SCHEME OF INSTRUCTION AND EVALUATION
II SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

COMPUTER SCIENCE AND ENGINEERING

Course Number	Name of the Course	Periods of Instruction per week			Evaluation Scheme				
					External Evaluation		Internal Evaluation		Total Marks
		Lectures	Tutorials	Practicals	Time (Hrs)	Max. Marks	Time (Hrs)	Max. Marks	
CS420	Network Programming	3	1	-	3	100	2	50	150
CS421	Professional Elective-II	3	-	-	3	100	2	50	150
CS422	Professional Elective-III	3	-	-	3	100	2	50	150
CS423	Network Programming Laboratory	-	-	3	3	50	3	25	75
CS424	Object Oriented Analysis and Design Laboratory	-	-	3	3	50	3	25	75
CS417	Project Work	-	-	8	-	100	-	150	250
	Total	**9**	**1**	**14**		**500**		**350**	**850**

Professional Elective-II

1. Cryptography and Network Security
2. Simulation and Modeling
3. Real Time Systems

Professional Elective-III

1. Data Mining and Data Warehousing
2. Digital Image Processing
3. Wireless Communications

CS420 NETWORK PROGRAMMING

Course: **IV/IV B.Tech. II Semester** | Theory: **3 Periods/week**
Branch: **Computer Science & Engineering** | Tutorial: **1 Period/week**
External Examination: **3 Hours** | External Evaluation: **100**
Internal Examination: **2 Hours** | Internal Evaluation: **50**

UNIT – I (9+3)

Introduction: Process, File Descriptor, File, Access Permissions, input-output System Calls, Signals, Process Control System Calls, File Sharing.

Inter Process Communication: Pipes, Streams and Messages, Name Spaces, Message Queues, Semaphores, Shared Memory.

Transport Layer: TCP Connection Establishment and Termination, TIME_WAIT State, Port Numbers, Concurrent Servers, Buffer Sizes and Limitations. Standard Internet Services.

Sockets: Address Structures, Value-Result Arguments, Byte Ordering, Byte Manipulation and *inet_aton, inet_addr* and *inet_ntoa* Functions. *inet_pton, inet_ntop, sock_ntop* and Related Functions. *readn, written* and *readline* Functions. i*sfdtype* Function.

UNIT – II (9+3)

Elementary TCP Sockets: *socket* Function, *connect* Function, *bind* Function, *listen* Function, *accept* Function, *fork* and *exec* Functions. Concurrent Servers. *close* Function, *getsockname* and *getpeername* Functions. TCP Client-Server Example, Normal Startup, Termination, Handling SIGCHLD Signals, Connection Abort, Termination of Server Processes, Crashing & Rebooting, Shutdown of Server Host.

I/O Multiplexing: I/O Modes, *select* Function, Batch Input, *pselect* and *poll* Functions.

Socket Options: *getsockopt, setsockopt* Functions, Socket States, Generic Socket Options, Ipv6 Socket Options, TCP Socket Options, *fcntl* Function.

Elementary UDP Sockets: *recvfrom, sendto* Functions and their implementation, Lost Datagrams, *connect* Function with UDP, Lack of Flow Control with UDP**.**

UNIT – III (9+3)

Daemon Processes and inetd Superserver: *syslogd* Daemon, *syslog* and *daemon_ init* functions, *inetd* Daemon, *daemon_inetd* Function.

Advanced I/O Functions: Socket Timeouts, *recv, send, readv, writev, recvmsg and sendmsg* Functions.

Unix Domain Protocols: Socket Address Structure, s*ocketpair* function, *socket* functions, Unix Domain Stream and Datagram Client, Server, Passing Descriptors, Receiving Sender Credentials.

Nonblocking I/O: Non Blocking Reads and Writes, Daytime Client and Web Client.

I/O Control (*ioctl*) Operations: *ioctl* Function, Socket Operations, File Operations, Interface Configuration, Interface, ARP Cache Operations and Routing Table Operations.

UNIT – IV (9+3)

Broadcasting: Broadcast Addresses, Unicast versus Broadcast, Race Conditions.

Multicasting: Multicast Addresses, Multicasting versus Broadcasting on a LAN, Multicast socket options, SNTP (Simple Network Time Protocol).

Threads: Creation and Termination of Threads, Thread Specific Data, Web Client and Simultaneous Connections, Mutual Exclusion (Mutex), Conditional Variables.

IP Options: IPv4 Source route Options, IPv6 Extension Headers, Hop-by-Hop and Destination, Routing and Sticky Options.

Client-Server Design Alternatives: TCP Client Alternatives, Iterative Server, Preforked Server, Concurrent Server, Prethreaded Server.

SUGGESTED TEXT / REFERENCE BOOKS:

1. W.Richard Stevens, “Unix Network Programming”, Prentice-Hall, Inc Eastern Economy Edition, ISBN -81-203-0749-6,2001
2. W.Richard Stevens, “UNIX NETWORK PROGRAMMING Networking APIs: Sockets and XTI, Volume 1”, Second edition, Pearson Education, ISBN-81-203 2061-1,2002

CS421(1) CRYPTOGRAPHY AND NETWORK SECURITY

Course: **IV/IV B.Tech. II Semester** Theory: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination: **3 Hours** External Evaluation: **100**
Internal Examination: **2 Hours** Internal Evaluation: **50**

UNIT-I (9)

Introduction: Attacks, Service and Mechanisms, Security Attacks, Security Services, The OSI Security Architecture, A model for Network Security.
Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.
Block Ciphers and the Data Encryption Techniques: Simplified DES, Block Cipher principles, Data Encryption Standard , Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and modes of operation.
Advanced Encryption Techniques: Evaluation Criteria for AES, The AES Cipher. **Contemporary Symmetric Ciphers**: Triple DES, Blowfish ,RC5 Characteristics of Advanced Symmetric Block Ciphers, RC4 Stream Cipher, CAST-128, IDEA Algorithms.

UNIT-II (9)

Confidentiality Using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.
Public-Key Cryptography And RSA : Principles of Public-Key Cryptosystems, The RSA Algorithm.
Key Management; Other Public-Key Cryptosystems: Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic and Cryptography.
Message authentication and Hash functions: Authentication Requirements and Functions, Message Authentication Codes, Hash functions, Security of Hash functions and MACs.

UNIT – III (9)

Hash Algorithms: MD5 Message Digest Algorithm, Secure Hash Algorithm, RIPEMED-160, HMAC.
Digital Signature and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.
Authentication Applications: Kerberos, X.509 Authentication Service .
Electronic Mail Security: Pretty Good Privacy, S/MIME.
IP Security: Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management.

UNIT –IV (9)

Web Security: Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.
Intruders: Intruders, Intrusion Detection, Password Management.
Malicious Software: Viruses and Related Threats, Virus Counter Measures.
Firewalls: Firewall Design Principles, Trusted Systems.

SUGGESTED TEXT / REFERENCE BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice –, 3rd Edition, Pearson Education, ISBN No:81-7808-605-0.
2. Applied Cryptography by Bruce Schneier, John Wiley & Sons –Second Edition, 2002.
3. Denning. D, "Cryptography and Data Security", Addison Wesley, 1982.

CS421(2) SIMULATION AND MODELING

Course: **IV/IV B.Tech. II Semester** Theory: **3 Periods/week**
Branch**: Computer Science & Engineering**
External Examination: **3 Hours** External Evaluation:**100**
Internal Examination: **2 Hours** Internal Evaluation: **50**

UNIT–I (9)

System Models: The Concepts of a System – System Environment – Stochastic Activities – Continuous and Discrete Systems – Steps in a Simulation Study – Areas of Applications - System Modeling – Types of Models – Static and Dynamic Physical Models – Static and Dynamic Mathematical Models - Principles used in Modeling.
System Studies: Subsystems – A Corporate Model – Environment Segment – Production Segment – Management Segment – The Full Corporate Model – Types of System Study – System Analysis – System Design – System Postulation.
System Simulation: The Technique of Simulation – The Monte Carlo Method – Comparison of Simulation and Analytical Methods – Experimental Nature of Simulation – Types of System Simulation – Numerical Computation Technique for Continuous and Discrete Models – Distributed Lag Models – Cobweb Models – Progress of a Simulation Study – Simulation Examples.

UNIT-II (9)

Continuous System Simulation: Continuous System Models – Differential Equations – Analog Computers – Analog Methods – Hybrid Computers – Digital Analog Simulators – Continuous System Simulation Languages (CSSLs) – CSMP III – Hybrid Simulation – Feedback Systems – Simulation of an Autopilot – Interactive Systems – Real Time Simulation.
Discrete System Simulation: Discrete Events – Representation of Time – Generation of Arrival Patterns – Simulation of a Telephone System – Delayed Calls – Simulation Programming Tasks – Gathering Statistics – Counters and summary Statistics – Measuring Utilization and Occupancy – Recording Distributions and Transit Times – Discrete Simulation Languages.
System Dynamics: Concept – Exponential Growth and Decay Models – Modified Exponential Growth Models – Logistic Curves – Generalization of Growth Models – System Dynamics Diagrams – Multi Segment Models – Representation of Time Delays – Feedback in Socio-Economic Systems.

UNIT-III (9)

Probability Concepts in Simulation: Discrete and Continuous Probability functions – Measures – Numerical Evaluation of Continuous Probability Functions – Continuous Uniformly Distributed Random Numbers – Computer Generation of Random Numbers – A uniform Random Number Generator – Generating Discrete Distributions – Non-Uniform Continuous Distributed Random Numbers – The Rejection Method.
Arrival Patterns and Service Times: Congestion in Systems – Arrival Patterns – Poisson Arrival Patterns – The Exponential Distribution – The Coefficient of Variation – The Erlang Distribution – The Hyper-Exponential Distribution – Service Times – The Normal Distribution – Queuing Disciplines – Measures of Queues – Mathematical Solutions of

Queuing Problems – Utilization as a Design Factor – Grade of Service.

UNIT-IV (9)

GPSS and SIMSCRIPT: Introduction to GPSS - GPSS Examples- Introduction to SIMSCRIPT – Management of Sets in SIMSCRIPT.
Simulation Programming Techniques: Entity Types – List Processing – Data Structures in GPSS & SIMSCRIPT **–** Implementation of Activities – Simultaneous and Conditional Events – Event Scanning – Execution of Simulation Algorithms in GPSS and SIMSCRIPT.
Case Studies: Simulation of Inventory Problem, Manufacturing System, Hospital System.

SUGGESTED TEXT / REFERENCE BOOKS*:*

1. Geoffrey Gordon, "System Simulation", Prentice Hall of India, 2nd Edition, ISBN: 81 – 203 – 0140 - 0, 2005.
2. Jerry Banks and John S.Carson II, Barry L.Nelson, David M.Nicol, "Discrete Event System Simulation", Third Edition, Pearson Education, ISBN: 81 – 7808 – 505 - 4, 2004.
3. Narsingh Deo, "System Simulation with Digital Computer", Prentice Hall of India, ISBN: 81 – 203 – 0028 – 9, 2002.
4. Bernard P.Zeigler, Herbert Praehofer, Tag Gon Kim, "Theory of Modeling and Simulation", 2nd Edition, Harcourt India Private Limited, ISBN: 81 – 7867 – 043 - 7, 2000.
5. Francis Neelamkavil, "Computer Simulation and Modeling", John Wiley & Sons, ISBN: 0 – 471 – 91129 - 1, 1996.
6. Averill Law and David M. Kelton, "Simulation Modeling and Analysis", McGraw Hill International Edition, ISBN: 0 – 07 – 116537 – 1, 2004.

CS421(3) REAL TIME SYSTEMS

Course**: IV/IV B.Tech II Semester** Theory: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination:**3 Hours** External Evaluation**: 100**
Internal Examination**: 2 Hours** Internal Evaluation: **50**

UNIT-I (9)

Typical Real-Time Application: Digital control, high-level controls, signal processing.
Hard Versus Soft Real-Time Systems: Jobs and processors, release times, deadlines, and timing constraints, hard and soft timing constraints, hard real-time systems, soft real-time systems.
A Reference Model Of Real-Time Systems: Processor and resources, temporal parameters of real-time workload, periodic task model, precedence constraints and data dependency, other types of dependencies, functional parameters, resources parameters of jobs and parameters of resources, scheduling hierarchy.

UNIT-II (9)

Commonly Used Approaches To Real-Time Scheduling: Clock driven approach, weighted round-robin approach, priority driven approach, dynamic versus static systems, effective release times and deadlines, optimality of the EDF and LST algorithms, non-optimality of the EDF and the LST algorithms**(Theorems and Corollaries are not included),** challenges in validating timing constraints in priority-driven systems, Off-line Vs On-line scheduling.
Clock-Driven Scheduling: Notations and assumptions, static timer-driven scheduler, general structure of cyclic schedules, cyclic executives, improving the average response time of periodic jobs, scheduling sporadic jobs, practical considerations and generalizations.
Priority driven scheduling of periodic task: static assumption, fixed-priority versus dynamic priority algorithms, maximum schedulable utilization, optimality of the RM and DM algorithms, a schedulability test for fixed-priority tasks with short response times, schedulability test for priority tasks with arbitrary response times **(Theorems and Corollaries are not included) .**

UNIT-III (9)

Scheduling A Periodic And Sporadic Jobs In Priority-Driven System : Assumptions and approaches. Algorithms for Scheduling of A periodic jobs: Bandwidth-Preserving Algorithms:-
Deferrable Servers, Sporadic Servers, Constant Utilization and Total Bandwidth**(Theorems and Corollaries are not included)** .Scheduling of Sporadic Jobs: A Simple Acceptance Test in Deadline-Driven Systems. Real-Time performance for jobs with soft timing constraints.
Resources and Resource Access Control: Assumptions on resources and their usage, effects of resource contention and resource access control, non-preemptive critical sections, basic priority-ceiling protocol, preemptive-ceiling protocol, controlling access to multiple-unit resources.

UNIT-IV (9)

Real-time Communication: Model of Real-Time Communication: Architectural Overview, Packets, Network Bandwidth and Physical size, Real-Time traffic models, performance

Objectives and Constraints, Real-Time Connections and Service Disciplines. Priority-Based Service Disciplines for Switched Networks: Weighted Fair-Queuing Discipline, Rate-proportional Server Model and Algorithm, Frame-Based Weighted Fair Queuing.
Weighted Round-Robin Service Disciplines: Greedy WRR Discipline, Time –Driven WRR Discipline, Budgeted Weighted Round-Robin Algorithm. Internet and Resource Reservation Protocols, Real-Time Protocol.

Note: Proofs of theorems not to be considered.

SUGGESTED TEXT / REFERENCE BOOKS:

1. Jane W.S.LIU, "Real-Time Systems", Pearson Education Asia, ISBN NO. 81-7808-463-5,2003
2. C.M.Krishna and Kang G. Shin,"Real-Time Systems",McGraw-Hill International Edition,ISBN 0-07-114243-6,1997

CS422(1) DATA MINING AND DATA WAREHOUSING

Course: **IV/IV B.Tech. II Semester** Theory: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination: **3 Hours** External Evaluation: **100**
Internal Examination: **2 Hours** Internal Evaluation: **50**

UNIT – I (9)

Data warehouse: What is Data Warehouse, Importance, Comparison with Relational Database System, Basics: Partitioning Strategy, Aggregation, Metadata, fact and dimensional tables, star snowflake and fact constellation schemas, data marts.
Architecture: Process Architecture, Design Architecture, three tier architecture, Multidimensional Model, Implementing OLAP Servers.
Data warehouse Design: Developing a data warehouse – design consideration, crucial decisions in designing a data warehouse, technological considerations – Data warehousing for the Government of Tamil Nadu, Data warehousing for the Government of Andhra Pradesh, Data warehousing for the Ministry of Commerce.

UNIT – II (9)

Data Preprocessing: Cleaning, integration, Transformation & reduction.
Data Mining: What is Data Mining, Functionalities, Classification: Major Issues, Priorities, System Architecture, and DMQL.
Descriptive Data Mining: Concept Description – Generalized Characterization, Summarized Characterization, Analytical Characterization, Class Comparison, Descriptive Statistical Measures.
Associative Rule Mining – Basic Concepts, Single and Multi Dimensional Boolean and Multilevel association rules for transaction databases, Correlation Analysis, Constrained based associative rules.

UNIT – III (9)

Predictive Data Mining: What is Predictive Data Mining, Classification – Preparing Data, criteria for comparing algorithms,
Classification: Issues regarding Classification, classification by decision tree, Bayesian Classification, Classification by back propagation, Classification based on concepts from Association Rule Mining, k-nearest neighbor Classifiers, Genetic Algorithms, Fuzzy Set Approaches, Regression – Linear and Multiple Regression, Nonlinear Regression, classifier accuracy.

UNIT – IV (9)

Cluster Analysis: Cluster analysis, Types of data in Cluster Analysis, partitioning methods, hierarchical methods, density based methods, grid based methods, model based clustering methods.
Mining complex types of data: mining spatial databases, mining multimedia databases, mining text databases, mining web based databases.

SUGGESTED TEXT / REFERENCE BOOKS:

1. Jiawei Han, Micheline Kambler, "Data Mining Concepts and Techniques" Morgan Kaufmann Publishers, ISBN-81-7867-023-2, 2002.
2. Sam Anahory, Dennis Murray, "Data Warehousing in the real world", Low Price Edition, Pearson Education, ISBN-81-7808-387-6, 2003.
3. C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", Second Edition, Prentice-Hall of India, ISBN – 81-203-2068-9, 2002.

CS422(2) DIGITAL IMAGE PROCESSING

Course: **IV/IV B.Tech. II Semester** Lectures: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination: **3 hours** External Evaluation: **100**
Internal Examination: **2 hours** Internal Evaluation: **50**

UNIT-I (9)

Introduction: Origin of Digital image processing, Fundamental steps in Digital Image processing, Components of an Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, Image Sampling and Quantization: Basic concepts in sampling and quantization, Representing Digital Images Spatial and Gray-level Resolution .Aliasing and Moiré Patterns. Zooming and Shrinking Digital Images. Some Basic Relationship between Pixels, Liner and Nonlinear Operations.

UNIT-II (9)

Image Transforms: 2D Fourier transforms, 2D- DFT, Fast fourierTransform, Walsh, Hadmard, Discrete cosine.

Image Enhancement : Image Enhancement in the Spatial Domain:-Some Basic Gray level Transformations: Image Negatives, log Transformations, Power-Law Transformations, Piecewise-Liner Transformation Functions. Histogram Processing: Histogram Equalization, Histogram Matching, Local Enhancement, Use of Histogram Statistics for Image Enhancement. Enhancement Using Arithmetic / Logical Operations: Image Subtraction, Image Averaging.

UNIT-III (9)

Image Enhancement in the Frequency Domain: Introduction to the Furier transform and frequency domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.

Image Restoration: A model of Image Degradation/Restoration Process, Noise Models Restoration in the Presence of noise only Spatial filtering.

Image compression and Segmentation: Fundamentals, Image compression models, Elements of information theory, Error free compression, Lossy compression, Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

UNIT-IV (9)

Image Representation and Description: Representation: Chain codes, Polygonal approximations, Signatures, Boundary Segments, Skeletons. Boundary Descriptors: Simple Descriptors, Shape numbers, Fourier Descriptors, Statistical moments.

SUGGESTED TEXT/REFERENCE BOOKS:

1. Rafael C.Gonzalez and Richard E.Woods,"Digital Image Processing", Pearson Education Asia, ISBN No.81-7808-629-8, 2002.
2. Anil K. Jain," Fundamentals of Image Processing", Prentice-Hall of India, ISBN No.81-203-0929-4, 1995.
3. B.Chanda & D.Dutta Majunder, "Digital Image Processing & Analysis", Prentice Hall India Pvt Ltd, ISBN No.81-203-1618-5,2002

CS423 NETWORK PROGRAMMING LABORATORY

Course: **IV/IV B.Tech. II Semester** Laboratory: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination: **3 Hours** External Evaluation: **50**
Internal Examination: **2 Hours** Internal Evaluation: **25**

1. Programs to Implement *fork, exec, pipe* (System Calls) Functions using *write, read, open* and *close* Functions.
2. Programs to Implementing Inter Process Communication between a Client and Server using
   (a) Pipes. (b) Fifos.
3. Implement Client Server Programs using
   (a) Message Queues (b) Shared Memory.
4. Implement Client and Server Programs using sockets.
   (a) TCP Daytime Client Program using in-built Daytime Server Program.
   (b) TCP Daytime Server Program.
5. Implement TCP Echo Client and Server Programs.
6. Implement User Datagram Protocol for
   (a) Daytime Client Program using in-built Daytime Server Program.
   (b) Daytime Server Program.
7. Implement UDP Echo Client and Server Programs.
8. Implement File Transfer from Server to Client, the Client passes File name.
9. Implement of Unix Domain Protocol
   (a) Daytime Client and Server.
   (b) Echo Server and Client Programs.
   (c) Program to implement *socketpair* system call.
10. Develop a Program to Read and Display different TCP Socket Options.
11. Implement Concurrent Server using *select* Function for Server of TCP to handle TCP and UDP Clients.
12. Program to Implement *gethostbyname, gethostbyaddr* Functions.
13. Program for Sending and Receiving User Credentials.
14. Implement *recv, send, readv, writev, recvmsg, sendmsg* Functions.
15. Implementation of Non-Blocking *connect* and *accept.*
16. Implementation of Signal Driven I/O using *sigio* Function.
17. Implementation of Server Programs of Different Architectures
    (a) TCP Echo Server Program using Threads.
    (b) TCP Concurrent Server, One Child per Client.
    (c) TCP Preforked server, No Locking around *accept.*
    (d) TCP Concurrent server, One thread per client.

CS424 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY

Course**: IV/IV B.Tech. II Semester** Laboratory: **3 Periods/week**
Branch: **Computer Science & Engineering**
External Examination: **3 Hours** External Evaluation: **50**
Internal Examination: **2 Hours** Internal Evaluation: **25**

LIST OF EXPERIMENTS

1. Forward Engineer Class diagrams for the following.
    (a) File System
    (b) Spread Sheet
    (c) Window Manager
    (d) School Information System
2. Reverse Engineer
    (a) Class student with attributes name, roll_no and operation study()
    (b) Relation ship Aggregation
    (c) Relationship Generalization
    (d) Interface.
3. Construct Use case Diagrams for the following.
    (a) Diagram Editor
    (b) Library Information System
    (c) Banking System
    (d) Cab Dispatching System.
4. Construct Sequence Diagrams for the following.
    (a) Mobile Phone
    (b) Use case student register for a course
    (c) Diagram Editor.
5. Construct Collabaration Diagrams for the following.
    (a) Use case Librarian issues books to student.
    (b) Mobile Phone
    (c) Diagram Editor.
6. Construct Activity Diagrams for the following.
    (a) ATM Transaction
    (b) Ticket Machine
    (c) Sales Order Processing.
7. Construct State Chart Diagrams for the following.
    (a) Account
    (b) CD Player
    (c) ATM machine.
8. Reverse Engineering the following Class Diagrams Using JAVA.
    (a) School Information System
    (b) File System
    (c) Window Manager
    (d) Library Information System
9. Case Study 1: ATM System
10. Case Study 2: Library Information System
11. Case Study 3: Railway reservation System
12. Case Study 4: Elevator System.