RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Artificial Intelligence/ Artificial Intelligence, III-Semester

AI 301 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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AI 302 Introduction to Probability and Statistics

Objective: The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Unit 1: Basic Probability-

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Unit 2: Continuous Probability Distributions-

Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

Unit 3: Bivariate Distributions-

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

Unit 4: Basic Statistics-

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

Unit 5: Applied Statistics-

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit 6: Small samples-

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Suggested Text/Reference Books :

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd

Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

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AI303 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 Augustein, "Data structure using C and C++", Prentice Hall India.

2. Robert Kruse, Bruse 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 Trembly , Paul Sorenson, "An Introduction to Data Structure with application", TMH.

4. Richard, GilbergBehrouz, Forouzan ,"Data structure – A Pseudocode Approach with C", Thomson press.

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CSE-Artificial Intelligence/ Artificial Intelligence, III-Semester

AI 304 Introduction to Artificial Intelligence

1. Fundamental of Artificial Intelligence, history, motivation and need of AI, Production systems, Characteristics of production systems , goals and contribution of AI to modern technology, search space, different search techniques: hill Climbing, Best first Search, heuristic search algorithm, A* and AO* search techniques etc.

2. Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

3. Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, forward and backward reasoning.

4. Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding, natural language processing (NLP), Components of NLP, application of NLP to design expert systems.

5. Expert systems (ES) and its Characteristics, requirements of ES, components and capability of expert systems, Inference Engine Forward & backward Chaining, Expert Systems Limitation, Expert System Development Environment, technology, Benefits of Expert Systems.

TEXT BOOKS:

1. Russel,S., and Norvig,P., “Artificial Intelligence: A Modern Approach”, 4th Edition, 2020, Pearson.
2. Elaine Rich, Kevin Knight,Shivashankar B. Nair, “Artificial Intelligence”, McGraw-Hill International.
3. Nils J. Nilsson, “Artificial Intelligence: A New Synthesis”, Morgan-Kauffman.

REFERENCE BOOKS:

1. Janakiraman, K.Sarukesi, ‘Foundations of Artificial Intelligence and Expert Systems’, Macmillan Series in Computer Science.
2. W. Patterson, ‘Introduction to Artificial Intelligence and Expert Systems’, Prentice Hall of India.

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AI 305 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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CSE-Artificial Intelligence/ Artificial Intelligence, III-Semester

AI 306 Computer Workshop/Introduction to Python-I

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/0, 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.