



Integral University, Lucknow
 Department of Computer Science and Engineering
Study and Evaluation Scheme
 Program: B. Tech. CSE (Cloud Technology and Information Security)
2nd Year Semester-III

S. No.	Course code	Course Title	Type of Paper	Period Per hr/week/sem			Evaluation Scheme				Sub. Total	Credit	Total Credits	Attributes							
				L	T	P	CT	TA	Total	ESE				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
THEORIES																					
1	CS-230	Introduction to Communication Skills	HM	2	1	0	40	20	60	40	100	2:1:0	3		√	√					
2	CS-231	Computer Architecture and Organization	DC	2	1	0	40	20	60	40	100	2:1:0	3							√	
3	CS-232	Data Structures & Algorithms	DC	2	1	0	40	20	60	40	100	2:1:0	3	√		√					
4	CS-234	Object Oriented Programming using JAVA	DC	2	1	0	40	20	60	40	100	2:1:0	3	√	√	√					
5	CS-254	Introduction to Information Security & Cryptography	DC	3	1	0	40	20	60	40	100	3:1:0	4			√					
6	CS-252	Python Programming	DC	3	1	0	40	20	60	40	100	3:1:0	4	√	√						
7	CS-239	Operating System Building Blocks	DC	2	1	0	40	20	60	40	100	2:1:0	3			√					
8	BM-226	Human Values and Professional Ethics	HM	3	0	0	-	-	-	50	50	-	-			√				√	
PRACTICAL																					
9	CS-233	Data Structures & Algorithms Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1			√					
10	CS-235	Object Oriented Programming using JAVA Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1			√					
11	CS-237	Information Security Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1			√					
Total				19	7	6	400	200	600	450	1050		26								

BS- Basic Science

DC- Departmental Core

HM- Humanities

OE- Open Elective

DE- Departmental Elective

ESA- Engineering Sciences & Arts (Foundation Course & Engineering Courses)



Integral University, Lucknow
 Department of Computer Science and Engineering
Study and Evaluation Scheme
 Program: B. Tech. CSE (Cloud Technology and Information Security)
2nd Year Semester-IV

S. No.	Course code	Course Title	Type of Paper	Period Per hr/week/sem			Evaluation Scheme				Sub. Total	Credit	Total Credits	Attributes						
				L	T	P	CT	TA	Total	ESE				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEORIES																				
1	CS-240	Desktop Operating System	DC	2	1	0	40	20	60	40	100	2:1:0	3		√	√				
2	CS-242	Relational Database Management Systems	DC	2	1	0	40	20	60	40	100	2:1:0	3						√	
3	CS-244	Network Security Basics	DC	3	1	0	40	20	60	40	100	3:1:0	4	√		√				
4	CS-246	Enterprise Network Engineering	DC	3	1	0	40	20	60	40	100	3:1:0	4	√	√	√				
5	CS-248	Introduction to Linux	DC	2	1	0	40	20	60	40	100	2:1:0	3			√				
6	MT-206	Mathematical Analysis	BS	3	1	0	40	20	60	40	100	3:1:0	4	√	√					
PRACTICAL																				
7	CS-247	Enterprise Network Engineering- Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1	√		√				
8	CS-243	Relational Database Management Systems Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1		√	√				
9	CS-249	Introduction to Linux Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1	√		√				
10	CS-245	Network Security Basics Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1	√		√				
11	CS-241	Desktop Operating System Lab	DC	0	0	2	40	20	60	40	100	0:0:2	1			√				
12	CS-286	Comprehensive Annual Assessment-I	DC	0	0	0	0	100	100	0	100	0.0.0	1			√				
Total				15	6	10	440	320	760	440	1200		27							

BS- Basic Science

DC- Departmental Core

HM- Humanities

OE- Open Elective

DE- Departmental Elective

ESA- Engineering Sciences & Arts (Foundation Course & Engineering Courses)

Introduction to Communication Skills

Subject Code: CS230

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Oral Communication

Principles of nonverbal communication - through clothes and body language, Types of managerial speeches – speech of introduction, speech of thanks, occasional speech, theme speech, Mastering the art of giving interviews in selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, Building Persuasion & Negotiation abilities. [8]

Unit II: Communication in Business

Role of Communication in Business - Main forms of Communication in Business - Communication process – Coding and decoding - Roots of misunderstanding - Inferential model - Original message and reconstructed message Symbols mismatch implications -Non-verbal symbols - Verbal symbols - Seven communication roadblocks Communicating across cultures. [8]

Unit III: Better Public Speaking & Presentation Introduction:

Definition; Speaking to Audience; Preparing a Presentation; Achieving Clarity and Impact; Using Visuals; Arranging the room; Presentation Planning Checklist; Presentation Delivery, appearance, Visual Aids; Understanding Presentations Aspects; Making Technical Talk interesting, Preparation, Research, Organizing Materials; Delivering presentation. [8]

Unit IV: Written Communication

7cs of written communication, Business letters - Stationery - Format and layout -E-mail - Managing the mailbox Presenting mail – Common sense and etiquette. Report Writing - Parts of a report - Qualities of a good report improving writing skills, internal communication through memos, minutes, notices & reports. [8]

Unit V: Sample Business Letters

Types of Business letters - routine letters, bad news and persuading letters, sales letters, Inquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Claims & Adjustments, collection letters, job application letters, Curriculum Vitae / Resume -Invitation to interview - Offer of employment - Letter of acceptance Letter of resignation -Recommendation letter, Logical Traps. [8]

Reference Books:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.
3. Shirley Taylor, Communication for Business, Pearson Education.
4. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.
5. Courtan L. Bovees et al., Business Communication Today, Pearson Education.

Computer Architecture and Organization

Subject Code: CS231

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtrator, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit. [8]

Unit II: Basic Computer Organization

Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions. [8]

Unit III: Micro Programmed Control Unit

Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes. [8]

Unit IV: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input-Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors. [8]

Unit V: Modes of Data Transfer and Memory Organization

Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. [8]

Reference Books:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI
3. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
4. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010
5. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
6. Fundamental Of computer Organization by Albert Zomaya, 2010

Data Structures & Algorithms

Subject Code: CS232

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Data structures

Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: Malloc(), Calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD. [8]

Unit II: Searching and Sorting

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort. [8]

Unit III: Stack and Queue

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on all types of Queues. [7]

Unit IV: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display. [9]

Unit V: Tree Graphs and their Applications:

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search. [8]

Reference Books:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, AusensteinMaoshe& M.Tanenbaum Aaron Data Structures using C and C++ Pearson Education

Object Oriented Programming Using Java

Subject Code: CS234

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction

History and Overview of Java, Object Oriented Programming, Control statements- if and for loop. Using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words, Data types - Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting. Automatic type promotion in Expressions Arrays. Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements. [8]

Unit II: Classes

Class Fundamentals, Declaring objects, Assigning object reference variables. Methods - constructors, “this” keyword, finalize () method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects. Recursion, Access control, Introducing final, understanding static. Introducing Nested and Inner classes. Using command line arguments. Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance. [8]

Unit III: Packages

Definition. Access protection importing packages. Interfaces: Definition and implementation. Exception Handling –Fundamentals, types, Using try and catch and Multiple catch clauses, Nested try Statements, throw, throws, finally. Java’s built-in exception, using Exceptions. [8]

Unit IV: Multithreaded Programming

Java thread model – main thread, creating single and multiple thread. Is alive () and join (). Thread – Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi-threading. I / O basics – Reading control input, writing control output, Reading and Writing files. Applet Fundamentals – AWT package, AWT Event handling concepts, the transient and volatile modifiers. Using instance of using assert. [8]

Unit V: JAVA Database Connectivity (JDBC)

Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: types and methods. An example - JDBC application to query a database. [8]

Reference Books:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Introduction to Information Security & Cryptography

Subject Code: CS254

(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Information Security

Overview of Information security, Threats, Type of Vulnerabilities and Risk, Business Requirements, Information Security Definitions – Security Policies – Tier 1 (origination Level), Tier 2 (Functional Level), Tier 3 (Application or Device Level), Procedures, Standards, Guidance. Role of Governance in Information Security, Develop a Risk Management Program, Risk Management Process, Best Practices for IT Governance.

Unit II: Information Asset Classification

Classification of Information, Information Assets – Owner, Custodian, User, Information Classification in terms of Secret, Confidential, Private and Public, Declassification. Retention and Disposal of Information Assets. Provide Authorization for Access – Owner, Custodian and User.

Unit III: Logical Access Control

User Identity and Access Management- Account Authorization, Access and Privilege Management, System and Network Access Control. Operating Systems Access Controls, Monitoring Systems Access Controls, Intrusion Detection System, Event logging, Cryptography. Physical Security: Identify Assets to be Protected, Perimeter Security, Firewalls, Prevention and Detection Systems, Safe Disposal of Physical Assets. Email Security: PGP, MIME, IP Security: IP security overview.

Unit IV: Introduction to Cryptography

Introduction to Advanced Cryptography and Cryptanalysis, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Permutation Method. Advanced Encryption Techniques and Security Issues – RC4, One-time Pad, RSA, DES, Triple DES, AES and Diffie Hellman.

Unit V: Conventional Encryption

Confidentiality using conventional encryption – Placement of Encryption, Traffic Confidentiality, Key Distribution and Random Number Generation. Key management – Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys, Updating Keys, Storing keys, Backup keys, Compromised Keys, Lifetime of Keys, Destroying Keys and Public-Key Management

Reference Books:

1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009)
2. Cryptography and Information Security by V. K. Pachghare, Prentice-Hall of India Pvt.Ltd; 2nd Revised edition edition (30 March 2015)
3. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
4. Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017)
5. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
6. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)
7. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)

Python Programming
Subject Code: CS252
(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Python Environment

History and development of Python, Why Python? Grasping Python’s core philosophy, discovering present and future development goals, working at the command line or in the IDE, Installing Anaconda on Windows, Linux and MAC, variables, data types. Output statements. [9]

Unit II: Expressions and Control Statements

Working with Numbers and Logic, Performing variable assignments, Doing arithmetic, Comparing data using Boolean expressions, Creating and Using Strings, Interacting with Dates, Creating and Using Functions, Calling functions in a variety of ways, Using Conditional and Loop Statements, Making decisions using the if statement, Choosing between multiple options using nested decisions, Performing repetitive tasks using for, Using the while statement. [9]

Unit III: Data Structures

Storing Data Using Sets, Lists, and Tuples: Performing operations on sets, working with lists, Creating and using Tuples, Defining Useful Iterators, indexing Data Using Dictionaries. [8]

Unit IV: Data Management

Introduction to RDMS, Working with Real Data, Uploading small amounts of data into memory, Streaming large amounts of data into memory, Sampling data, Accessing Data in Structured Flat-File Form, Sending Data in Unstructured File Form, Managing Data from Relational Databases. [8]

Unit V: CGI and GUI Programming in Python

Classes and Objects, Regular Expressions, CGI Programming, Networking, Sending Email, Multithreading, XML Processing, GUI Programming, Extending and Embedding Python [8]

Reference Books:

1. Python: Essential Reference, by David M. Beazley
2. Core Python Programming, by Wesley J. Chun, Prentice Hall
3. Python Programming: An Introduction to Computer Science, by John M. Zelle, Franklin – Beedle and Associates
4. Professional Ruby on Rails by Noel Rappin, Wiley India Pvt Ltd
5. Learn Ruby on Rails: Book one, by Daniel Kehoe

Operating System Building Blocks

Subject Code: CS239

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Operating System

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines. [6]

Unit II: Process Management

Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. Threads: Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Realtime Scheduling, Algorithm Evaluation, Process Scheduling Models. Process Synchronization: Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. [14]

Unit III: Storage Management

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. Virtual Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation File-System Interface: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics File-System Implementation: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery Disk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation. [10]

Unit IV: Protection and Security

Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, Language – Based Protection Security: Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications. [5]

Reference Books:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6th Edition,WSE (WILEY Publication)
4. William Stallings, Operating System, 4th Edition, Pearson Education.
5. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
6. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
7. Nutt: Operating Systems, 3/e Pearson Education 2004

Human Values & Professional Ethics

Subject Code: BM-226

(w.e.f. July 2018)

L	T	P	C
3	0	0	0

Recommended Prerequisite – None

Co-requisite - None

Unit-I: Human Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self Exploration - Its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly. [6]

Unit-II: Introduction to Ethical Concept

Definition of industrial ethics and values, Ethical rules of industrial worker. Values and Value Judgments. Moral Rights and Moral rules, Moral character and responsibilities. Privacy, Confidentiality, Intellectual Property and the Law. Ethics as Law. [6]

Unit-III: Professional Responsibility

The basis and scope of Professional Responsibility, Professions and Norms of Professional Conduct, Ethical Standards versus Profession, Culpable mistakes, the Autonomy of professions and codes of ethics. Employee status and Professionalism. Central Professional Responsibilities of Engineers: The emerging consensus on the Responsibility for safety among engineers, hazards and risks. [6]

Unit-IV: Engineers Ethics

Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas – moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles theories about right action - Self-interest - customs and religion - uses of ethical theories. Valuing Time – Cooperation – Commitment. [6]

Unit-V: Global Issues: A Glimpse of Life Stories

Life story of Prophet Mohammad, Mahatma Gandhi, Swami Vivekanand, Marie Curie and Steve Jobs. Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers consulting engineers-engineers as expert witnesses and advisors -moral leadership. [6]

Reference Readings:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*
6. The Hundred, Michael Hart

Data Structures & Algorithms Labs

Subject Code: CS233

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Programs:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort

Object Oriented Programming Using Java Lab

Subject Code: CS235

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Lab programs

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc.)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
13. Write a program to get file name at runtime and display number of lines and words in that file.
14. Write a program to list files in the current working directory depending upon a given pattern.
15. Create a text field that allows only numeric value and in specified length.
16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

Information Security Fundamentals Lab

Subject Code: CS237

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Lab programs

1. System Security Configuration and Security Policy Management in Windows 10
2. Studying and configuring Windows and Linux based password authentication and user privilege management processes
3. Hashes and message digests calculation using has calculators
4. Generate Hash File and testing Kerberos Authentication
5. HMAC Construction using a "Dummy" Hash Function
6. Setting up simulator for SHA-1
7. Implement following Substitution & Transposition techniques
 - a. Caesar cipher
 - b. Play fair cipher
 - c. Hill cipher
 - d. Vigenere cipher
 - e. Rail fence – row & Column Transformation
8. Implement following algorithms
 - a. DES
 - b. RSA
 - c. MD5
 - d. SHA-1
9. Diffie – Hellman

Desktop Operating System

Subject Code: CS240

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Operating System

Introduction to Operating System, Evolution of operating system, Structure of Operating, OS Operations OS Organizations, Distributed Systems, Open source Operating systems, Process Management, Memory Management, Storage Management, Computing Environment.

Unit II: Installing, upgrading and managing Windows

Gathering hardware devices, preparing to install windows, upgrading and migrating, Clean and Image based installation, Configuring Application Compatibility, administrating windows features, Disk management, and installing and configuring device drivers.

Unit III: File Access, Printers and Network connectivity with Windows

Introduction to Authentication and Authorization, Managing file access , Shared Folders, File compression, file archiving, managing printers, connecting windows client with server, configuring ipv4 & ipv6 connectivity, Implementing APIPA, Introduction to Name resolution, troubleshooting network issues, Overview of wireless network, configuring wireless network.

Unit IV: Securing, Optimizing and maintaining windows Client

Overview of local security management, local security policy settings, EFS and Bitlocker, Application restrictions, UAC, Windows Firewall, Administrating IE8, Windows Defender.

Unit V: Configuring Mobile Computing and Remote Access in windows

Configure Mobile computer and device settings, Remote desktop, remote assistance, direct access, branch cache

Reference Books:

1. Milan Milenkovic - Operating Systems – TATA McGraw hILL, 2009.
2. Operating Systems Fundamentals D. Irtegov, 2005Python: Essential Reference, by David M. Beazley
3. A Short Introduction to Operating Systems (M. Burgess), 2010
4. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

Relational Database Management Systems

Subject Code: CS242

(w.e.f. July 2018)

L	T	P	C
2	1	0	3

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction

Purpose of Database System — Views of data – Data Models – Database Languages — Database System Architecture– Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases. [5]

Unit II: Relational Model

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables. Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases. [13]

Unit III: Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form –Join Dependencies and Fifth Normal Form. [7]

Unit IV: Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols –Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency. [11]

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata
2. McGraw Hill, 2006
3. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition,
4. Pearson/Addision Wesley, 2007.
5. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

Network Security Basics

Subject Code: CS244

(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit I: Introduction to Network Security

Perimeter Security - Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Attack vector and Mitigation techniques; Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC). [9]

Unit II: Threats, Vulnerabilities and Attacks

Threat; Vulnerabilities – vulnerability assessment and vulnerability scanning; Attacks – Application Attack, Network Attack and Mitigating & Detering Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements; Administering a Secure Network – Network Administrative Principles and Securing Network Application. [8]

Unit III: Network Security Management

Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digests Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN). [9]

Unit IV: Network Security Controls

Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability; Host Intrusion Prevention; Anomaly Detection and Mitigation. [8]

Unit V: Network Management

Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies. [6]

Reference/ Text Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

Enterprise Network Engineering

Subject Code: CS246

(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit I: Networking Fundamentals

The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications. [7]

Unit II: Ethernet LANs and Switches

Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching. [6]

Unit III: IP Version 4 Addressing and Subnetting

Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks, Analysing Subnet Masks, Analysing Existing Subnets, Implementing IP Version 4: Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching. [9]

Unit IV: LAN Routing

Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface. [9]

Unit V: IPv4 Services and IP Version 6

Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing. [9]

Reference Books:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
3. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
4. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Introduction to Linux
Subject Code: CS248
(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit I: Linux Introduction

Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces. Exploring Linux Flavours: Introduction to various Linux flavours. Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. History, Versions, Installation, Features, Ubuntu one. Fedora: History, Versions, Installation, Features. [9]

Unit II: The UNIX File System

I nodes - Structure of a regular file – Directories - Conversion of a path name to an I node Super block – Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open –Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link. [8]

Unit III: UNIX Process Management

The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell. [7]

Unit IV: VI editor

Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg, ftp. [7]

Unit V: System Administration

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of 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, installing and removing packages with rpm command. [9]

Reference Books:

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
2. Advance UNIX, a Programmer’s Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010
4. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
5. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

Mathematical Analysis

Subject Code: MT-206

(w.e.f. July 2018)

L	T	P	C
3	1	0	4

Recommended Prerequisite – None

Co-requisite - None

Unit-I: Errors

Error and their analysis, Computer Arithmetic, Floating-Point Number Operation, Normalization & their consequences. Statistics: Correlation and Regression analysis, Binomial Distribution, Poisson Distribution, Normal Distribution. [8]

Unit-II: Algebraic & Transcendental Equations:

Bisection Method, Iteration Method, False Position Method, Secant method, Newton-Raphson Method, LinBairstow's Method. Rate of Convergence of Methods. Solution of system of linear equations by LU decomposition method and Gauss Seidel Method. [8]

Unit-III: Interpolation

Finite differences, Newton's forward & backward Formula, Gauss, Stirling and Bessel's Formula for Equal Interval. Lagrange's Formula and Newton's Divided Difference Formula for Unequal Interval, Numerical Differentiation. [8]

Unit-IV: Numerical Integration & Solution of Ordinary Differential Equations

Numerical Integration by Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Boole's & Weddle's Rule, Euler-Maclaurin's Formula. Taylor's Series Method, Euler's Method, Modified Euler's Method, Runge-Kutta Method. [8]

Unit-V: Integral Transform & Complex Analysis:

Introduction to Fourier Transform, Sine and Cosine transforms, Z-transform. Analytic functions, C-R equations and harmonic functions, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Conformal mapping and bilinear transformations. [10]

References:

1. Sastry, Introductory method of Numerical Analysis, PHI
2. Balaguruswamy, Numerical method, TMH
3. Jain, Iyengar, Jain, Numerical Methods for Scientific & Engineering Computations, New Age International
4. P. Kandasamy, Numerical methods, S. Chand & Company
5. H.K. Dass, Advanced Engineering Mathematics, S. Chand & Company
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Pub.

Enterprise Network Engineering Lab

Subject Code: CS247

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Programs

1. Executing of Switch Configuration - Basic Commands
2. Recognize Switch Configuration - Switch Port Security
3. Schematize Router - Configuration
4. Demonstrate Configuration of IP Address for a Router
5. Classify Setting up of Passwords
6. Compare PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication
7. Differentiate Configuration of Static and Dynamic Routing
8. Analyse Configuration of Default Route
9. Execute Implementation of EIGRP
10. Execute Implementation of OSPF
11. Interpret VLAN Configuration
12. Show Switch Troubleshooting
13. Justify Configuration of Access-lists - Standard & Extended ACLs
14. Analyse Cisco Discovery Protocol
15. Illustrate DHCP, DHCP Relay & DHCP Exclusions
16. Demonstrate Configuring Logging to a Remote Syslog Server

Relational Database Management Systems Lab

Subject Code: CS243

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of programs

1. Create User in Oracle Database and grant and revoke the privileges and use of commit save point role back command.
2. Create the following:
 - Synonym sequences and Index
 - Create alter and update views.
3. Create PL/SQL program using cursors, control structure, exception handling
4. Create following:
 - Simple Triggers
 - Package using procedures and functions.
5. Create the table for
 - COMPANY database
 - STUDENT database and Insert five records for each attribute.
6. Illustrate the use of SELECT statement
7. Conditional retrieval - WHERE clause
8. Query sorted - ORDER BY clause
9. Perform following:
 - UNION, INTERSECTION and MINUS operations on tables.
 - UPDATE, ALTER, DELETE, DROP operations on tables
10. Query multiple tables using JOIN operation.
11. Grouping the result of query - GROUP BY clause and HAVING clause
12. Query multiple tables using NATURAL and OUTER JOIN operation.

Introduction to Linux Lab
Subject Code: CS249
(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Programs

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. WAP that accepts user name and reports if user is logged in.
4. WAP which displays the following menu and executes the option selected by user:
 1. ls 2. Pwd 3. ls -l 4. ps -fe
5. WAP to print 10 9 8 7 6 5 4 3 2 1 .
6. WAP that replaces all “*.txt” file names with “*.txt.old” in the current.
7. WAP that echoes itself to stdout, but backwards.
8. WAP that takes a filename as input and checks if it is executable, if not make it executable.
9. WAP to take string as command line argument and reverse it.
10. Create a data file called employee in the format given below:
 - a. EmpCode Character
 - b. EmpName Character
 - c. Grade Character
 - d. Years of experience Numeric
 - e. Basic Pay Numeric

```
$vi employee
A001 ARJUN E1 01 12000.00
A006 Anand E1 01 12450.00
A010 Rajesh E2 03 14500.00
A002 Mohan E2 02 13000.00
A005 John E2 01 14500.00
A009 Denial SmithE2 04 17500.00
A004 Williams E1 01 12000.00
```
11. Perform the following functions on the file:
 - a. Sort the file on EMPCode.
 - b. Sort the file on
 - i. Decreasing order of basic pay
 - ii. Increasing order of years of experience.
 - c. Display the number of employees whose details are included in the file.
 - d. Display all records with ‘smith’ a part of employee name.
 - e. Display all records with EmpName starting with ‘B’.
 - f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.
 - g. Store in ‘file 1’ the names of all employees whose basic pay is between 10000 and 15000.
 - h. Display records of all employees who are not in grade E2.

Network Security Basics Lab

Subject Code: CS245

(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of Programs

1. Firewall Configuration - I
2. Firewall Configuration - II
3. VPN Configuration - I
4. VPN Configuration - II
5. IDS Configuration - I
6. IDS Configuration - II
7. IDS Configuration - III
8. Router Security - I
9. Router Security - II
10. Router Security - III
11. Traffic Monitoring using WireShark - I
12. Traffic Monitoring using WireShark – II

Desktop Operating System Lab
Subject Code: CS241
(w.e.f. July 2018)

L	T	P	C
0	0	2	1

Recommended Prerequisite – None

Co-requisite - None

List of programs

1. Installing Windows 10
 - Upgrading Windows 7 to Windows 10
 - Migrating User Settings
2. Configuring Windows 10
 - Using the Settings App
 - Using Control Panel
 - Using Windows PowerShell
 - Using GPOs
3. Configuring Network Connectivity
 - Verifying and Testing IPv4 Settings
 - Configuring Automatic IPv4 Settings
 - Configuring and Testing Name Resolution
4. Managing Storage
 - Adding a Disk
 - Creating a Simple Volume
 - Compressing a Folder
 - Enabling Disk Quotas
 - Creating a Storage Space
5. Configuring and Managing Permissions and Shares
 - Creating, Managing, and Sharing a Folder
 - Using Conditions to Control Access and Effective Permissions
6. Installing and Managing a Printer
 - Managing and Using a Printer
7. Managing Data Security
 - Using EFS
 - Using BitLocker
8. **Managing Device Security**
 - Creating Security Policies
 - Testing Security Policies
 - Configuring UAC Prompts
 - Configuring and Testing AppLocker