - Design Engineering	(9)
Design Engineering: Design process and design quality - design concepts, the design model. Creating an architectural design: software architecture - data design -architectural styles and patterns - architectural design - conceptual model of UML - basic structural modeling - class diagrams - sequence diagrams - collaboration diagrams - use case diagrams - component diagrams .	

UNITIV - Testing Strategies**(9)**

Testing Strategies: A strategic approach to software testing - test strategies for conventional software - black-box and white-box testing - validation testing - system testing - the art of debugging. Product metrics: Software quality - metrics for analysis model - metrics for design model - metrics for source code - metrics for testing - metrics for maintenance.

UNITV - Risk management and Quality Management**(9)**

Metrics for Process and Products: Software measurement - metrics for software quality. Risk management: Reactive Vs proactive risk strategies - software risks - risk identification - risk projection - risk refinement - RMMM - RMMM plan. Quality Management: Quality concepts - software quality assurance - software reviews - formal technical reviews - statistical software quality assurance - software reliability - the ISO 9000 quality standards.

TOTAL(L:45):45PERIODS**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCES:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	2	2	1	1	.	1	.	2	.	2	2	3	3
2	1	2	2	1	1	.	1	.	2	.	3	2	3	3
3	2	1	2	1	1	.	2	.	1	.	3	3	3	3
4	2	2	3	2	2	.	2	.	2	.	3	2	3	3
5	2	2	3	2	2	.	1	.	2	2	3	3	3	3
CO (W.A)	2	2	2	1	1	.	1	.	2	2	3	2	3	3

PRINCIPAL**Nandha Engineering College
(Autonomous)****Erode - 638 052.**

Approved by the Government of Tamil Nadu
Higher Education Department
Erode - 638 052.

22CCC05 - COMPUTER NETWORKS
(Common to 22AIC12, 22CSC06, 22CCC05, 22CIC09 and 22ITC07)

L	T	P	C
3	0	0	3

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To understand the concepts of data communications	1.1	The students will be able to gain knowledge on Data Communication Concepts
2.0	To impart the fundamental concepts of Data Link Layer	2.1	The students will be able to use services of the Data Link Layer.
3.0	To gain exposure about Addressing and Routing Protocols	3.1	The students will be able to work with network addressing and Routing Protocols.
4.0	To get knowledge about services in Transport Layer	4.1	The students will be able to apply Transport Layer protocols.
5.0	To learn about Application Layer functionalities	5.1	The students will be able to work with Application layer protocols

UNIT I - INTERNET AND DATA COMMUNICATIONS	(9)
Internet - Network Edge - Network of Networks - Data communication Components - Data representation and Data flow - Networks - Protocols and Standards - OSI model - TCP/IP protocol suite - Physical Layer: Multiplexing - Transmission Media.	
UNIT II - DATA LINK LAYER	(9)
Framing - Error Control: Introduction - Block coding - Linear block codes - Cyclic codes - Checksum - Media Access Control: Random Access - CSMA/CD, CDMA/CA - Controlled Access - Wired LANs - Wireless LANs.	
UNIT III - NETWORK LAYER	(9)
IPV4 - IPV6 - ICMP - Transition from IPV4 to IPV6 - Routing Algorithm: Distance-Vector Routing, Link-State Routing, Path-Vector Routing - Unicast Routing protocols - Multicast Routing protocols.	
UNIT IV - TRANSPORT LAYER	(9)
Process to Process Communication - User Datagram Protocol - Transmission Control Protocol - SCTP - Congestion Control - Quality of Service.	
UNIT V - APPLICATION LAYER	(9)
Domain Name System - Standard Application: WWW and HTTP, FTP, Electronic Mail, TELNET - Firewalls - Network Management System - SNMP.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking with TCP/IP Protocol Suite", 6th Edition, McGraw-Hill, 2022.

REFERENCES:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, 2017.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 8th Edition, Pearson Education, 2020.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	-	3	-	-	3	-	3	3	3	-	3	3	3
2	3	3	3	-	3	-	-	-	3	-	-	3	3	3
3	3	3	3	3	3	-	-	-	3	3	-	3	3	3
4	3	3	3	2	3	-	-	-	3	3	-	3	3	3
5	3	3	3	2	3	-	-	-	3	3	-	3	3	3
CO (W.A)	3	3	3	2.3	3	3		3	3	3		3	3	3



PRINCIPAL
Nandha Engineering College
(Autonomous)
Erode - 638 052.

22CCP04 - COMPUTER NETWORKS LABORATORY
(Common to 22CSP05, 22CCP04, 22CIP06 and 22ITP05)

L	T	P	C
0	0	4	2

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To know the connectivity of systems with different types of cables	1.1	The students will be able to connect a system with various topologies
2.0	To work with addressing protocols	2.1	The students will be able to apply addressing protocols
3.0	To gain knowledge about the working of routing algorithms	3.1	The students will be able to implement various routing algorithms
4.0	To learn socket programming	4.1	The students will be able to program using Sockets
5.0	To use analyzing tools to analyze the performance of protocols in different layers in computer networks	5.1	The students will be able to use Analyzer tools

LIST OF EXPERIMENTS:

1. Study of Color coding Jack RJ45 and do the following Cabling works in a network
 - a. Cable Crimping
 - b. Standard Cabling
 - c. Cross Cabling and
 - d. Establish a LAN connection using three systems using any topology.
2. Configure IP Address in a system in LAN (TCP/IP Configuration) and Implement the client server communication using socket connection
3. Write a program for transferring a file between nodes in a network.
4. Perform CRC computation
5. By varying the number of frames, design the Sliding Window Protocol
6. Simulation of ARP/RARP
7. Display the routing table for the nodes in a network using Distance Vector Routing (DVR) algorithm.
8. Write a program for downloading a file from HTTP server
9. Develop a client that contacts a given DNS server to resolve a given host name.
10. Configure a Network topology using Packet tracer software
11. Study of Network simulator (NS) and Simulation of any one of routing protocol using NS2.

TOTAL (P:60) : 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 60 STUDENTS SOFTWARE :

HARDWARE:

Standalone desktops 60 Nos., Jack RJ45 connectors

SOFTWARE:

C / C++ / Java / Equivalent Compiler

Network simulator like Ethereal / NS2 / NS3 / Glomosim / OPNET/ 60 Equivalent.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	3	-	-	-	-	-	-	-	3	3	3
2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
3	3	3	3	3	-	-	-	-	-	3	-	3	3	3
4	3	3	3	2	-	-	-	-	-	3	-	3	3	3
5	3	3	3	2	3	-	-	-	-	3	-	3	3	3
CO (W.A)	3	3	3	2.6	3	-	-	-	-	3	-	3	3	3

22CCP07-DATABASE SECURITY LABORATORY

	L	T	P	C
	0	0	4	2

PREREQUISITE: NIL

Course Objectives		Course Outcomes	
1.0	To learn and implement important commands in SQL.	1.1	The student will be able to apply databases with different types of key constraints.
2.0	To learn the usage of nested and joint queries.	2.1	The student will be able to implement simple and complex SQL queries using DML and DCL commands.
3.0	To Understand functions, procedures and procedural extension of database.	3.1	The student will be able to realize database design using 3NF and BCNF.
4.0	To understand attacks on database and to learn to defend against the attacks on databases.	4.1	The student will be able to implement advanced features such as stored procedures and triggers.
5.0	To learn to store and retrieve encrypted data in database.	5.1	The student will be able to understand secure database and mitigate attacks on database.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), in set rows , update and delete rows using SQL DD Land DML commands.
2. Create set of tables, add foreign key constraints and in corporate ferentialin tegrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the data base table sand explore sub queries and simple join operations.
5. Query the data base tables and explore natural, e qui and outer joins.
6. Write user defined functions and store d procedures in SQL.
7. Execute comp le x transactions and realize DC Land TCL commands.
8. Write SQLT riggers for insert, delete, and update operations in data base table.
9. Use SQLito authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQL I attacks given in the previous exercise

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. 33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0

Mapping of COs with POs/PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	2	1	3	1	1	-	2	2	1	2	2	3
2	2	2	2	1	3	1	1	-	2	2	2	2	2	3
3	2	2	3	1	3	1	2	-	2	2	2	2	2	3
4	2	3	3	2	3	1	2	-	2	2	3	3	3	3
5	3	3	3	2	3	1	1	-	2	1	3	3	3	3
CO (W.A)	2	2	3	1	3	1	1	-	2	2	2	2	2	3

22CCP07-DATABASE SECURITY LABORATORY

	L	T	P	C
	0	0	4	2

PREREQUISITE: NIL

Course Objectives		Course Outcomes	
1.0	To learn and implement important commands in SQL.	1.1	The student will be able to apply databases with different types of key constraints.
2.0	To learn the usage of nested and joint queries.	2.1	The student will be able to implement simple and complex SQL queries using DML and DCL commands.
3.0	To Understand functions, procedures and procedural extension of database.	3.1	The student will be able to realize database design using 3NF and BCNF.
4.0	To understand attacks on database and to learn to defend against the attacks on databases.	4.1	The student will be able to implement advanced features such as stored procedures and triggers.
5.0	To learn to store and retrieve encrypted data in database.	5.1	The student will be able to understand secure database and mitigate attacks on database.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), in set rows , update and delete rows using SQL DD Land DML commands.
2. Create set of tables, add foreign key constraints and in corporate ferentialin tegrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the data base table sand explore sub queries and simple join operations.
5. Query the data base tables and explore natural, e qui and outer joins.
6. Write user defined functions and store d procedures in SQL.
7. Execute comp le x transactions and realize DC Land TCL commands.
8. Write SQLT riggers for insert, delete, and update operations in data base table.
9. Use SQLito authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQL I attacks given in the previous exercise

TOTAL (P:60) : 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. 33 nodes with LAN connection or Standalone PCs

SOFTWARE:

1. MYSQL 8.0

Mapping of COs with POs/PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	2	1	3	1	1	-	2	2	1	2	2	3
2	2	2	2	1	3	1	1	-	2	2	2	2	2	3
3	2	2	3	1	3	1	2	-	2	2	2	2	2	3
4	2	3	3	2	3	1	2	-	2	2	3	3	3	3
5	3	3	3	2	3	1	1	-	2	1	3	3	3	3
CO (W.A)	2	2	3	1	3	1	1	-	2	2	2	2	2	3

22CCC07 - OPERATING SYSTEMS AND SECURITY

		L	T	P	C
		3	0	2	4
PREREQUISITE : NIL					
Course Objectives		Course Outcomes			
1.0	To understand the basic concepts of Operating Systems.	1.1	The students will be able to gain knowledge on the concepts of Operating Systems.		
2.0	To explore the process management concepts including scheduling, synchronization, threads and deadlock.	2.1	The students will be able to acquire knowledge on process management concepts.		
3.0	To understand the memory, file and I/O management activities of OS.	3.1	The students will be able to manage the memory, file systems.		
4.0	To learn the secure systems model.	4.1	The students will be able to protect the systems by secure models.		
5.0	To learn how security is implemented in various operating systems.	5.1	The students will be able to gain security exposure in various operating systems.		

UNIT I - OPERATING SYSTEM OVERVIEW	(9)
Computer-System Organization-Architecture-Operating-System Operations-Resource Management - Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services-System Calls-System Services-Why Applications Are Operating-System Specific - Operating-System Design and Implementation - Operating-System Structure -Building and Booting an Operating System.	
UNIT II - PROCESS MANAGEMENT	(9)
Process Concepts - Process Scheduling - Operation on Processes, Inter- process Communication - Threads - Overview Multi threading models - Threading issues; CPU Scheduling criteria, Scheduling algorithms; Process Synchronization - Critical section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; deadlock. System model, Deadlock characterization, Method for handling deadlock, Dead lock prevention, Deadlock avoidance, Detection, Recovery.	
UNIT III - MEMORY MANAGEMENT AND FILE SYSTEMS	(9)
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.	

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCES:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology - Cengage Learning, New Delhi, 2008.
5. Mohammad Tehranipoor, Cliff Wang, "Introduction to Hardware, Security and Trust, book", Springer, 2012.
6. Gerardus Blokdyk, Security Focused Operating System A Complete Guide-2020 Edition, 5STARCOoks, ISBN: 9781867373353, 2020.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	3	2	3	-	-	3	-	3	3	3	3
2	3	3	2	2	2	2	-	-	2	-	3	3	3	3
3	3	3	3	2	1	2	-	-	2	-	3	3	3	3
4	3	3	3	2	1	2	-	-	2	-	3	3	3	3
5	3	3	3	3	2	2	-	-	2	-	3	3	3	3
CO (W.A)	3	2.8	2.6	2.4	1.6	2.2	-	-	2.2	-	3	3	3	3


PRINCIPAL**Nandha Engineering College**

Approved (Autonomous) by Academic Council

Erode - 638 052.

22CCC09-SECURE SOFTWARE ENGINEERING

	L	T	P	C
	3	0	0	3

PREREQUISITE : Nil

Course Objectives		Course Outcomes	
1.0	To learn the fundamentals concepts, principles, and terminology related to software Engineering process models and also their applications.	1.1	The student will be able to gain software Engineering process models.
2.0	To study the principle for implementation of UML to visualize, design and communicate software system along with skills acquired to create comprehensive SRD.	2.1	The student will be able to implement UML, and Software Requirements Document (SRD).
3.0	To learn architect and implement robust security measures, ensuring resilient software solutions that protect sensitive data.	3.1	The student will be able to appropriate software architectures and patterns to carry out high level design.
4.0	To learn effective testing strategies by various tools and methodologies through evaluation and validation of software systems.	4.1	The student will be able to test the software quality.
5.0	To learn how to identify, assess, and mitigate project risks while ensuring the delivery of superior quality software products.	5.1	The student will be able to identify the quality of the product.

UNIT I - Introduction to Software Engineering	(9)
The evolving role of software - changing nature of software -software myths - A Generic view of process: Software engineering- a layered technology - a process framework -the capability maturity model integration (CMMI) - process patterns - process assessment -personal and team process models -Process models: The waterfall model- incremental process models - evolutionary process models - the unified process.	
UNIT II - Software Requirements	(9)
Functional and non-functional requirements - user requirements - system requirements - interface specification - the software requirements document. Requirements engineering process: Feasibility studies - requirements elicitation and analysis - requirements validation - requirements management. System models: Context models -behavioral models - data models - object models - structured methods .	
UNIT III - Design Engineering	(9)
Design Engineering: Design process and design quality - design concepts, the design model. Creating an architectural design: software architecture - data design -architectural styles and patterns - architectural design - conceptual model of UML - basic structural modeling - class diagrams - sequence diagrams - collaboration diagrams - use case diagrams - component diagrams .	

UNITIV - Testing Strategies**(9)**

Testing Strategies: A strategic approach to software testing - test strategies for conventional software - black-box and white-box testing - validation testing - system testing - the art of debugging. Product metrics: Software quality - metrics for analysis model - metrics for design model - metrics for source code - metrics for testing - metrics for maintenance.

UNITV - Risk management and Quality Management**(9)**

Metrics for Process and Products: Software measurement - metrics for software quality. Risk management: Reactive Vs proactive risk strategies - software risks - risk identification - risk projection - risk refinement - RMMM - RMMM plan. Quality Management: Quality concepts - software quality assurance - software reviews - formal technical reviews - statistical software quality assurance - software reliability - the ISO 9000 quality standards.

TOTAL(L:45):45PERIODS**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCES:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	2	2	1	1	-	1	-	2	-	2	2	3	3
2	1	2	2	1	1	-	1	-	2	-	3	2	3	3
3	2	1	2	1	1	-	2	-	1	-	3	3	3	3
4	2	2	3	2	2	-	2	-	2	-	3	2	3	3
5	2	2	3	2	2	-	1	-	2	2	3	3	3	3
CO (W.A)	2	2	2	1	1	-	1	-	2	2	3	2	3	3

PRINCIPAL

Nandha Engineering College
(Autonomous)

Erode - 638 052.

Approved by the Government of Tamil Nadu
Higher Education Department
Tamil Nadu State Council
Erode - 638 052.