MAHARANI LAKSHMI AMMANNI COLLEGE FOR WOMEN
AUTONOMOUS
18th Cross, Malleshwaram, Science P.O., Bangalore – 12
Affiliated to Bengaluru City University
Accredited with Grade A by NAAC

MAHARANI LAKSHMI AMMANNI COLLEGE FOR WOMEN
(AUTONOMOUS)
Affiliated to Bengaluru City University (BCU)

DEPARTMENT OF COMPUTER SCIENCE

Title of Papers, Blow-up Syllabus, Scheme of Study & Pattern of Examination for

BSc. (Bachelor of Science)

(Academic Year 2023-2024 onwards)

Under

National Education Policy 2020

Choice Based Credit System (Semester Scheme)

Program Outcomes (PO)

PO1: To develop analytical skills and apply to real life problems.

PO2: To develop logical thinking.

PO3: To develop interdisciplinary skills.

PO4: To create interest in learning.

PO5: To train students with skills other than core subjects.

PO6: To produce enthusiastic and confident students.

PO7: To prepare students to face outside world.

Program Specific Outcomes (PSO)

PSO1: Ability to analyze any given problem.

PSO2: Ability to arrive at an optimum solution for the problem.

PSO3: Ability to make use of computers to solve real life problems.

PSO4: To know how various software can be implemented to arrive at solutions for complex and large problems.

PSO5: To make students understand the importance and power of technology.

PSO6: To train students such that they meet the requirements of the industry.

BSc. COMPUTER SCIENCE [MAJOR] SYLLABUS-NEP

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
I	CS-C1T	Problem Solving Techniques	4	OE1: Open Elective	3	25
	CS-C2P	Problem Solving Lab using C HLL	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC I :	2	
				Physical Education	1	
				Health & Wellness	1	
II	CS-C3T	Data Structure	4	OE2: Open Elective	3	25
	CS-C4P	Data Structures Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	Environmental Science	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
III	CS-C5T	Object Oriented Programming using Java	4	OE3: Open Elective	3	25
	CS-C6P	Java Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC II :	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
IV	CS-C7T	Operating Systems	4	OE4: Open Elective	3	25
	CS-C8P	Linux Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	The Constitution of India	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
V	CS-C9T	Database Management System	3	Vocation Course I : Other Option (Major)	3	22
	CS-C10T	Artificial Intelligence	2	SEC III :	2	
	CS-C11P	Database Management System Lab	3	Physical Education	1	
	CS-C12P	Artificial Intelligence Lab	2	NCC/NSS/CL/R&R	1	
	XX	Other Option (Minor) LAB	3			
	XX	Other Option (Minor) LAB	2			
				Technical Writing		
	CS-C14T	Computer Networks	3	Internship	2	
	CS-C15P	Python Programming Lab	2	SEC III :	2	
	CS-C16P	Computer Networks Lab	2	Physical Education	1	
	XX	Other Option (Minor) Theory	3	NCC/NSS/CL/R&R	1	
	XX	Other Option (Minor) LAB	2			
VII	CS-C17T	Internet Technologies	3	Elective I: (Internet of Things, Cloud Computing, Data Mining, Image Processing, Discrete Structures, Modeling and Simulation)	3	22
	CS-C18T	Data Analytics	3	Elective II : (Internet of Things, Cloud Computing, Data Mining, Image Processing, Discrete Structures, Modeling and Simulation)	3	
	CS-C19T	Design and Analysis of Algorithm	3	Research Methodology	3	
	CS-C20P	Internet Technologies Lab	2			
	CS-C21P	Data Analytics Lab	2			
VIII	CA-C22T	Machine Learning	3	Elective III : (Block Chain Technologies,	3	20

				Technologies, Operations Research, Human Computer Interface, Parallel Algorithms)		
	CA-C23T	Theory of Computation	3	Research Project	6	
	CA-C24T	System Security	3			
	CA-C24P	Machine Learning Lab	2			

COURSE PATTERN, CREDITS AND PATTERN OF EXAMINATION

SEM I, II, III, IV, V & VI

Sem	Paper code	Paper title	Hours/ week [L+T+P]	Exam duration	IA marks	EE marks	Total marks	Credits
I	CS-C1T	Problem solving techniques	4+0+0	2.5 Hours	40	60	100	4
I	CS-C2P	LAB: C Programming	0+0+3	3 Hours	25	25	50	2
II	CS-C3T	Data structures	4+0+0	2.5 Hours	40	60	100	4
II	CS-C4P	LAB: Data Structure	0+0+3	3 Hours	25	25	50	2
III	CS-C5T	Object Oriented Programming using JAVA	4+0+0	2.5 Hours	40	60	100	4
III	CS-C6P	LAB: JAVA Lab	0+0+4	3 Hours	25	25	50	2
IV	CS-C7T	Operating Systems	4+0+0	2.5 Hours	40	60	100	4
IV	CS-C8P	LAB: Linux Lab	0+0+4	3 Hours	25	25	50	2
V	CS-C9T	Database Management System	4+0+0	2.5 Hours	40	60	100	4
V	CS-C10T	Artificial Intelligence	4+0+0	2.5 Hours	40	60	100	4
V	CS-C11P	LAB: DBMS Lab	0+0+4	3 Hours	25	25	50	2
V	CS-C12P	LAB: Mini Project	0+0+4	3 Hours	25	25	50	2
VI	CS-C13T	Python Programming	4+0+0	2.5 Hours	40	60	100	4
VI	CS-C14T	Computer Networks	4+0+0	2.5 Hours	40	60	100	4
VI	CS-C15P	LAB: Python Programming Lab	0+0+4	3 Hours	25	25	50	2
VI	CS-C16P	LAB: Major Project	0+0+4	3 Hours	25	25	50	2+2

CS-C1T: PROBLEM SOLVING TECHNIQUES

Objective: To understand the role and importance of algorithms and to develop procedure - oriented programming skills using C Language

Skills to be developed: Problem Analysis, Algorithm Design, various programming structures, Implementation by Coding.

Course Outcomes:
CO1.1: Knowledge of algorithms, technologies, notations. Writing algorithms and flowcharts for different types of problems.
CO1.2: Learning basics of C language, Operators, loops, arrays and pointers.
CO1.3: Advanced array operations like reversing the elements, histograms, partitioning etc.
CO1.4: Learn about functions, reusability, types. Understand structures and Unions. Also learn about strings and string operations.

Total No. of hours	Credits	Hours per Week	Internal assessment marks	End exam marks	Total marks
52	4	4	40	60	100

CS-C1T: PROBLEM SOLVING TECHNIQUES

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I

Introduction: Block diagram, hardware, Software, The Role of Algorithms in Computing, designing algorithms, analyzing algorithms. Growth of Functions, Asymptotic notation, Flow-chart symbols. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation. Generating of the Fibonacci sequence, reversing the digits of an integer, base conversions.

[13 Hours]

UNIT-II

C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output. Formatted output-printf variable length argument list, formatted input-scanf. Control Flow: Statements and Blocks, If-else, else-if, switch. Loops: while loop, for loop, do while, break and continue.

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers. Generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power, computing the nth Fibonacci number.

[13 hours]

UNIT-III

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,Traversing linear arrays, Multidimensional arrays, Matrices and Sparse matrices.
Array Techniques: Array order Reversal, Array counting or histogram, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest element- multiplication of two square matrices.
Functions: Declaration, definition, calling. Functions with parameters- actual and formal parameters, categories of functions, recursive functions.
String handling: Declaration, initialization, reading & writing, string functions. [13 Hours]

UNIT-IV
Structures, Unions and Pointers: Structures: Declaration, initialization, accessing. Array of structures. **Union**: Declaration, initialization, accessing, difference between structure and union. **Pointers and address**, pointer arithmetic, pointers to functions, pointers to arrays.
Files: Sequential and random files, Text and binary files. [13 Hours]

Text Books:

1. Brain M. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd edition, Pnnceton Hall Software Series. 2015.
2. Yeshwanth Kanetkar, Let us C, 18th edition 2021
3. R.G.Dromey, '*How to Solve it by Computer", Pearson Education India, 2008.

Reference Books:

1. Greg Perry and Dean Miller, "C programming Absolute Beginner's Guide", 3rd edition,
2. Pearson Educauon, Inc, 2015.
3. Steven S. Skiena, "The Algorithm Design Module", 2nd Edition, Springer-Verlag London Limited, 2008.
4. Donald E. Knuth, The Art of Computer Programming", Volume 2: Seminumerical Algorithms, 3rd Edition. Addison Wesley langman, 2008.

Web Resources:
I. http://algorithmsforinlemews.com "Algorithms for Interviews"

CS-C3T - DATA STRUCTURES

Objectives: To give the knowledge of various data structures, data organization and their applications in real world.

Skills to be developed: Building data structures and operations on them. Applications.

Course Outcomes:

CO1: Introduction, types, complexity, Mathematical functions, searching and sorting techniques.

CO2: Linked lists – construction, manipulations, and applications.

CO3: Stacks and Queues – types, construction, manipulations, and applications.

CO4: Trees, Graphs and Hashing - construction, manipulations, and applications

Total No. of hours	Credits	Hours per Week	Internal assessment marks	End semester exam	Total marks
52	4	4	40	60	100

UNIT-I

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms. **Arrays**: Inserting and deleting elements. **Searching:** Introduction and Notation, sequential search, Binary Search, hash search, linear pattern search. Comparison of Methods. **Sorting:** Introduction and Notation, Bubble sort, insertion Sort, Selection Sort, sorting by partitioning, sorting by diminishing increment, shell sort, divide and conquer.

[13 Hours]

UNIT-II

Linked list: Definition, Representation of Singly Linked List in memory, traversing a Singly linked list, searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list.

[13 Hours]

UNIT-III

Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack Definition. **Queues:** Array representation of queue, Linked list representation of queues. Types of Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues. [13 Hours]

UNIT-IV

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, External Searching: B-Trees, Applications of Trees. **Graphs:** Mathematical Back ground, Computer Representation, Graph Traversal. Topological Sorting, Greedy Algorithm, Graphs as Data Structure. **Hashing:** parse Tables, choosing a Hash function, Collision Resolution with Open addressing, Collision Resolution by Chaining. [13 Hours]

Text Books:

1. Seymour Lipschutz, "Data Structures with C", Schaum's outLines, Tata Mc Graw Hill, 2015.
2. Robert Kmse, C.L.Tondo, Bruce Leung,Shashi Mogalla,"Data Structures and Program Design using C", Pearson Education, 2009.

Reference Books:

1. Mark Allen Weiss," Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education,2013

2. Forouzan,"A Structured Programming Approach using Edition, Cengage LeamingIndia,2012.

CS-C5T: OBJECT ORIENTED PROGRAMMING USING JAVA

Objectives: To give the knowledge of OOPs concept and its applications

Skills to be developed: Knowledge of Inheritance, Polymorphism, Applet Programming.

Course Outcomes:

CO1: Basics of OOP concepts.

CO2: Knowledge of inheritance, polymorphism, overloading

CO3: Knowledge of Packages and Exception Handling

CO4: Applet programming & Event handling

Total No. of hours	Credits	Hours per Week	Internal assessment marks	End semester exam	Total marks
52	4	4	40	60	100

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT-I

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. Objects and Classes: Basics of objects and classes in java, Methods and objects, Constructors, Finalizer, Visibility modifiers

[13 Hours]

UNIT-II

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

[13 Hours]

UNIT-III

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons,Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing [13 Hours]

UNIT-IV

Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java,

[13 Hours]

Textbooks:

1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2019

Reference Books:

1. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Eidth Edition, Oracle Press, 2018

2. Herbert Schildt, 'The Complete Reference Java, 12th Edition, McGraw Hill, 2021

Web Resources

1. https://docs.oracle.com/javase/tutorial/
2. https://javabeginnerstutorial.com/core-java-tutorial/

CS-C7T: OPERATING SYSTEMS

IV SEMESTER

Objectives: To give the knowledge of Operating System concepts

Skills to be developed: Shell Programming.

Course Outcomes:

CO1: Computer architecture, kernel, system calls

CO2: Knowledge of Synchronized processes and process scheduling

CO3: Memory management & file system

CO4: Distributed Systems & protection

Total No. of hours	Credits	Hours per Week	Internal assessment marks	End semester exam	Total marks
52	4	4	40	60	100

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I

Introduction: Computer System Organization, Architecture, Structure, Operations, Process Management, Memory Management, Storage Management, Kernel Data Structures, Computing Environments. Operating System Structures: Services, System Calls, Types, System Boot. Processes: Process Concept, Scheduling, Operations, Inter-process Communication. [13 Hours]

UNIT –II

Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Producer-consumer's, Dining Philosopher's, Process Scheduling: Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Real-time CPU Scheduling. Deadlocks: System model, Characterization, Methodsfor handling deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery from deadlock. [13 Hours]

UNIT – III

Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory Management: Demand Paging; Copy-on-Write, Page Replacement; Allocation of Frames; Thrashing, File System: File Concept, Access Methods, File-System Implementation: Structure, File-System and Directory Implementation, Allocation Methods, Free Space Management, Mass-Storage Structure: Overview, Disk Scheduling, Disk Management.

[13 Hours]

UNIT-IV

Shell Programming: types of shell, Internal and External commands, General purpose commands.

Unix file system: file related commands, Directory related commands, wild cards, Comparing files. File attributes, File permissions, Ownership of files.

Shell script features, Reading variables, positional parameters, Expressions- Arithmetic, Relational, Logical, File, Real arithmetic. **Control structures**: if, if-then, if-then-else, case; Loop control structures: while, until, for, AWK concepts.

[13 Hours]

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Concepts, 9thEdition, 2016 India, Wiley.

Reference Books:

1. William Stallings, "Operating Systems-Internals and Design Principles", Pearson, 9th Edition, 2018
2. D M Dhamdhere: Operating Systems – A Concept Based Approach, 3rd Edition, TataMcGraw –Hill, 2015.
3. Gary Nutt, Nabendu Chaki, Sarmistha Neog, "Operating Systems" Pearson Education Limited,3rd Edition, 2016.
4. Sumitabha Das: "UNIX Concepts and Applications", 4th Edition, Tata McGraw Hill, 2017.
5. Shell Programming by Yeshawant Kanetkar 4th edition

V SEMESTER

CS-C9T: DATABASE MANAGEMENT SYSTEMS

Objective: To understand database and database management concepts

Skills to be developed: Creating, modifying and maintaining databases, effectively querying databases to retrieve data as required.

Course Outcomes:

CO7.1: Understanding Database Management System, Database concepts, architecture, classification of DBMS.

CO7.2: Gain knowledge on Data modelling using ER model, data model, Record storage and primary file organization, Hashing techniques.

CO7.3: Relational Data Model and Relational Algebra, Examples of Relational Algebra queries,Relational Database Language, Data types, DDL and DML queries, Nested Queries, Applications of various types of SQL queries and their implementation

CO7.4: Functional Dependencies, Transitive Dependency and Normalization for Relational Database, Understand Transaction Processing Concepts, Concurrency Control techniques, Distributed Databases and Client Server Architecture and ACID properties.

Total Number Of Hours	Credits	Hours/Week	Internal Assessment Marks	Exam	Total Marks
52	4	3	40	60	100

Unit 1

Introduction: Database, Database management System, Database System; Characteristics of the Database Approach, Different people behind DBMS, Uses of DBMS, Implications of Database Approach, when not to use a DBMS;

Database System Concepts and Architecture: Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Database languages and interfaces, The database system Environment; Centralized and Client-Server Architectures, Classification of DBMS.

[13 Hours]

Unit 2

Data Modelling Using the Entity-Relationship Model: High level conceptual Data Models for Database Design with example; ER model concepts: Entities and Attributes, Entity types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Relationships and roles, Notation for ER Diagrams;Generalization,Specialization and aggregation

Record Storage and Primary File Organization: Secondary Storage Devices, Buffering of Blocks,Placing file Records on Disk; Operations on Files: Types of File Organizations-Sequential, Heap, Hash, ISAM, Cluster file organizations.

[13 Hours]

Unit 3

Relational Data Model and Relational Algebra: Concepts, Constraints and Update operations, Defining Relations; Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory- UNION, INTERSECTION, SET DIFFERENCE, Binary Relational Operations: JOIN and DIVISION Examples of queries in the Relational Algebra;

Relational Database Language: Data definition in SQL, Queries in SQL, Insert, Delete and UpdateStatements in SQL, Views in SQL, Embedded SQL; **[13 Hours]**

Unit 4

Relational Database Design: Anomalies in a database, Functional Dependencies, Transitive dependencies and Normalization for Relational Database, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Lossless Join and dependency, Boyce-Codd Normal Form, higher order Normal Forms

Transaction Processing Concepts: Introduction, Transaction and System Concepts, Desirable properties of transaction, Schedules and Recoverability, Serializability of Schedules

Concurrency Control techniques: Locking Techniques, Concurrency Control based on time stamp ordering, Optimistic Concurrency control techniques

Distributed Databases and Client Server Architecture: Introduction, Overview of Client-Server Architecture, Data fragmentation, Replication and Allocation techniques, Types of Distributed database systems **[13 Hours]**

Textbook:

1. Remez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Addison Wesley, 2016.
2. Silberschatz, Korth and Sudharshan, "Database System Concepts", 7th Edition, TataMcGraw Hill,2019

References:

1. C.J.Date, "Introduction to database systems", Eight Edition, Addison Wesley, 2004
2. Nilesh Shah, "Database Systems Using Oracle", 2nd Edition,| Pearson Education,2004

CS-C10T ARTIFICIAL INTELLIGENCE

Objective: To understand Artificial Intelligence concepts

Skills to be developed: Knowledge representation, symbolic reasoning under uncertainty, knowledge on planning systems, AI programming skills in Prolog and LISP.

Course Outcomes:

CO.1: Gain knowledge on fundamentals of Artificial Intelligence (AI) and expert systems, and knowledge representation.

CO.2: Application of basic principles of AI in solutions that require problem solving, knowledge representation.

CO.3: Gain knowledge on Symbolic reasoning under uncertainty, Overview of Expert System.

CO.4: Gain knowledge on Planning systems, AI in parallel and distributed applications, perceptions and fuzzy logic systems, Gain programming skills in Prolog and LISP.

Total Number Of Hours	Credits	Hours/Week	Internal Assessment Marks	Exam	Total Marks
52	4	3	40	60	100

UNIT-I Introduction to Artificial Intelligence: Definition, Al Applications, Al representation, Properties of internal Representation, Problem solving, Heuristic search techniques. Best first search, mean and end analysis, A* and AO* Algorithm, Game Playing, Minimize search procedure, Alpha beta cutoffs.

[13 Hours]

UNIT-II

Knowledge representation using predicate logic: predicate calculus, Predicate and arguments. Knowledge representation using non monotonic logic: TMS (Truth maintenance system), statistical and probabilistic reasoning, fuzzy logic, structure knowledge representation, semantic net, Frames, Script, Conceptual dependency. [13 Hours]

UNIT-III

Planning: block world, strips, Implementation using goal stack, Non linear planning with goal stacks, Hierarchical planning, list commitment strategy. **Perception**: Action, Robot architecture, Vision, Texture and images, representing and recognizing scenes. [13 Hours]

UNIT-IV

Learning: Learning as induction matching algorithms. Failure driver learning, learning in general problem solving concept learning. **Neural Networks:** Introduction to neural networks and perception-qualitative Analysis only, neural net architecture and applications.

[13 hours]

Text books:

1. Elaine Rich, Kevin Knight, Shivashankar B Nair," Artificial Intelligence", 3rd Edition, Tata Mc Graw Hill, 2013.
2. Russell S. and Norvig P, Artificial Intelligence: A Modern Approach, Third Edition,Prentice-Hall, 2020.

Reference Books:

1. Jean-Louis Ermine," Expert Systems: Theory and Practice", Prentice Hall of India, 2004
2. E. Charnaik and D.McDermott, " Introduction to artificial Intelligence Pearson Education, 2012.
3. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI, 2013.
4.E. Rich and K. Knight, " Artificial Intelligence", Tata McGraw Hill, 2013.
5. Nils J. Nilson, "Principles ofArtificial Intelligence ", Narosa Publishing Co. 2002.
6. M. Timjones "Artificial Intelligence a Systems Approach" University Science Press 2010

CS-C13T: PYTHON PROGRAMMING

Objective: To introduce core programming basics – including data types, control structures, algorithm development, and program design with functions – via the python programming language. **Skills to be developed:** This course helps students in coding using object-oriented programming.

Course Outcomes:

CO13.1: Understand Python programming basics and control structures.

CO13.2: Gain knowledge on use of Python functions, anonymous functions, recursive functions and modules for code reusability, command line arguments and to be able to write simple Python programsfor solving problems.

CO13.3: Ability to use data structures in Python such as arrays, lists, tuples, dictionaries and sets.

CO13.4: Ability to develop programmers on files, Binary data interchange formats, Exception handling,defining and using regular expressions in Python, small applications on GUI, Data Visualization,Database connectivity in Python.

Total Number Of Hours	Credits	Hours/Week	Internal Assessment Marks	End Semester Exam	Total Marks
52	**4**	3	**40**	**60**	**100**

Unit I

Introduction: Introduction to Python programming, writing a Python program, Python Interactive Shell,Building blocks – Values and Variables, Variables and Assignment,

Identifiers, Expressions and Arithmetic, Operators and operands, Order of operations, Operations on strings, Control codes within strings, String formatting, String operations, Composition, Comments, User input and Output, Errors in Python: syntax errors, run-time exceptions, and logic error.

Control Structures: Conditional expressions, Simple IF statement, IF...ELSE statement, Compound Boolean expressions, pass statement, Nested conditionals, Multi-way Decision statements, Iteration statement – While, for statement, nested loops, break and continue statements, while/else and for/elsestatements [13 hours]

Unit II

Functions and Modules: Function calls, Built-in Functions, Standard Mathematical functions, Random functions, Time functions, system specific functions, eval and exec functions, String functions, writing functions- Global variables, Default parameters, importing a module using import statement, Functions as Data, return statement, Anonymous function using Lambda expression, Generators, Local function definitions, Recursion, Command Line Arguments;

Objects and Classes: Using objects, String objects, File objects, Fraction objects, Turtle graphicsobjects, Abstract Data types and classes, Inheritance [13 hours]

Unit III

Lists: Using Lists, Building lists, List length, List membership, List operations: Traversal, ElementRemoval, List Slicing, List element removal, Lists and Functions, Cloning lists, List methods, Multidimensional lists, Nested lists, Comparison between Lists and Generators, Sparse matrices; **Tuples:** Tuple assignment, Tuples as return values, Mutability and tuples, Comparison between Listsand Tuples;

Dictionaries: Using, Counting, Grouping, Keyword Arguments, Dictionary operations, Dictionarymethods;

Sets: Creating set, set operations, Set Quantification with all and any;

Files: Text files, writing a text file, reading from a text file, writing a binary file, reading from a binary file, seek(), Structured text files, Binary data Interchange formats: CSV, HTML, XML, JSON, variables, Serialization using pickle module, Directories, Pickling;

Exceptions: Errors and exceptions, handling exceptions, modules. [13 hours]

Unit IV

Regular Expressions: Defining regular expressions, Compiling regular expressions, using regular expressions, Using match objects to extract a value, Extracting multiple items, Replacing multipleitems;

DB_API, Graphics: Python's standard web libraries-HTTPLib, URLLib, SMTPLib, The simplest Python Web server, Web Server Gateway Interface (WSGI), GUIs, Plots, Graphs, Visualization, Databaseconnectivity [13 hours]

Text Books:

1. Richard L. Holterman," Fundamentals of Python Programming", 2017

Reference Books:

1. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Scientist –Learning with Python ",
   First Edition, Green Tea Press, 2002,
2. Charles Dierbach," Introduction to Computer Science Using Python", Wiley Publication

3. Learning with Python “, Green Tea Press, 2002, First Edition.
4. Dave Kuhlman,” A Python Book: Beginning Python, Advanced Python, and Python Exercises”.
5. Mark Lutz, “Learning Python”,5th Edition”, O’Reilly
6. Micheal Urban, Joel Murach, “Murachs Python Programming”, 2016
7. Zed Shaw,” Learn Python the Hard way”, 3rd Edition, Addison Wesley,2013
8. Bill Lubanovic,” Introducing Python- Modern Computing in Simple Packages”, O ‘Reilly Publications

VI SEMESTER

CS-C14T: COMPUTER NETWORKS

Objective: Enable students to comprehend the principles of transmission technique, the basics of data communication and various types of computer networks.

Skills to be developed: Understanding network models, communication protocols, network devices and their functions within a network.

Course Outcome: The student should be able to illustrate basic computer network technology, types of network topologies and protocols, enumerate the layers of OSI model and TCP/IP model.

Total Number Of Hours	Credits	Hours/Week	Internal Assessment Marks	Exam	Total Marks
52	4	3	40	60	100

Unit-I

Introduction to Computer Networks: Communication Model, Network classifications; Network protocol; Layered network architecture; Overview of OSI Reference model; Overview of TCP/IP

Data Communication Fundamentals and Techniques (Physical Layer): Analog and digital signal, Transmission media, Transmission Impairments, Data Rate Limits: Noiseless channel (Nyquist Bit Rate), Noisy channel (Shannon Capacity) Digital to digital line encoding schemes, Parallel and Serial transmission. [13 hours]

Unit - II

Physical Layer: Circuit switching, Packet switching- Connectionless Datagram switching, Virtual circuit networks**;** Digital subscriber line, ADSL, Cable TV Networks, Cable TV for data transfer; **Data Link Layer - Error Detection and Correction:** Types of errors, Block Coding – Error Detection, Error Correction, Hamming Distance and Hamming Codes, Polynomials, Check Sum.

Data Link Control: Framing, Flow control, Error Recovery control Protocols – Stop and Wait ARQ, Go-Back-N ARQ, Piggybacking, , Point-to-Point Protocol (Framing, Transition phases only), Include only the types of errors like Random Access – ALOHA, CSMA, CSMA/CA, CSMA/CD. Controlled Access – Reservation, Polling, Token Passing.

[13 hours]

Unit - III

Channelization – FDMA, TDMA, CDMA; IEEE Ethernet Standards and types, IEEE 802.11; Connecting Devices – Hubs, Repeaters, Bridges, Switches, Routers;, Virtual LANs

Network Layer: IP Addressing: IPv4 Addresses, IPv6 Addresses, Address Mapping – ARP, ICMP, IGMP. **Delivery, Forwarding and Routing:** Delivery: Direct Vs Indirect, Forwarding, Unicast routing protocols:, Distance Vector routing, Link State routing.

[13 hours]

Unit - IV

Transport Layer: Process-to-Process Delivery, UDP, TCP, Congestion control.

Application Layer: Overview of DNS protocol, DNS in the internet, Resolution, Remote logging: Telnet, Electric mail: Architecture, Message transfer agent – SMTP, File transfer: FTP, SNMP.

Network security: Introduction to security attacks- services and mechanism, introduction to cryptography conventional encryption: conventional encryption model-classical encryption techniques, substitution cipher and transposition ciphers.

[13 hours]

Text Books

1. Computer Networks-Andrew .S. Tannenbaum,David.J Wetherall,Pearson Publications

Reference Books

2. Behrouz A. Forouzan , “Data Communications and Networking,” 4th edition, Mc Graw Hill Publications, 2015Douglas E. Comer, “Computer Networks and Internets”, 6th edition, Pearson Education, 2015.