REVISED SYLLABUS

MSc(Comp. Sc.) II semester Syllabus w.e.f. 2024-25 onwards

HCT 2.1	Operating System Concepts	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Understand the basics of Operating Systems Structure and Operating system services.
- Describe, illustrate and analyze the concept of Process Management and CPU scheduling, Deadlock and different approaches to memory management.
- Review the Disk and Drum scheduling, file system and its protection mechanism.

Unit-I **10 Hrs**

Introduction: Operating System Concepts, Types of Operating System — Batch, Interactive, Time Sharing, Real Time and Distributed Operating Systems. Operating System Services, System Calls, System Components, System Programs.

Process Management: Processes-Process Scheduling, Operation On Processors, Cooperating Process Threads, Inter Process Communication, Concept of Critical Section Problemand Solution, Semaphores and Implementation.

Unit-II12 Hrs

CPU Scheduling: Scheduling Criteria and Scheduling Algorithms, Multiple Processor Scheduling. **Deadlock: Deadlock Problem,** Characterization, Prevention, Avoidance, Detection, Recovery, Combined Approach to Deadlock Handling.

Unit-III10 Hrs

Memory Management: Logical and Physical Address, Swapping Overlays, ContigousAllocation, Paging Segmentation, Segmentation With Paging, Virtual Memory-Demand Paging Page Replacement Algorithms.

Unit-IV10 Hrs

Disk And Drum Scheduling: Physical Characteristics FCFS, Shortest Seek Time First, Scan Scheduling, Selection of Disk Scheduling Algorithm, Sector Queuing.

Unit-V **10Hrs**

File System: Files, Access Method, Directory Structure, Protection and File System Implementation, Allocation Methods.

Protection: Goals, Mechanism and Policies, Doman of Protection, Access Matrix and Its Implementation, Dynamic Protection Structure, Revocation, Security.

References:

1. J.P. Hopecroft, Rajeev Motwani. J.D. Ullman, Introduction To Automata Theory,' Languages and Computation. Ii Edition. Pearson Education, 2001.
2. Introduction ToFormal Languages and Automata, Peter Linz, Narosa Publ.
3. Languages & Machine An Introduction To Computer Science, Thomds A Sud Kamp,Addison Wesluy.
4. Elements Of Theory of Computation, H.R. Lewis, Shistor H, Papadimitroce, Prentice Hall,*New* Delhi 199

5. Introduction To Language And Theory of Computation, John MastinTmh New Delhi,1998.
6. Theory of Computation, Rajesh KShukla,Cengage 1 Delmar Learning India Pvt, 1, 2009

HCT 2.2	**Design and Analysis Of Algorithms**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Understand about introduction to algorithm, analyze, efficiencies of algorithms
- Analyze an algorithm for searching and sorting techniques
- Analyze about Greedy Techniques and Dynamic Programming

Unit-I: **12 Hrs**

Introduction: What Is An Algorithm? Fundamentals of Algorithmic Problem Solving. Important Problem Types. Fundamental Data Structures.

Fundamentals ofthe Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes. Mathematical Analysis of Recursive and Non-Recursive Algorithms.

Brute Force and Exhaustive Search: Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Depth-First Search and Breadth-First Search

Unit-II: **10 Hrs**

Decrease-and-Conquer

Insertion Sort, Topological Sorting, Algorithms For Generating Combinatorial Objects, Binary Search.

Divide-and-Conquer

Merge Sort, Quick Sort, Binary Tree Traversals and Related Properties, Multiplication of Large Integers. Strassen's Matrix Multiplication

Unit-III: **10 Hrs**

Space and Time Tradeoffs

Sorting By Counting. Input Enhancement in String Matching. Hashing.

Unit-IV: **10 Hrs**

Dynamic Programming

Computing A Binomial Coefficient, Warshall's and Floyd's Algorithms. The Knapsack Problem and Memory Functions.

Unit-V: **10 Hrs**

Greedy Technique Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.

Limitations of Algorithm Power

Lower-Bound Arguments, Decision Trees, P, Np and Np-Complete Problems.

References:

1. Introduction tothe Design and Analysis of Algorithms, 3rd Edition, By AnanyLevitin, Pearson, 2012,

2. Introduction To Algorithms,, 3ed, By T. Cormen, C. Leiserson, R. Rivest, C Stein.
3. International Edition, Mit Press, 2009.
4. Fundamentals of Computer Algorithms. Ellis Horowitz: SartajSahni: SanguthevarRajasekaran, Universitypress, 2008.
5. Algorithm Design, Michael T Goodrich and Roberto Tamassia, Wiley India.
6. Introduction to Design and Analysis of Algorithms "R Ct Lee, S S Tseng, R C, Chang, Y T Tsai, A Strategic Approach, Tata Mcgraw Hill.

HCT 2.3	PYTHON PROGRAMMING	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks		Exam duration: 03 hrs

Course Outcomes (COs): At the end of the course, students will be able to:

- To learn the fundamentals of python scripting.
- To learn about reading, writing and implementing other operation on files in Python.
- understand the system, modules, packages and regular expressions
- To acquire the knowledge on Classes , Objects and GUI Programming
- To implement threading concept and multithreading on Python
- To know about use of handling exceptions for writing robust python programs.

Unit-I **12Hrs.**

INTRODUCTION TO PYTHON PROGRAMMING: Python Interpreter and Interactive Mode. Comments, Debugging: Modules and Functions: Function Calls, Adding New Functions, Definitions Les and Types Variables, Expressions, Statements, Tuple Assignment, Order of Operations. andUses, Flow of Execution. Parameters and Arguments, Fruitful Functions. Conditionals; Boolean Else: Iteration: State While, For, Range, Break, Continue, Pass; Recursion; Strings: String Slices. Immutability, String Functions and Methods, String Module; Lists as Arrays.

Unit-II **10Hrs.**

LISTS. TUPLES. DICTIONARIES: Lists: Traversing AList. List Operations, List Slices, List Methods. Map. Filter And Reduce, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters; Dictionaries: Operations And Methods: Advanced List Processing List Comprehension; Tuples: Tuple Assignment. Tuple as Return Value.

Unit-III **10Hrs.**

FILES, MODULES, PACKAGES: Files and Exception: Text Files, Reading and Writing Files, Format Operator: Command Linc Arguments, Errors and Exceptions, Handling Exceptions, Modules. Packages: PANDAS. NUMPY, SCIKIT-LEARN:

Unit-IV **10Hrs.**

CLASSES AND OBJECTS: Introduction. Defining Classes. Creating Objects. Data Abstraction and Hiding throughClasses, Class Method and Self Argument. Class Constructor (InitMethod). Data Members. Calling A Class Method From Another Class Method. Class Methods and Static Methods. Inheritance. Types of Inheritance. Abstract Classes and Interfaces. Operator Overloading. Overriding Methods.

Unit-V **10Hrs.**Multithreading.

GUI Programming, Graphics. Plotting and Web Programming: Multithreading- Introduction.

Threading Module (Creating A Thread, Synchronizing Threads) GUI Programming With Tkinter Package, Simple Graphics Using Turtle. Plotting Graphs inPython, Web Programming Using Python.

References

1. Allen B. Downey. Think Python: How To Think Like A Computer Scientist..... 2nd Edition. Updated For Python 3. Shroff/0..Reilly Publishers, 2016
2. Guido Van Rossum and Fred L, Drake Jr. -An Introduction toPython - Revised and Updated For Python 3.2. Setwork Theory Ltd., 2011.
3. John V Gottg-Introduction toComputationAndProgramming Using Python..... Revised and Expanded Edition. MIT Press, 2013.
4. Robert Sedgewich. Kevin Wayne. Robert Dondero. -Introduction toProgramming In
5. Pykaan Tater-Disciplinary Appiach. Peinem India Education Services Pet. Lid.. 2016.

HCT 2.4	**Linear Algebra**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Solve the real time problems using algebraic operations.
- Compute the Eigen value and Eigen vectors on real time requirements
- Discuss on matrix algebra and vector space

Unit – 1 **10hrs.**

Introduction to Vector: Vector and Linear Combination, Length and Dot Products, Matrices. Solving Linear Equations: Vectors and Linear Equations, The Idea of Elimination, Elimination Using Matrices, Rules For Matrix, Inverse Matrices, Elimination-Factorization: A=Lu. Transposes and Permutations.

Unit-II **12hrs. Vector Spaces and Subspaces:** Spaces of Vectors, the Null Space of A, the Complete Solution to Ax=B, Independence, Basis and Dimension, Dimension of the Four Subspaces.

Orthogonality: Orthogonality of the Four Subspaces, Projections, Least Squares Approximations, Orthogonal Bases and Gram-Submidt.

Unit-III **10hrs. Determinants:**

The Properties of Determinants, Permutations and Cofactors, Cramer's Rule, Inverses, and Volumes.

Unit-IV **10hrs. Eigen Values and Eigenvectors:** Introduction to Eigenvalues, Diagonalizing a Matrix, Systems of Differential Equations, Symmetric Matrices, Positive Definite Matrices.

Unit-V **10hrs. Single Value Decomposition (Svd):** Image Processing By Linear Algebra, Bases and Matrices inthe Svd, Principal Component Analysis (Pca by Svd), the Geometry of the Svd

References:

1. Introduction to Linear Algebra by Gilbert Strang (5th Edition), Wellesley - Cambridge Press, 2016
2. Linear Algebra by Kenneth Hoffman and Ray Kunze (2nd Edition), Prentice-Hall, 1971
3. Introduction to Linear Algebra by Thomas A Whitelaw, (2nd Edition), Champman& Hall/ Crc, 2018
4. Introduction to Linear Algebra with Applications by Jim De Franza& Daniel Gagliardi, Waveland Press.

SCT 2.1	**Data Base Management System(Using My SQL) Lab**	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week
Internal assessment: 20 marks		Term end exam: 80 marks	Exam duration: 03 hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Identify the difference between database systems from file systems and describe each in both function and benefit.
- Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model.
- Describe the concept of normalization theory for normalizing database.
- Explain the relational data model.

Unit-I **10Hrs**

Introduction to DBMS Introduction, Characteristics of Database, Advantages of DBMSover File Processing System. A Brief History of Database Applications. Database Softwares (Microsoft Sql Server, Oracle RDBMS, MY SQL) Data Models, Schemas, and Instances: Three-Schema Architecture and Data Independence; Database Languages and Interfaces: Centralized and Client/Server Architectures for DBMS.

Unit-II **10 Hrs**

Data Modeling Entity-Relationship Diagram, Relational Model Constraints, Languages, Design, and Programming, Relational Database Schemas. Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.

Unit-III: **12 Hrs**

Enhanced Data Models Temporal Database Concepts, Multimedia Databases, Deductive Databases, Xml and Internet Databases: Mobile Databases, Geographic Information Systems, Genome Data Management. Distributed Databases and Client-Server Architectures.

Unit-IV **10 Hrs**

Sql and Nosql Data Definition and Data Types: Constraints, Queries, Insert, Delete, and Update Statements: Views, Stored Procedures and Functions; Database Triggers, Sql Injection.
Nosql: Nosqland Query Optimization: Different Nosql Products, Querying and Managing Nosql; Indexing and Ordering Data Sets: Nosql In Cloud.

Unit-V **10 Hrs**

Normalization for Relational Databases Functional Dependencies and Normalization: Algorithms For Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques. Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.

References:

1. "Database System Concepts" By Silberschatz, Korth, Sudarshan, 4th Edition, McGraw Hill Publication.
2. "Database Systems, Concepts. Design and Applications" By S.K.Singh, Pearson Education.
3. "Database Management Systems" By Raghu Ramakrishna. Johannes Gehrke. McGraw Hill Publication.
4. "Fundamentals of Database Systems" By Elmsari, Navathe, 5th Edition, Pearson Education (2008).

OET 2.1	COMPUTER CONCEPTS	Credits: 2	Contact Hours: 32	Theory 02 Hrs/week
Internal assessment: 10 marks		Term end exam: 40 marks	Exam duration: 1 1/2hrs	

Course Outcomes (COs): At the end of the course, students will be able to:

- Describe the basics of computers and number systems
- Discuss types of Operating systems and Networks

Unit-I **12 HrsBasics**: History and Generations of Computer. Basic Concepts of Digital Computers-Control Unit, ALU, Input/output function and Memory. Hardware-Input/Output devices, Software-Classification of software, Memory Unit: Types of Memory- Ram, Rom, Types of Ram and Rom

Unit-II **10 HrsNumber System:** Binary,Octal, Decimal and Hexa-Decimal. Number Base Conversion.

Unit-III **10 HrsOperating System and Networks:**Definition, Functions, Types of Operating system, Definition of Network, Types of Network (Lan Man & Wan). Internet and Its Applications.

References:

1. Computer Concepts & C Programming. P.B.Kottur. Sapna Beck House Bangalore 2000
2. Computer Fundaments. V. Rajaraman Prentice Hall of India.2008 12225
3. Computer Fundamental P.K. Sinha. Prentice Hall Of India, Oth Edition. 1902
4. Fundamentals of Information Technology Second Edition. Alexis Leon.2009
5. Microsoft Office-Complete Reference Curt Simmons, Mc Graw Hill 2006

M.Sc. (Comp. Sc.) III semester Syllabus w.e.f. 2024-25 onwards

HCT 3.1	Computer Networks	Credits: 4	Contact Hours: 52	Theory 04 Hrs/week