

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Cyber Security/Cyber Security, III-Semester

CY301 Technical Communication

1. **Technical Communication Skills:** Understanding the process and scope of Communication, Relevance, & Importance of Communication in a Globalized world, Forms of Communication, Role of Unity, Brevity and Clarity in various forms of communication.
2. **Types of Communication:** Verbal & Non-verbal Communication, Classification of NVC, Barriers to Communication, Communicating Globally, Culture and Communication. **Soft Skills:** Interpersonal Communication, Listening, Persuasion, Negotiation, Communicating bad news/messages, communicating in a global world.
3. **Writing Skills:** Traits of Technical Writing, Principles of Business Writing, Style of Writing, Writing Memos, Letters, Reports, and Types of technical reports, Characteristics, format and structure of technical reports, Writing Research Papers. **Speaking Skills:** Audience-awareness, Voice, Vocabulary and Paralanguage, Group Discussion, Combating Nervousness, Speaking to one and to one thousand, Mock Presentations.
4. **Job Interviews:** Preparing for interviews, assessing yourself, Drafting Effective Resume, Dress, decorum and Delivery techniques, Techniques of handling interviews, Use of Non-verbals during Interviews, Handling turbulence during interviews. **Group Discussion:** Objective, Method, Focus, Content, Style and Argumentation skills. **Professional Presentations:** Individual Presentations (Audience Awareness, Body Language, Delivery and Content of Presentation).
5. **Grammar & Linguistic ability:** Basics of grammar, common error in writing and speaking, Study of advanced grammar, Vocabulary, Pronunciation Etiquette, Syllables, Vowel sounds, Consonant sounds, Tone: Rising tone, Falling Tone, Flow in Speaking, Speaking with a purpose, Speech & personality, Professional Personality Attributes.

Texts and Reference Books:

1. Sharon Gerson and Steven Gerson. Technical Writing: Process and Product (8th Edition), London: Longman, 2013
2. Rentz, Kathryn, Marie E. Flatley & Paula Lentz. Lesikar's Business Communication Connecting in a Digital world, McGraw-Hill, Irwin. 2012
3. Allan & Barbara Pease. The Definitive Book of Body Language, New York, Bantam, 2004
4. Jones, Daniel. The Pronunciation of English, New Delhi, Universal Book Stall. 2010
5. Sharma, Sangeeta & Mishra, Binod. Communication Skills for Engineers and Scientists, New Delhi: PHI Learning, 2009, rpt 2012

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CY302 Fundamentals of Cryptography

Course Outcome

- 1 To understand basics of Cryptography and Network Security.
- 2 To be able to secure a message over insecure channel by various means.
- 3 To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for network security to protect against the threats in the networks.

Unit 01

Introduction of cryptography , Symmetric-key Encryption, Historical Ciphers, Computational Security, Semantic Security and Pseudorandom Generators (PRGs), Perfect secrecy. One-time-pad encryption. Characterizations of perfect secrecy, Limitations of perfect secrecy

Unit 02

CPA-Secure Ciphers from PRF, Modes of Operations of Block Ciphers, DES, AES and Message Authentication Codes (MAC) ,Information-theoretic Secure MAC, Cryptographic Hash Functions

Unit 03

Ideal-Cipher Model, Davies-Meyer construction and Merkle-Damgård Paradigm, Birthday Attacks on Cryptographic Hash Functions, Applications of Hash Functions, Random Oracle Model and Authenticated Encryption. Generic Constructions of Authenticated Encryption Schemes, Key-exchange Problem, One-way Trapdoor Functions and Cyclic Groups

Unit 04

Discrete-Logarithm Problem, Computational Diffie-Hellman Problem, Decisional , Diffie-Hellman Problem, Elliptic-Curve Based Cryptography and Public-Key Encryption

Unit 05

CCA -secure Public-key Hybrid Ciphers Based on Diffie-Hellman Problems and RSA-assumption, Digital Signatures, Overview of TLS/SSL, Number Theory, Interactive Protocols .

Reference Book

1. Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education
2. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR
3. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
4. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.

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CY303 Data Structures

1. Introduction to Data Structure: Concepts of Data and Information, Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation. Introduction to linear data structures- Arrays, Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.
2. Stacks and Queue: Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Queue simulation, Application of queues.
3. Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.
4. Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)-Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.
5. Sorting: Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods. Hashing & Indexing. Case Study: Application of various data structures in operating system, DBMS etc.

Text Books

1. AM Tanenbaum, Y Langsam & MJ Augstein, "Data structure using C and C++", Prentice Hall India.
2. Robert Kruse, Bruce Leung, "Data structures & Program Design in C", Pearson Education.

Reference Books

1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.
2. N. Wirth, "Algorithms + Data Structure = Programs", Prentice Hall.
3. Jean – Paul Tremblay, Paul Sorenson, "An Introduction to Data Structure with application", TMH.
4. Richard, Gilberg Behrouz, Forouzan, "Data structure – A Pseudocode Approach with C", Thomson press.

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CY304 Digital Systems

Unit 1: Review of number systems and number base conversions. Binary codes, Boolean algebra, Boolean functions, Logic gates. Simplification of Boolean functions, Karnaugh map methods, SOP-POS simplification, NAND-NOR implementation.

Unit 2: Combinational Logic: Half adder, Half subtractor, Full adder, Full subtractor, look-ahead carry generator, BCD adder, Series and parallel addition, Multiplexer – demultiplexer, encoder- decoder, arithmetic circuits, ALU

Unit 3 : Sequential logic: flip flops, D,T, S-R, J-K Master- Slave, racing condition, Edge & Level triggered circuits, Shift registers, Asynchronous and synchronous counters, their types and state diagrams. Semiconductor memories, Introduction to digital ICs 2716, 2732 etc. & their address decoding. Modern trends in semiconductor memories such as DRAM, FLASH RAM etc. Designing with ROM and PLA.

Unit 4 : Introduction to A/D & D/A convertors & their types, sample and hold circuits, Voltage to Frequency & Frequency to Voltage conversion. Multivibrators :Bistable, Monostable, Astable, Schmitt trigger, IC 555 & Its applications. TTL, PMOS, CMOS and NMOS logic. Interfacing between TTL to MOS.

Unit 5 : Introduction to Digital Communication: Nyquist sampling theorem, time division multiplexing, PCM, quantization error, introduction to BPSK & BFSK modulation schemes. Shannon's theorem for channel capacity.

References:

1. Morris Mano, Digital Circuits & Logic Design, PHI
2. Gothman, Digital Electronics, PHI
3. Tocci, Digital Electronics, PHI
4. Mavino & Leach, Digital Principles & Applications, PHI
5. Taub and schilling, Digital Integrated electronics.
6. Simon Haykin, Introduction to Analog & Digital Communication, Wiley.
7. Lathi B.P., Modern analog & digital communication , Oxford University.

List of Experiments:

1. To study and verify the truth tables of various Logic gates
2. To verify the properties of NAND and NOR gates as Universal Building Blocks.
3. Simplification and implementation of a Boolean function
4. Implementation of basic Boolean arithmetic logic circuits such as Half-adder, Half-subtractor, Full adder and Full subtractor
5. Conversion from Binary to Gray and Gray to Binary code
6. To construct a binary multiplier using combinational logic and to verify with the truth table
7. To verify 2-bit Magnitude comparator for all possible conditions
8. Generation of various logical functions using 8-to-1 multiplexer
9. Construction of a 4-bit ripple counter and study of its operation
10. Operation of IC-555 Timer as Monostable, Astable and Bistablemultivibrators
11. To characterize binary ladder type digital to analog (D/A) and analog to digital (A/D) convertor
12. Comparison of various Logic families
13. Design and implementation of various types of flip-flops using JK flip-flop
14. To study natural sampling of continuous time waveforms using different sampling rates
15. To study Pulse-Code modulation with Time-division multiplexing (PCM-TDM)
16. To study generation and detection of BPSK and QPSK waveforms

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CY305 Object Oriented Programming & Methodology

1. Introduction to Object Oriented Thinking & Object Oriented Programming: Comparison with Procedural Programming, features of Object oriented paradigm– Merits and demerits of OO methodology; Object model; Elements of OOPS, IO processing, Data Type, Type Conversion, Control Statement, Loops, Arrays.
2. Encapsulation and Data Abstraction- Concept of Objects: State, Behavior & Identity of an object; Classes: identifying classes and candidates for Classes Attributes and Services, Access modifiers, Static members of a Class, Instances, Message passing, and Construction and destruction of Objects.
3. Relationships – Inheritance: purpose and its types, ‘is a’ relationship; Association, Aggregation. Concept of interfaces and Abstract classes.
4. Polymorphism: Introduction, Method Overriding & Overloading, static and run time Polymorphism. Virtual Function, friend function, Static function, friend class.
5. Strings, Exceptional handling, Introduction of Multi-threading and Data collections. Case study like: ATM, Library management system.

Text Books

1. Timothy Budd, “An Introduction to Object-Oriented Programming”, AddisonWesley Publication, 3rd Edition.
2. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I, Fundamentals”, Prentice Hall publication.

Reference Books

1. G. Booch, “Object Oriented Analysis& Design”, Addison Wesley.
2. James Martin, “Principles of Object Oriented Analysis and Design”, Prentice Hall/PTR.
3. Peter Coad and Edward Yourdon, “Object Oriented Design”, Prentice Hall/PTR.
4. Herbert Schildt, “Java 2: The Complete Reference”, McGraw-Hill Osborne Media.

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CY306 Computer Workshop (Python Programming)

Module1: Introduction to python language, Basic syntax, Literal Constants, Numbers, Variable and Basic data types,String, Escape Sequences, Operators and Expressions, Evaluation Order, Indentation, Input, Output, Functions, Comments.

Module2: Data Structure: List, Tuples, Dictionary, DataFrame and Sets, constructing, indexing, slicing and content manipulation.

Module3: Control Flow:Conditional Statements - If, If-else, Nested If-else. Iterative Statement - For, While, Nested Loops. Control statements - Break, Continue, Pass.

Module4: Object oriented programming:Class and Object, Attributes, Methods, Scopes and Namespaces, Inheritance, Overloading, Overriding, Data hiding,Exception: Exception Handling, Except clause, Try finally clause, User Defined Exceptions.

Module5: Modules and Packages: Standard Libraries: File I/O, Sys, logging, Regular expression, Date and Time, Network programming, multi-processing and multi-threading.

References

- **Timothy A. Budd: Exploring python, McGraw-Hill Education.**
- **R.NageshwarRao ,”Python Programming” ,Wiley India**
- **Think Python: Allen B. Downey, O'Reilly Media, Inc.**

List of Experiments:

1. To write a Python program to find GCD of two numbers.
2. To write a Python Program to find the square root of a number by Newton's Method.
3. To write a Python program to find the exponentiation of a number.
4. To write a Python Program to find the maximum from a list of numbers.
5. To write a Python Program to perform Linear Search
6. To write a Python Program to perform binary search.
7. To write a Python Program to perform selection sort.
8. To write a Python Program to perform insertion sort.
9. To write a Python Program to perform Merge sort.
10. To write a Python program to find first n prime numbers.
11. To write a Python program to multiply matrices.
12. To write a Python program for command line arguments.
13. To write a Python program to find the most frequent words in a text read from a file.
14. To write a Python program to simulate elliptical orbits in Pygame.
15. To write a Python program to bouncing ball in Pygame.