



## M.Sc COMPUTER SCIENCE

### SEMESTER – III

Paper Code	Paper Title	Credits	No .Of Hrs/Week Theory/Pra cticle	Main Exam Hrs.Theory/ Practicale	Marks		Total
					IA	Theory	
HCT3.1	Computer Networks	4	4	3	20	80	100
HCT3.2	Software Engineering	4	4	3	20	80	100
HCT3.3	Web Technologies	4	4	3	20	80	100
HCT3.4	Elective-1	4	4	3	20	80	100
HCP3.1	Web Technologies Lab	2	2	2	10	40	50
SCT3.1	Machine Learning	4	3	3	20	80	100
SCP3.1	Machine Learning Lab	4	3	3	10	40	50
OET3.1	SPSS Tool	2	2	2	10	40	50
	Communication Skills	2	2	2	10	40	50

## M.Sc. COMPUTER SCIENCE

### SEMESTER – IV

Paper Code	Paper Title	Credits	No .Of Hrs/Week Theory/pr acticale	Main Exam Hrs.Th ery/Pra cticale	Marks		Total
					IA	Theory	
HCT4.1	Artificial Intelligence	4	4	3	20	80	100
HCT4.2	Cryptography and Network Security	4	4	3	20	80	100
HCT4.3	Operation Research	4	4	3	20	80	100
HCT4.4	Elective-2	4	4	3	20	80	100
HCP4.1	Artificial Intelligence Lab	4	3	3	20	80	100
SCT4.1	Computer Graphics	4	3	3	20	80	100
SCP4.1	Project	4	3	3	20	80	100

#### Electives-1

1. Mobile Computing
2. Digital Image Processing
3. Soft Computing
4. Data Mining

## SEMESTER-II

### HCT 2.1 Operating System Concepts

Total Hours: 48

#### 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 Problem and Solution, Semaphores and Implementation.

#### Unit-II

10 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-III

10 Hrs

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

#### Unit-IV

10 Hrs

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

#### Unit-V

08 Hrs

**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. Hopcroft, Rajeev Motwani. J.D. Ullman, Introduction To Automata Theory, ' Languages and Computation. Ii Edition. Pearson Education, 2001.
2. Introduction To Formal 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 Mastin Tmh New Delhi,1998.
6. Theory of Computation, Rajesh K Shukla,Cengage 1 Delmar Learning India Pvt, 1,2009

## HCT 2.2: Design and Analysis Of Algorithms

**Total Hours: 48**

**Unit-I: 12 Hrs**

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

**Fundamentals Of The 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: 8 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: 08 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 To The Design and Analysis Of Algorithms, 3rd Edition, By Anany Levitin, Pearson, 2012,
2. Introduction To Algorithms,, 3ed, By T. Cormen, C. Leiserson, R. Rivest, C Stein. International Edition, Mit Press, 2009.
3. Fundamentals of Computer Algorithms. Ellis Horowitz: Sartaj Sahni: Sanguthevar Rajasekaran, University press, 2008.
4. Algorithm Design, Michael T Goodrich and Roberto Tamassia, Wiley India.
5. 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

Total 48hrs.

### 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. and Uses, 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

12hrs.

**LISTS. TUPLES. DICTIONARIES:** Lists: Traversing A List. 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

07hrs.

**FILES, MODULES, PACKAGES:** Files and Exception: Text Files, Reading and Writing Files, Format Operator: Command Line 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 Through Classes, Class Method and Self Argument. Class Constructor (Init Method). 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

07hrs.

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 In Python, 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 To Python - Revised and Updated For Python 3.2. Setwork Theory Ltd., 2011.
3. John V Gottg-Introduction To Computation And Programming Using Python..... Revised and Expanded Edition. MIT Press, 2013.
4. Robert Sedgewich. Kevin Wayne. Robert Dondero. -Introduction To Programming In Pyka An Tater-Disciplinary Appiach. Peinem India Education Services Pet. Lid .. 2016.

## HCT 2.4: Linear Algebra

### Unit – 1

12hrs.

**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

7hrs.

**Eigen Values and Eigenvectors:** Introduction To Eigenvalues, Diagonalizing A Matrix, Systems of Differential Equations, Symmetric Matrices, Positive Definite Matrices.

### Unit-V

7hrs.

**Single Value Decomposition (Svd):** Image Processing By Linear Algebra, Bases and Matrices In The 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**

### **Unit-I Introduction To DBMS**

**10hrs**

Introduction, Characteristics of Database, Advantages of Dbms Over File Processing System. A Brief History of Database Applications. Database Softwares (Microsoft Sql Server, Oracle Rdbms, Mysql) Data Models, Schemas, and Instances: Three-Schema Architecture and Data Independence; Database Languages and Interfaces: Centralized and Client/Server Architectures For Dbms.

### **Unit-II Data Modeling**

**10 Hrs**

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; Cod Rules.

### **Unit-III: Enhanced Data Models**

**12 Hrs**

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 SQL and NOSQL:**

**08 Hrs**

Data Definition and Data Types: Constraints, Queries, Insert, Delete, and Update Statements: Views, Stored Procedures and Functions; Database Triggers, Sql Injection.

Nosql: Nosql and Query Optimization: Different Nosql Products, Querying and Managing Nosql; Indexing and Ordering Data Sets: Nosql In Cloud.

### **Unit-V Normalization For Relational Databases**

**08 Hrs**

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 Ramakrishnan. Johannes Gehrke. Mcgraw Hill Publication.
4. "Fundamentals Of Database Systems" By Elmsari, Navathe, 5th Edition, Pearson Education (2008).

## OET 2.1: Computer Concepts

**Total Hours: 32**

### **Unit-I**

**12 Hrs.**

**Basics:** History and Generations of Computer, Basic components of a Digital computer-Control Unit, ALU, Input/output functions and memory. Hardware-Input/ Output Devices, Software-classification of Software, Memory Unit: Types of Memory Rom, Ram. Types of Ram & Rom.

### **Unit-II**

**10 Hrs.**

**Number System:** Binary, Octal, Decimal and Hexa -Decimal, Number Base Conversion.

### **Unit-III**

**10 Hrs.**

**Operating System and Networks:** Definition, Functions, Types of Operating System, Definition of Network, Types of Network (LAN, MAN & WAN). Internet and It's Applications.

### **References:**

1. Computer Concepts & C Programming. P.B.Kottur. Sapna Beck House Bangalore 2000
2. Computer Fundamentals. V. Raja Raman 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