

**4<sup>th</sup> SEMESTER SYLLABUS**  
**Bachelor of Computer Science**  
**DEPARTMENT OF COMPUTER SCIENCE & IT**  
**COTTON UNIVERSITY**

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PAPER: CSC401C

**OPERATING SYSTEM**  
(Credits: 3+1+1=5)

**UNIT I: Introduction [3 Lectures]**

Operating systems overview: Operating systems as an extended machine & resource manager, operating systems classification; Operating systems and system calls; Operating systems architecture.

**UNIT II: Process [5 Lectures]**

Process Concept, Thread, design issues of thread, user space thread and kernel space thread. Usage of thread. Process states, Operation on Processes:- creation and termination. Implementation of process:- process table.

**UNIT III: Process Synchronization [8 Lectures]**

Race condition, Critical-Section, mutual exclusion. Solution to race condition and synchronization: - disabling interrupt, test-and-set-lock, Peterson's solution, semaphore, mutex, monitor, message passing. Classical problems:- The Dining philosopher, sleeping barber and readers-and-writers (bounded buffer) problems and their solution.

**UNIT IV: Scheduling [8 Lectures]**

Basic Concepts, preemptive and non preemptive scheduling. Scheduling Algorithms. Types of scheduling: - batch, interactive and real-time. Goals of scheduling algorithms. FCFS, SJF, RR, priority, multiple queues, three-level scheduling.

**UNIT V: Deadlocks [7 Lectures]**

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Banker's algorithm.

**UNIT VI: Memory management [9 Lectures]**

Multiprogramming. Address binding (relocation), and protection. Swapping. Virtual memory:- logical versus physical address space, paging, page fault, page table and its entries, demand paging, multi level page table, TLB, its entries and working. Page replacement algorithms: - LRU, optimal, NRU, FIFO, second chance, clock, NFU. Working set. What is segmentation, what are its benefits and drawbacks.

**UNIT VII: File system [5 Lectures]**

What is file, file naming, file types(directory, regular, device), sequential access and random access files, file attributes, operations on file, hierarchical directory structure, path name (relative and absolute), operation on directories, FAT, i-nodes, directories in UNIX, file system security

**UNIT VIII: I/O management [3 Lectures]**

Basic principles and overall structure of I/O management subsystem, Device controllers.

**Textbooks:**

1. Modern Operating System, Tanenbaum, PHI Publication.

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**Recommended Books :**

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne.
2. G. Nutt Operating Systems: A Modern Perspective, Pearson Education.
3. W. Stallings Operating Systems, Prentice Hall of India.

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**PAPER: CSC402C**

**COMPUTER NETWORKING**

**(Credits: 4+1+0=5)**

**UNIT I: Introduction [10 Lectures]**

Usage of Computer Network, study of topology, concept of protocol, Connection less and connection Oriented Service, Layered architecture, study of OSI and TCP model.

**UNIT II: Physical Layer [8 Lectures]**

Introduction to Guided and Unguided media, physical description of twisted pair, coaxial cable, and fiber optic cable, Maximum data rate of a channel (Nyquist and shannons law), Basic concepts of Modulation and demodulation, Data encoding techniques (Manchester and Differential Mancestar encoding).

Network connecting devices hub, repeater, bridge, switch, router, and gateway

**UNIT III: Data Link Layer [10 Lectures]**

Functions and services of DLL, Framing and Framing Methods, Concept of Error Control, Error Correcting code(Hamming code), Error detecting code(CRC), Concept of Flow Control, Piggybacking, Stop-and-Wait sliding window protocol, Pipelining techniques(Go backN, Selective Repeat).

Medium Access Control: What is MAC? Static Channel Allocation, Dynamic Channel Allocation, PureALOHA, Slotted ALOHA, Carrier Sense Protocol, 1-persistent CSMA, Non-Persistent CSMA, CSMA/CD, Ethernet(IEEE 802.3) and Ethernet Frame Format, Basic concept of Wireless LAN(IEEE 802.11), Binary Exponential Back-off Algorithm.

**UNIT IV: Network Layer [10 Lectures]**

Services and Functions of Network Layer, Virtual Circuit and Datagram Subnet, Routing, Distance Vector Routing, the Count-to-Infinity problem, Link State Routing, Congestion (definition and factors of congestion only), Definition of Quality of Service, Traffic shaping, Leaky Bucket and token Bucket Algorithm, Concept of IP Address.

**UNIT V: Transport Layer [8 Lectures]**

Functionality of transport Layer, Establishment and release of connection, TCP and UDP(Overview), Introduction to Sockets, port numbers.

**UNIT VI: Application Layer [8 Lectures]**

Concept of E-mail, Telnet, WWW, DNS, HTTP, FTP, URL, SMTP, MIME.

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**UNIT VII: Network Security [10 Lectures]**

Network security concepts, Policy, Types of Attacks, Network Administration, Security management.

**Textbooks:**

1. Computer Networks, Andrew S. Tanenbum, PHI Publication.

**Recommended Books:**

1. "Computer Network" , by S.S. Shinde, NAI Publisher.
2. Data and Computer Communication, 8th edition, William Stallings, Pearson Publication.
3. Cryptography and Network Security, 5th Edition, William Stallings, Pearson Publication.

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**PAPER: CSC403C**

**DATABASE MANAGEMENT SYSTEM**

**(Credits: 3+1+1=5)**

**UNIT I: Introduction[6 Lectures]**

An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and database language and interfaces, Data definitions language, DDL, Overall Database Structure.

**UNIT II: Database Design using Entity Relationship Model [10 Lectures]**

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

**UNIT III: Relational data Model and Language [12 Lectures]**

Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus

**UNIT IV: Data Base Design & Normalization [10 Lectures]**

DFD, Functional dependencies, Full functional dependency, Partial dependency, Transitive dependency, normal forms, first, second, third normal forms, BCNF.

**UNIT V: File structure [10 Lectures]**

Record storage and primary file organization: memory hierarchies and storage devices, Storage of DataBases, Placing file records on disks: Records and its Types, Files, Fixed length records and variable length records, Record Blocking, allocating file blocks on disks, operation on files. Issues in Physical Design: Concept of indexes

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**Textbooks:**

1. Date C J, “An Introduction To Database System”, Addison Wesley

**Recommended Books:**

1. Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill
2. Elmasri, Navathe, “Fundamentals Of Database Systems”, Addison Wesley
3. Leon & Leon, “Database Management System”, Vikas Publishing House.
4. Bipin C. Desai, “An introduction to Database Systems”, Galgotia Publication
5. Majumdar & Bhattacharya, “Database Management System”, TMH

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**PAPER: CSC404G**

**INTRODUCTION TO UNIX**

**(Credits: 3+0+1=4)**

**UNIT I: Introduction to Unix [6 lectures]**

Introduction to Operating System, Functions of Operating System, Introduction to Unix, Brief History, Basic Features, Architecture of Unix System, Kernel, Shell, Unix Environment, Installing requirement, Partitioning the Hard drive, Installing the Unix system, Unix Booting Process, System startup and shut-down process, init and run levels.

**UNIT II: Unix File System [4 lectures]**

Introduction, Unix files: Ordinary, Directory, Device, Unix Directory Structure, File system: Boot block, Super block, Inode block, Data block, Swap file system, Mounting and Unmounting File Systems.

**UNIT III: Basic Unix Commands [8 lectures]**

Internal and External Commands, Commands for files and directories: ls, mkdir, rmdir, cd, cat, cp, mv, rm, pwd, file, more, less, head, tail, pg, touch, lp. Mathematical commands- bc, expr, factor, units. Disk related commands: du, dd, df, dfspace, fdisk, gzip, gunzip, zip, unzip. Other basic commands: man, date, cal, echo, who, finger, exit. Creating and editing files with vi/gedit editor.

**UNIT IV: Unix Processes [4 lectures]**

Process fundamentals, kernel architecture, process structure, connecting processes with pipes, tee, Redirecting input output, managing multiple processes, changing process priority with nice, scheduling of processes: at, cron, batch, kill, ps, sleep.

**UNIT V: System administration [6 lectures]**

Roles of a System Administrator, Identifying administrative files: configuration and log files, Managing user accounts: adding and deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su, Getting system information with uname, host name, disk partitions & sizes, users, kernel.

Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages.

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**UNIT VI: Unix Filters [8 lectures]**

Introduction, Simple filter commands: sort, wc, uniq, comm, cut, paste, diff, cmp, tr, pr. Filter using regular expressions: grep, egrep, and sed.

**UNIT VII: Shell programming [12 lectures]**

Basic of shell programming, various types of shell available in Unix, comparisons between various shells, shell programming in bash, input and output: read, echo commands, Shell variables, conditional and looping statements, case statements, array, parameter passing and arguments, system shell variables, shell keywords, Creating Shell programs for automate system tasks.

**Textbooks:**

1. B.M.Harwani, Unix and Shell Programming, Oxford University Press

**Recommended Books :**

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition.
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH
4. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.

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**(Skill Enhancement Course)**

**PAPER: CSC102SEC**

**DESK TOP PUBLISHING**

**(Credits: 1+0+1=2)**

**UNIT I: Basics of Computer [4 lectures]**

Computer & Internet: Desktop computers, Block diagram of a computer, Input and output devices, memory and storage devices, different ports and its uses, Different type of printers. Software: OS, Windows OS, Application software. Introduction to WINDOWS and LINUX operating systems.

**UNIT II: Word Processing; MS Word [4 lectures]**

Features, Creating, Saving and Opening Documents in Word, Interface, Toolbars, Ruler, Menus, Keyboard 100 Shortcut, Editing, Previewing, Printing, & Formatting a Document, Advanced Features of MS Word, Find & Replace, Using Thesaurus, Using Auto- Multiple Functions, Mail Merge, Handling Graphics, Tables & Charts, Converting a word document into various formats like- Text, Rich Text format, Word perfect, HTML, PDF etc. PageMaker concepts, Preparing document with PageMaker.

**UNIT III: Worksheet- MS-Excel and MS-PowerPoint [4 lectures]**

Worksheet basics, creating worksheet, entering into worksheet, heading information, data, text, dates, alphanumeric values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Keyboard shortcuts, Working with single and multiple workbook, working with formulae & cell referencing, Auto sum, Coping formulae, Absolute &

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relative addressing, Worksheet with ranges, formatting of worksheet, Previewing & Printing worksheet, Graphs and charts, Database, Creating and Using macros, Multiple worksheets-concepts and Creating slide show with animations using MS-PowerPoint.

**UNIT IV: Basic Internet Concepts [4 lectures]**

Internet Applications: Email, Chat, Commerce on the Internet etc. , Networking, different LAN and WAN connections, connecting to a network, testing connection, Internet, IP address, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing.

**Textbooks:**

1. Windows XP Complete Reference. BPB Publications.

**Recommended Books:**

1. MS Office XP Complete BPB Publications.
2. I.T. Tools and Applications, by A. Mansoor, Praga Publications, Matura.
3. Joe Habraken, Microsoft Office 2000, 8 in 1, by Prentice Hall of India.

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