M.Sc. (CS) First Year (Two Semesters)

Semester-I					
course code	**Title of the paper**	**External credit**	**Internal credit**	**Total Credits**	**Total Nor of Classes**
CS-101	Computer Architecture & Microprocessor	3	1	4	40hrs
CS-102	Programming in C++	3	1	4	40hrs
CS-103	Design Analysis of Algorithm	3	1	4	40hrs
CS-104	Distributed Database Concepts	3	1	4	
CS-105	Elective-I 1. Web Technology with PHP & MySQL 2. JAVA Technology 3. Principles of Programming Language	3	1	4	40hrs
CS-106	Lab-1 (Programming in C++)	1	1	2	60hrs
CS-107	Lab-2 (Computer Architecture)	1	1	2	60hrs
CS-108	Seminar	0	1	1	40hrs
Total Credits		**17**	**8**	**25**	

Semester-II					
course code	**Title of the paper**	**External credit**	**Internal credit**	**Total Credits**	**Total Nor of Classes**
CS-201	Advance Networking Concepts	3	1	4	40hrs
CS-202	Mobile Computing	3	1	4	40hrs
CS-203	C#.NET	3	1	4	40hrs
CS-204	Compiler Design	3	1	4	40hrs
CS-205	Elective-II 1. Discrete Event System simulation 2. Distributed Computing 3. Network Programming	3	1	4	40hrs
CS-206	Lab-3(Advance N/W Concepts)	2	1	4	60hrs
CS-207	Lab-4(C#.NET)	2	1	4	60hrs
CS-208	Seminar	1	0	1	40hrs
Total Credits		**18**	**7**	**25**	

CS-101 Advanced Computer Architecture & Microprocessors (4-Credits)

UNIT I: Design Methodology

Introduction to system modeling, Design levels of Combinational and Sequential circuits-Gate level, Register level and Processor level, Queuing Model, Simulation.

UNIT II: Binary Arithmetic

Fixed point arithmetic's and algorithms for addition, subtraction, multiplication and division, Floating point arithmetic's and algorithms for addition, subtraction, multiplication and division.

UNIT III: Processors Design & Control Units

Processor organization, Information representation, Instruction –Format, types, Implementation, CICS and RISC, Vector Concepts, Control Unit-Hardwired and Micro programmed control unit, Interrupt and Branch Instruction processing.

UNIT IV: Memory Organization

Virtual memory, Memory hierarchies, Main memory -allocation, Segmentation, High speed-interleaved and associative memories.

UNIT V: 8085 Microprocessor

Architecture of 8085 Microprocessor, Features of 8085, Pin diagram of 8085,Timing diagram of Memory read , memory write, Opcode fetch and execute cycle, Addressing modes, DE multiplexing of address and data bus, Instruction set –classification, Instruction timing ,Assembly language programming of 8085.

UNIT VI: 8086 Microprocessor

Architecture of 8086 Microprocessor-EU and BIU, Features of 8086, Pin diagram of 8086,Addressing modes, Instruction set classification , Assembly language programming of 8086.

Reference Books:-

1) Computer Architecture & Organization (3rd edition) by J.P Hays, McGraw-Hill Science/Engineering/Math, (September 3, 2002), ISBN-10: 0072861983
2) Fundamentals of Microprocessors by B.Ram, Dhanpat Rai Publishing Co Pvt Ltd , 2010, ISBN 13: 9788189928605 ISBN 10: 8189928600

CS - 102 Programming with C++ (4-Credits)

UNIT I: Introduction and basic concepts of C++

Procedure Oriented Programming, Object Oriented Programming Paradigm, Basic concepts of OOP's, Benefits and Applications, Structure of C++ program

UNIT II: Tokens, Operators and Functions in C++

Keywords, Identifiers, Data-types, Operators in C++, Operator precedence and associativity, Function, function prototype, default arguments, Reference variable, call by reference, return by reference, Inline function, function overloading

UNIT III: Class and object

Specifying a class and object, Nesting of member function, Memory allocation for objects, Static data member, static function, Friend function, Returning objects

UNIT IV: Constructor and destructor

Constructor, Types of constructor, Destructor

UNIT V: Inheritance and polymorphism

Types of inheritance, Virtual base class, Operator overloading (Unary and binary), Virtual function and there rules, Pure virtual function, Abstract class, Pointer to object, This pointer

UNIT VI: Input / Output Operation

Console I/O operation, formatted I/O, unformatted I/O, C++ classes for console I/O, C++ stream classes for file I/O, Opening and closing file, sequential and random access, Error handling during a file operation, command line arguments, Templates, template function, template class.

Reference Books:-

1. The C++ Complete Reference(4th Edition) by Herb Schildt TMH Publication, December 10, 2002, ISBN 0072226803 / 9780072226805
2. Object-Oriented Programming with C++,(6th Edition) by E-Balgurusamy, McGraw - Hill Education India Pvt. Ltd, , ISBN-10: 125902993X
3. Let us C++ (2nd Edition) by Yashwant kanetkar, BPB Publications,2003 ISBN-10: 8176561061, ISBN-13: 978-8176561068

CS – 103 Design and analysis of an algorithm (4-Credits)

UNIT I: Introduction to data structure

Concepts of data and algorithm, Time and space Complexity of a given algorithm

UNIT II: Divide and Conquer

General Method, Binary search, Merge sort, Quick sort, Strassen's matrix multiplication

Unit III: The Greedy method

The general method, Knapsack problem, Optimal storage on tapes, Job sequencing with deadlines, Optimal merge pattern, Minimum spanning tree, Shortest path

UNIT IV: Dynamic Programming

The general method, Multistage graphs, Optimal binary search tree, Reliability Design, Travelling sales person problem

UNIT V: Basic search and traversal techniques

Binary tree traversal, Breadth first search(BFS), Depth first search(DFS), Bi-connected components and DFS

UNIT VI: Backtracking

The general method, The 8-Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycle, Knapsack problem, Efficiency consideration

Reference Books :

1. Fundamentals of computer algorithm by Elis Horowitz, Sahani, Rajshekharan, Galgotia Publication, 2001, ISBN 81-7515-257-5.

CS-104 Distributed Database System (4-Credits)

UNIT I: Database System Architectures

Centralized Architectures, client server Architecture, Server System Architecture , Parallel System Distributed System , Network Types

UNIT II: Distributed Database

Homogeneous and Heterogeneous Databases , Distributed Database storage, Transaction Concept ,Distributed Transactions, Commit Protocols, Concurrency control in distributed databases, Availability, Serializability, Distributed Query Processing , Heterogeneous Distributed Databases , Distributed Database in Oracle

UNIT III: Parallel Database

Introduction, I/O Parallism, Interquery Parallism, Intraquery Parallism, Interoperation Parallism, Intraoperation Parallism, Design of Parallel system,

UNIT IV: Decision Support System & Indexing and Hashing

Introduction, Aspects of decision support, Database design for Decision support, Data Preparation

Data warehouses and Data marts, Online Transaction Processing (OLTP) ,

Basic Concepts, Ordered indices, B tree index files, B+ tree index files, Multiple key access, Static Hashing, Dynamic Hashing, Comparison of Ordered indexing and Hashing, Bitmap indices

UNIT V: Advanced Data types and New Applications & Advanced Transaction Processing

Motivation, Time in Database, Spatial and Geographic data, Multimedia Databases, Mobility and Personal Databases. Transaction Processing Monitors, Transactional Workflows, Main memory databases, Real time transaction system, Long duration transactions, Transaction Management in Multidatabases

UNIT 6: Recovery System

Failure classification, Storage structure, Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery With concurrent Transactions, Failure with loss of Non-volatile storage, Advanced recovery technique, Remote backup system.

Reference Books –

1. Database System Concepts (5th edition) by Abraham, Korth and Sudarshan, Tata McGraw-Hill),2006, ISBN: 007124476X, 9780071244763
2. An Introduction to Database systems (3rd Edition) by C. J. Date Pearson Education , 2004, ISBN-10: 0321197844 ISBN-13: 9780321197849

CS-105 Elective I (1) Web Technology with PHP & MySQL (4 Credits)

UNIT I Introduction to PHP

Basic Syntax, Sending Data to the Web Browser, Understanding PHP and HTML and White Space, Writing Comments, What Are Variables? , About Numbers, About Strings, About Constants, Operators, What Are Arrays, Conditionals statements, looping statements.

UNIT II Creating Dynamic Web Sites

Creating an HTML Form, Handling an HTML Form, Validating Form Data, Handling HTML Forms with PHP Redux, Making Sticky Forms, Including Multiple File, Creating and Calling Your Own Functions, Variable Scope, Date and Time Functions,
Sending Email

UNIT III Introduction and Advanced SQL and MySQL

Choosing Your Column Types, Choosing Other Column Properties, Creating Databases and Tables, Inserting Records, Selecting Data, Using Conditionals, Using LIKE and NOT LIKE, Sorting Query Results, Limiting Query Results, Updating Data, Deleting Data, Using Functions, Database Design, Performing Joins, Grouping ,Creating Indexes, Using Different Table Types, Performing FULLTEXT Searches,
Database Optimization

UNIT IV Error Handling and Debugging

General Error Types and Debugging, Displaying PHP Errors, Adjusting Error Reporting in PHP, Creating Custom Error Handlers, Logging PHP Errors, Debugging Techniques, SQL and MySQL Debugging Techniques

UNIT V Using PHP with MySQL

Modifying the Template, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Ensuring Secure SQL, Counting Returned Records, Updating Records with PHP

UNIT VI Web Application Security and Making Universal Sites

Using Cookies, Using Sessions, Sessions and Cookies, Improving Session Security, More Secure Form Validation, Handling HTML, Validating Data by Type, Form Validation with JavaScript

Character Sets and Encoding, Creating Multilingual Web Pages, Unicode in PHP,Collation in PHP, Transliteration in PHP, Languages and MySQL, Time Zones and MySQL, Working with Locales

References

1. PHP and MySQL for Dynamic Web Sites: Visual Quickpro Guide, Second Edition, Larry Edward Ullman, Peachpit Press, 2003, ISBN 0321186486, 9780321186485.
2. Programming PHP, II Edition, "Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre", "O'Reilly Media, Inc.", 2013, ISBN 1449365833, 9781449365837

Practical's : 20 Practical's Based on the above Syllabus

CS-105 Elective I (2) JAVA Technology (4 Credits)

UNIT I Java Programming

Object oriented programming revisited, JDK, Java Virtual machine-Platform independent-portability scalability Operators and expressions-decision making ,branching, looping, Classes, Objects and methods, Arrays Strings and Vectors,

UNIT II Inheritance & Multithreading

Interfaces, packages, Multi-Threading, managing errors and exceptions, Applet programming, Managing files and streams. Java Technology, the Java Run-Time Environment, Java Library, Graphics Toolkit, Using Java Graphics on a Particular Computer, Java Interpreters and Browsers. Compiling a Java Program, Invoking an Applet, Example of Interaction with a Browser

UNIT III Use of Java Active Web Documents An Early Form of Continuous Update, Active Documents and Server Overhead, Active Document Representation and Translation,

RPC and Middleware

Programming Clients and Servers, Remote Procedure Call Paradigm, RPC Paradigm, Communication Stubs, External Data Representation, Middleware and Object-Oriented Middleware.

UNIT IV Network Management (SNMP)

Managing an Internet, The Danger of Hidden Features, Network Management Software, Clients,

Servers, Managers and Agents, Simple Network Management Protocol, Fetch-Store Paradigm, The MIP and Object Names, The Variety of MIB Variables, MIB variables that correspond to arrays

UNIT V Java technologies

Graphics, JFC-JAVA foundation classes, swing, images, java 2d graphics, internationalization,

Communication and Networking, TCP Sockets, UDP Sockets, ***java.net,*** java security, Object serialization, Remote method serialization,

UNIT V Advanced Java technologies

JDBC: Java Data Base Connectivity, Java beans, Java interface to CORBA, JAVA- COM Integration, Java Media Framework, commerce and java wallet, Data structures and java utilities, JavaScript, Servlets.

Text Books & References:

1. Using JAVA 2, Edition BK&CD ROM, Joseph L weber, PHI,1999, ISBN-13: 9780789720184
2. JAVA 2 complete, Editon I, Sybex, BPB, 1999, ISBN-13 9788176560771.
3. Java2 The complete Reference, Edition, Patrick Naughton, T M H 2000, **ASIN:** B000QEH0O4
4. Computing concepts With JAVA2, Edition I, Cay Horstmann,, WILEY, 1999
5. JSP Java Server Pages, Editon II, Barry Burd, IDG Books India(p) Ltd,1999
6. Java2 Programming Bible, Edition I, Aaron Walsh, IDG Books India(p) Ltd, 1999, ISBN-13: 978-0764546327

CS-105 Elective I (3) Principles of Programming Languages (4 Credits)

UNIT I Introduction & Non-Imperative Programming Models: Functional, Logic Languages

The Art of Language Design, The Programming Language Spectrum, Why Study Programming Languages? Compilation and Interpretation, Programming Environments.

Common LISP

Basic LISP Primitives (FIRST, REST, SETF, CONS, APPEND, LIST, NTHCDR, BUTLAST, LAST, LENGTH, REVERSE, ASSOC) Procedure definition and binding, DEFUN, LET Predicates and Conditional, EQUAL, EQ, EQL, =, MEMBER, LISTP, ATOM, NUMBERP, SYMBOLP, NIL, NULL, IF, WHEN, UNLESS, COND, CASE Procedure Abstraction and Recursion

Turbo Prolog

Introduction, facts, Objects and Predicates, Variables, Using Rules, Controlling execution fail and cut predicates

UNIT II Names, Scopes, and Bindings

The Notion of Binding Time, Object Lifetime and Storage Management: Static Allocation, Stack-Based Allocation, Heap-Based Allocation, Garbage Collection Scope Rules, Static Scoping, Nested Subroutines, Declaration Order, Dynamic Scoping, The meaning of Names in a Scope, Aliases, Overloading, Polymorphism and Related Concepts, The Binding of Referencing Environments Subroutine Closures, First-Class Values and Unlimited Extent, Object Closures Macro Expansion

UNIT III Control Flow

Expression Evaluation, Precedence and Associativity, Assignments, Initialization, Ordering Within Expressions, Short-Circuit Evaluation, Structured and Unstructured Flow, Structured Alternatives to goto Sequencing Selection, Short-Circuited Conditions, Case/Switch Statements

Iteration, Enumeration-Controlled Loops, Combination Loops, Iterators, Logically Controlled Loops, Recursion, Iteration and Recursion, Applicative- and Normal-Order Evaluation

Data Types

Introduction, Primitive Data Types, Character String Types, and User defined Ordinal types, Array types, Associative Arrays, Record types, Union Types, Pointer and Reference Types, Pointers in C and C++, Reference types, Evaluation, Implementation of pointer and reference types.

UNIT IV Subroutines and Control Abstraction

Fundamentals of Subprograms, Design Issues for subprograms, Local Referencing Environments, Parameter-Passing Methods, Parameters That are Subprograms, Overloaded Subprograms, Generic Subroutines, Generic Functions in C++, Generic Methods in Java, Design Issues for Functions, User-Defined Overloaded Operators, Co-routines, The General Semantics of Calls and Returns, Implementing “Simple” Subprograms Implementing

Subprograms with Stack-Dynamic Local Variables, Nested Subprograms. Blocks, Implementing Dynamic Scoping

UNIT V Data Abstraction and Object Orientation

Object-Oriented Programming, Encapsulation and Inheritance, Modules, Classes, Nesting (Inner Classes), Type Extensions, Extending without Inheritance, Initialization and Finalization, Choosing a Constructor, References and Values, Execution Order, Garbage Collection, Dynamic Method Binding, Virtual- and Non-Virtual Methods, Abstract Classes, Member Lookup,
Polymorphism, Object Closures, Multiple Inheritance. Semantic Ambiguities, Replicated Inheritance, Shared Inheritance, Mix-In Inheritance

UNIT VI Concurrency

Introduction, Multiprocessor Architecture, Categories of concurrency, Motivations for studying concurrency, Introduction to Subprogram-level concurrency, Semaphores, Monitors, Message Passing, Java Threads

Reference Books:

1. Scott Programming Language Pragmatics, 3e(With CD) Kaufmann Publishers, An Imprint of Elsevier,USA ISBN 9788131222560
2. Concepts of Programming Languages, Eighth Edition by Robert W. Sebesta, Pearson Education.
3. Introduction to Turbo Prolog Edition I,Carl Townsend, Sybex Inc ,January 1987, **ISBN-10:** 0895883597
4. LISP 3rd edition by Patrick Henry Winston & Berthold Klaus Paul Horn, BPB

Additional Reading:

Programming Languages: Principles and Paradigms, M. Gabbrielli, S. Martini, Springer, ISBN: 9781848829138

CS-201 Advanced Networking Concepts (4-Credits)

UNIT I: Review of Basic Concepts

Network Architecture – Protocol Hierarchies, Layered model, services, interface , Reference Models, Underlying Technologies

UNIT II: LAN Hardware

Network Interface card , Transmission Media , Topologies , Active hub and passive hub , Repeaters Wireless LAN.

UNIT III: The Internet Layer & Routing Protocols

IP-Datagram , fragmentation and reassembly, ICMP –types of messages, error reporting, ICMP package, BOOTP and DHCP, Interior and Exterior routing – RIP, OSPF, BGP, Multicase Routing- Unicast, Multicast and Broadcast, Multicasting, Multicast trees.

UNIT IV: The Transport Layer

The transport service –Services provided, services primitives, Sockets, Process-to-process communication, Elements of transport protocols – addressing, connection establishment, connection release, flow control and buffering , multiplexing, crash recovery, UDP-Introduction, Remote Procedure Call , TCP –service model, protocol, frame format , connection establishment, release, connection management, error control, congestion control.

UNIT V: Client –server Model & The Application Layer

Client-Server Model- Concurrency , Processes, Socket Interface –sockets, byte Ordering, Socket system calls, connectionless and connection Oriented applications , DNS Telnet and Rlogin, FTP, TFTP, SNMP, SMTP, World Wide Web(Client and server side, cookies, wireless web), Java and the internet

UNIT VI: Introduction to Network security

Cryptography, symmetric key algorithm, Public key algorithms, Digital signatures, Certificates, IPSec, Firewalls, Virtual Private Networks, Network Address Translation, Authentication protocols, Social Issues .

Reference Books:

1. Beehrouz Forouzan , TCP/IP protocol suit , second edition, Tata McGraw Hill
2. Andrew S. Tanenbaum, Computer Networks , Fourth Edition, Prentice Hall, 1 December 2008, ISBN-10: 8177581651, ISBN-13: 978-8177581652
3. Douglas Comer, Internetworking with TCP/IP, Principles, Protocols and Architecture, Volume 1, Pearson Education Asia, ISBN 0-13-018380-6.
4. William Stallings, Data and Computer Communications , Seventh edition , Pearson Education, July 1985.

Lab Assignment

1. Assigning an IP-address to client and server
2. Design a LAN with a given set of requirement.
3. Configuration of DHCP
4. Configuration of DNS
5. Active Directory Configuration
6. Creating an Network Users
7. Creating an Shared folders
8. Interconnecting client and server

CS – 202 Mobile Communications (4 – Credits)

UNIT I: Introduction

Applications, Vehicles, Emergencies, Business, Replacement of wired networks , Infotainment and more, Location dependent services, Mobile and wireless devices A short History of wireless communication, A market for mobile communication Some open research topics, A simplified reference model,

UNIT II: Cellular System

Basic Cellular System Performance Criteria, Operation of Cellular System ,Planning a Cellular System.

UNIT III: Wireless transmission

Frequencies for radio transmission, Regulations , Signals, Antennas, Multiplexing Modulation, Cellular Systems.

UNIT IV: Medium Access Control

Motivation for specialized MAC, SDMA,TDMA ,Fixed TDM, Classical Aloha Slotted Aloha, CSMA , Multiple Access with collision avoidance , CDMA .

UNIT V: Telecommunication and Satellite Systems

GSM, Mobile services , System architecture , Applications of satellite systems.

UNIT VI: Wireless LAN

Infra red Vs Wireless LAN, Infrastructure and Ad-hoc network , IEEE 802.11 System Architecture , Protocol Architecture, HIPERLAN, HIPERLAN 1 WATM, Bluetooth , Architecture .

References

1. Mobile Communications Second Edition by Jochen Schiller (Pearson Education) ,2006, ISBN 978-81-7758-263-5.
2. Mobile Cellular Telecommunications Second Edition by William C.Y.Lee (Mc-Graw-Hill),2006, ISBN 10: 0-07-063599-4.

CS - 203 C#. NET (4 - Credits)

UNIT I: Introducing C#

What is c#, Why C# & Evolution of C#, Character tics of C#, How C# differs from C++ & Java, Introduction to .Net Technology & Framework, The Common language Runtime(CLR)Visual Studio .Net & .Net languages

Features in Visual Studio.net

Integrated Development environment, Start page, Solution explorer window, Class view window, Object browser, Code window, Intellisense, Heap facility, Code Debugging, Project types

UNIT II: Arrays, String, Operators Properties, Indexers, Delegates & Events

Jagged Arrays, Array & Array List class, string class, Boxing & Unboxing variable, Short circuiting operators

Properties, Indexers, Delegates & Events

Properties, Indexers, Delegates, Multicast Delegates, Events

UNIT III: Namespace, interface & Exception handling

Creating & using Namespace(DLL library), Creating & using interface, Exception

UNIT IV: Multithreading

Understanding System. Threading Namespace, Creating & starting Thread, Threading synchronization & Pooling

UNIT V: Windows Application

Event Driven Programming Model, Important classes used in windows application, TextBox & Label Control, Button, CheckBox, RadioButton & GroupBox Control, ListBox & ComboBox control, Month Calendar Control, Docking Control, Tree View Control, Menu & Toolbar control, Dialog Boxes

UNIT VI: Database Connectivity, XML & Web Services

Advantages of ADO.NET, Managed Data providers, Developing a Simple ADO.NET Based Application, Retrieving & Updating Data From Tables., Disconnected Data Access Through Dataset Objects

Working with XML

Support for XML in .NET, System.Xml namespace, Working with streamed XML, Implementing document object model in .NET, XPath XSLT in .NET, Using XML with ADO.NET

Web Services

Introduction to web services, Simple object access protocol, Web service description language, UDDI, Creating a web service, Deploying a web service, Using the Web service class, Using the Web service

Reference Books :

1. Programming in C# A Primer - Second Edition By - E Balagurusamy
2. Visual C#.Net By – C Muthu
3. C# 2005 Programming Black Book By Matt Telles & Kogenet Solution Inc.
4. C#.Net Programming Wrox Publication

CS – 204 Compiler Design (4 – Credits)

UNIT I: Introduction to Compilers and Programming Languages

Compilers and translators, The structure of compiler, .Compiler writing tools, High level programming languages, Definitions of programming languages, A lexical and syntactic structure of a language, Data structures, Operators, Statements

UNIT II: Lexical Analysis & Syntax Analysis

Lexical analysis, Role of a Lexical analyzer, A simple approach to the design of lexical analyzer, regular expressions, Syntax analysis, Finite automata, Minimizing number of states of a DFA, Implementation of a lexical analyzer, Context free grammars

UNIT III: Basic parsing techniques

Introduction to parsers, Shift reduce parsing, Top-down parsing, Operator Precedence parsing, Predictive parsers, LR, SLR and LALR parsers.

UNIT IV: Syntax Directed Translation and Symbol tables

Introduction, Syntax directed Schemes5.3 Implementation of Syntax directed translators, Intermediate code, Postfix notation and evaluation of postfix expressions, Parse trees and syntax trees

Symbol Tables -The contents of a symbol table, Data structures for a symbol table

UNIT V: Error detection and recovery

Errors, Lexical-phase errors, Syntactic phase errors, Semantic errors

UNIT VI: Introduction to Code Optimization

Sources of optimization, Loop optimization

Recommended books :

1. Principles of Compiler Design By Alfred V. Aho, Jeffrey D. Ullman, Addison-Wesley,1977, ISBN 0-201-00022-9
2. Compilers - Principles, Techniques and Tools 2nd edition, A.V. Aho, R. Shethi and J.D. , Pearson Education, 2008, ISBN 978-81317-2101-8.
3. Introduction to system software By D. M. Dhamdhere Silicon Press, 1989 0961533676, 9780961533670

CS-205 Elective I (1):Elective Discrete Event System simulation

(4 – Credits)

UNIT I: Introduction to Simulation

System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.

UNIT II: Simulation Principles, Examples and Softwares

Simulation Examples- Simulation of Queuing systems, Other examples of simulation. General Principles- Concepts of discrete event simulation, List processing, Simulation Software-History of simulation software, An Example Simulation, Simulation Packages, Trends in simulation software.

UNIT III: Statistical Models in Simulation

Useful statistical model, Discrete distribution, Continuous distribution, Poison process , Empirical distribution.

UNIT IV: Queuing Models

Characteristics of Queueing systems, Queueing notations, Long run measures of performance of Queueing systems, Network of Queues.

UNIT V: Random Number Generation

Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers.

UNIT VI: Input Modeling

Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input models.

Text Book:

1. Jerry Banks, John Carson, Barry Nelson, David Nicol, "Discrete Event System Simulation, 3rd Edition,2001, ISBN:81-7808-505-4"

CS – 205 Elective II (2) Distributed Computing (4 – Credits)

UNIT I: Introduction to Distributed System

Goals, Hardware concepts, Software concepts, and Client-Server model. Examples of distributed systems.

UNIT II: Communication

Layered protocols, Remote procedures call, Remote object invocation, Message oriented communication, Stream-oriented communication.

UNIT III: Processes

Threads, Clients, Servers, Code Migration, Software agent.

UNIT IV: Naming

Naming entities, Locating mobile entities, Removing un-referenced entities.

UNIT V: Synchronization

Clock synchronization, Logical clocks, Global state, Election algorithms, Mutual exclusion, Distributed transactions.

UNIT VI: Consistency and Replication

Introduction, Data centric consistency models, Client centric consistency models, Distribution protocols, Consistency protocols.

Text Books :

1. A. Taunenbaum, "Distributed Systems: (2nd Edition) Principles and Paradigms",2007, 9780132392273.
2. G. Coulouris, J. Dollimore, and T. Kindberg, "*Distributed Systems: Concepts and Design*",Pearson Education

References:

1. M. Singhal, N. Shivaratri, "*Advanced Concepts in Operating Systems*", TMH

CS – 205 Elective II (3) Network Programming (4 - Credits)

UNIT I: Introduction

A Simple Daytime Client, Protocol Independence, Error Handling: Wrapper Functions, A Simple Daytime Server [Book-1]

Sockets Introduction

Socket Address Structures, Value-Result Arguments, Byte Ordering Functions, Byte Manipulation Functions, inet_aton, inet_addr, and inet_ntoa Functions, inet_pton and inet_ntop Functions, sock_ntop and Related Functions, readn, writen, and readline Functions, isfdtype Function [Book-1] What is a Socket? Using Sockets [Book-2]

UNIT II: 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 [Book-1]

UNIT III: TCP Client-Server Example

TCP Echo Server: main Function, TCP Echo Server: str_echo Function, TCP Echo Client: main Function, TCP Echo Client: str_cli Function, Normal Startup, Normal Termination, Connection Abort before accept Returns, Termination of Server Process, SIGPIPE Signal, Crashing of Server Host, Crashing and Rebooting of Server Host, Shutdown of Server Host [Book-1]

UNIT IV: I/O Multiplexing: The select and poll Functions

I/O Models, select Function, str_cli Function (Revisited), Batch Input, shutdown Function, str_cli Function (Revisited Again), TCP Echo Server (Revisited), pselect Function, poll Function, TCP Echo Server (Revisited Again) [Book-1]

Socket Options

getsockopt and setsockopt Functions, Checking If an Option Is Supported and Obtaining the Default, Socket States, Generic Socket Options, IPv4 Socket Options, ICMPv6 Socket Option, IPv6 Socket Options, TCP Socket Options

UNIT V: Elementary UDP Sockets

recvfrom and sendto Functions, UDP Echo Server: main Function, UDP Echo Server: dg_echo Function, UDP Echo Client: main Function, UDP Echo Client: dg_cli Function, Lost Datagrams, Verifying Received Response, Server Not Running, Summary of UDP example, connect Function with UDP, dg_cli Function (Revisited), Lack of Flow Control with UDP, Determining Outgoing Interface with UDP, TCP and UDP Echo Server Using select [Book-1].User Datagram Protocol, File Transfer, Error Handling [Book-2]

UNIT VI: Protocols, Sessions, State, and Implementing Custom Protocols

State vs. Stateless, Methods for Maintaining State, What Is a Protocol? Designing a Custom Protocol, Our Chat Protocol, Protocol Registration [Book-2].

Reference books :

1. Unix Network Programming, Volume 1: The Sockets Networking API, 3/E by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, PHI
2. The Definitive Guide to Linux Network Programming by KEIR DAVIS, JOHN W. TURNER, AND NATHAN YOCOM, Apress.