G.T.N. ARTS COLLEGE, (Autonomous) DINDIGUL

DEPARTMENT OF M.Sc COMPUTER SCIENCE

SYLLABUS CBCS

(With effect from the academic year 2017 – 2018)

1. OBJECTIVES:

The Syllabus for M.Sc. (Computer Science) degree under semester system has been designed on the basis of Choice Based Credit System (CBCS) , which would prepare the students understand fundamentals of Computer Science. To train the students to be a programmer, students to manage the hardware and software components and to pursue higher studies in Computer Science. It will effect from June 2017 onwards.

2. ELIGIBILITY:

Candidate for admission to the M.Sc. (Computer Science) course (Full Time) should posses a B.Sc, (CS), BCA and B.Sc (IT) of this University or as an Examination Accepted as equivalent thereto, with a minimum aggregate of 55% marks in Part III subjects other than Languages and mathematics subject as Ancillary and +2 level mathematics.

3. DURATION OF THE COURSE:

The students who are joining the M.Sc. (Computer Science) degree shall undergo a study period of two academic years – Four semesters.

4. SUBJECTS OF STUDY AND SCHEME OF EXAMINATION:

The subjects offered in major Computer Science for four semesters and the scheme of examination is given.

5. QUESTION PAPER PATTERN:

The Internal and External marks is 25: 75

EXTERNAL:

The pattern of Question Paper will be as follows:

Time: 3 Hours Max Marks: 75

SECTION – A [10 x 1 = 10 marks]

Question No: 1 to 10

1. Two questions from each unit
2. Four choices in each question
3. No ‘none of these ‘choice

SECTION – B [5 x 7 = 35 marks]

Question No: 11 to 15

1. Answer all questions choosing either (a) or (b)
2. Answers not exceeding two pages
3. One question from each unit

SECTION – C [3 x 10 = 30 marks]

Question No: 16 to 20

1. Answers not exceeding four pages
2. Answer any three out of five questions
3. One question from each unit

Note: There must be at least one problem in Section B and Section C

INTERNAL:

The pattern for internal valuation may be

1. Two tests – 15 marks each: average 15 marks
2. Group Discussion / Seminar / Quiz – 5 marks
3. Two Assignments – 5 marks each: average 5 marks
4. Third test may be allowed for absentees of anyone of the two tests
5. For Quiz, two quizzes should be conducted

Blue Print of the Question Paper (External) – Core Subjects

Maximum Marks: 75

Sections	Types of questions	No. of questions	No. of questions to be answered	Marks for each question	Total Marks
A	Multiple Choice : Two questions from each unit	10	10	1	10
B	Not exceeding two pages (either or type) : One question from each unit *	5	5	7	35
C	Not exceeding four pages (any three out of five) : one question from each unit	5	3	10	30

- There must be at least one problem in Section – B and Section – C

7. PRACTICALS:

Record Note Book	: 10 marks
Internal	: 30 marks
External examination	: 60 marks
Total	: 100 marks

8. ELIGIBILITY FOR THE DEGREE:

i. The candidate will not be eligible for degree without completing the prescribed courses of study, lab work etc., and passing all the prescribed External examinations.

ii. Attendance, progress and conduct certificate from the Head of the Institution will be required for the students to write the examination.

iii. The passing minimum is 50% (50% out of External Marks).

Papers studied by M.Sc. Computer Science students:

M.Sc. Computer Science- Semester – I

Part	Study Comp.	Course Code	Hours	Credit	Internal Marks	External Marks	Total Marks
I	Core -I Mathematical Foundation	17PCSC11	5	5	25	75	100
I	Core - II Digital Principles and Computer Organization	17PCSC12	5	4	25	75	100
I	Core- III Data Structures & Algorithms	17PCSC13	5	4	25	75	100
I	Core -IV Database management System	17PCSC14	5	4	25	75	100
I	Core Practicals – I Data Structures lab using C++	17PCSC1P	5	4	40	60	100
I	Core Practicals – II Client server	17PCSC1Q	5	4	40	60	100
	Total		30	25			

M.Sc. Computer Science- Semester – II

S.No	Study Comp.	Course Code	Hours	Credit	Internal Marks	External Marks	Total Marks
1	Core -I Advanced Java Programming	17PCSC21	5	4	25	75	100
2	Core -II Data Communication and Networks	17PCSC22	5	4	25	75	100
3	Core -III Operating System	17PCSC23	5	4	25	75	100
4	Core Practicals – I Advanced Java Programming	17PCSC2P	5	4	40	60	100
5	Core Practicals – II UNIX Programming	17PCSC2Q	5	4	40	60	100
6	Major Elective I		5	4	25	75	100
	Total		30	24			

MAJOR ELECTIVE I:

17PCSE21- Data Mining and Data Warehousing

17PCSE22- Computer Graphics and Multimedia

M.Sc. Computer Science- Semester – III

S.No	Study Comp.	Course Code	Hours	Credit	Internal Marks	External Marks	Total Marks
1	Core -I Software Engineering	17PCSC31	5	4	25	75	100
2	Core -II Web Technology	17PCSC32	5	4	25	75	100
3	Core Practicals – I Web Design	17PCSC3P	5	4	40	60	100
4	Core Practicals – II Python Programming	17PCSC3Q	5	4	40	60	100
5	Major Elective II		4	4	25	75	100
6	Non Major Elective I		6	4	25	75	100
	Total		30	24			

Major Elective II

17PCSE31. Information Retrieval

17PCSE32. Cryptography and Network Security

Non Major Elective:

17PCSN31- Internet and Web Programming

M.Sc. Computer Science- Semester – IV

S.No	Study Comp.	Course Code	Hours	Credit	Internal Marks	External Marks	Total Marks
1	Core -I Digital Image Processing.	17PCSC41	5	4	25	75	100
2	Core -II Big Data Analytics	17PCSC42	5	4	25	75	100
3	Core Practicals – I Image Processing.	17PCSC4Q	5	4	25	75	100
4	Core Practicals – II Project Work & Viva voce	17PCSC4P	15	5	40	60	100
	Total		30	17			

Summary of credits and marks

Subject	No. of Papers	Credit	Marks
Core	19	78	1900
Major Elective	2	8	200
Non Major Electives	1	4	100
Total	**22**	**90**	**2200**

Course Title: Mathematical Foundation Semester: 1
Course Code: 17PCSC11 Part: I Contact Hours /Week: 5 Credit: 5

Objectives

To have knowledge of the concepts needed about logic of a program, base and a basic for the prolog language and identifying patterns on many levels. To be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science and learn the concepts and properties of algebraic structures such as semi groups, monoids and groups

Unit I **13 Hours**

Propositions-logical operators-truth tables-Normal forms-Laws of logic –Proofs in prepositional calculus -Theory of inference.

Unit II **13 Hours**

Basic concepts-Matrix representation of graphs-shortest path problem-directed trees-binary trees.

Unit III **18 Hours**

Four class of grammars - context free language –generation trees. Representation of FA-Acceptability of a string by FA-Non Deterministic FA(NDFA)-Acceptability of a string by NDFA. Equivalence of FA and NDFA-procedure for finding FA-NDFA.

Unit IV **16 Hours**

Groups- subgroups- homomorphism- cosets- Lagrange's theorem-normal subgroup-semi groups-monoids-homomorphism of semi group and monoids-subsemigroups and submonoids

Unit V **15 Hours**

Lattices-properties-new lattices-modular and distribution lattices. Boolean algebra: Boolean polynomials-switching circuits.

Text Book

1. Venkatraman.M.K., Sridharan.N., and Chandrasekaran.N,, (2001), *Discrete Mathematics*, The National Publishing Company.

Reference Books

1. Trembkay. J.P, and Manohar. R., (1998), *Discrete Mathematical structures with Applications to Computer Science*, McGraw Hill Book Company, New York.
2. John Truss, (2000), *Discrete Mathematics for Computer Scientist*, Addison Wesley, 2nd Edition.
3. James L.Hein.,(2003), *Discrete Mathematics*, Jones & Bartlett, 2nd Edition.

Course Title: Digital Principles and Computer Organization Semester: 1
Course Code: 17PCSC12 Part: I Contact Hours /Week 5 Credit : 4

Objectives

To understand the basic structure and operation of digital computer and the hardware-software interface and familiarize with arithmetic and logic UNIT- and implementation of fixed point and floating-point arithmetic operations ,hierarchical memory system including cache memories and virtual memory. To learn with different ways of communicating with I/O devices and standard I/O interfaces and the concept of pipelining.

Unit I **15 Hours**

Digital Computers – Logic gates – Boolean algebra – Map Simplification – Combinational Circuits – Flip Flops – Sequential Circuits. Integrated Circuits – Decoders – Multiplexers – Registers – Shift Registers – Binary Counters – Memory Unit. Data Types – Complements – Fixed point Representation – Floating point Representation – other binary codes – Error Detection codes.

Unit II **17 Hours**

Register Transfer Language – Register Transfer – Bus and Memory Transfers – Arithmetic Microoperations – Logic Micro operations – Shift Microoperations – Arithmetic Logic Shift unit. Instruction codes – Computer Registers – Computer Instructions – Timing and Control – Instruction cycle – Memory Reference Instructions – Input Output and Interrupt – Complete Computer Description – Design of Basic Computer – Design of Accumulator Logic

Unit III **18 Hours**

Introduction – Machine Language – Assembly Language – The Assembler – Program Loops – Programming Arithmetic and Logic operations – Subroutines - Micro programmed control: Control Memory – Address Sequencing – Micro Program Example – Design of Control Unit. Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control.

Unit IV **12 Hours**

Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction pipeline – RISC Pipeline. Introduction – Addition and Subtraction – Multiplication Algorithms – Division Algorithms – Floating point Arithmetic operations – Decimal Arithmetic unit – Decimal Arithmetic operations.

Unit V **13 Hours**

Peripheral Devices – Input/output Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access – Input Output Processor – Serial Communication. Memory Organization: Memory Hierarchy – Main Memory – Auxiliary memory – Associative Memory – Cache Memory – Virtual Memory – Memory management hardware.

Text Book

1. Morris Mano.M, (2008), *Computer System Architecture*, Prentice Hall of India New Delhi, 3rd Edition.

Reference Books

1. Donald P Leach and Albert Paul Malvino, (2005), *Digital Principles & Applications*, TMH Publishers.
2. William Stallings, (2008), *Computer Organization and Architecture*, PHI Publishers.
3. Rajaraman.V, RadhaKrishnan.T, (2006), *Digital Logic and Computer Organization*, PHI Publishers.

Course Title: Data Structures and Algorithms Semester: 1
Course Code: 17PCSC13 Part: I Contact Hours /Week : 5 Credit: 4

Objectives

To learn the systematic way of solving problems and to implement different methods of organizing large amounts of data. Obtain knowledge about divide and conquer, then learning to efficiently implement the different data structure and solutions for specific problems

Unit I **16 Hours**

Algorithm Analysis, Lists, Stacks, and Queues, Trees - Implementation of Trees, Tree Traversals with an Application, Binary Trees - Implementation, An Example: Expression tree, The Search Tree ADT, AVL Trees, B-Trees

Unit II **16 Hours**

Hashing - Hash function, Separate chaining, Linear probing, Quadratic probing, Double Hashing, Rehashing, Extendible Hashing, Priority Queues - Implementations, Binary Heap, Applications of Priority Queues

Unit III **14 Hours**

Sorting - Insertion sort- The algorithm, STL Implementation of Insertion sort, Analysis of Insertion sort, Shell sort, Worst Case analysis of shell sort, Heap sort, Analysis of heap sort, Merge sort, Analysis of merge sort, Quick sort, External sorting

Unit IV **16 Hours**

Representation of Graphs, Topological sort, Shortest-path algorithms -Unweighted shortest paths, Dijkstra's Algorithm, Graphs with negative edge costs, Acyclic graphs, All-pairs shortest path, Shortest path example, Minimum Spanning Tree - Prim's Algorithm, Kruskal's Algorithm, Applications of Depth - First Search - Undirected Graphs, Biconnectivity, Euler circuits, Directed graphs, Finding strong components

Unit V **13 Hours**

Algorithm Design Techniques - Greedy Algorithms - A simple scheduling problem, Huffman codes, Approximate Bin Packing, Backtracking Algorithms - The Turnpike Reconstruction Problem, Games

Text Book

1. Mark Allen Weiss, (2005), *Data structures and Algorithm analysis in C++*, Pearson Publications, 3rd edition.

Reference Books

1. Ellis Horowitz., and Sartaj Sahni., (1999), *Fundamentals of Data Structures*, Galgotia publications.
2. Ellis Horowitz., and sartaj Sahni., (1998), *Fundamentals of Computer algorithms*, Galgotia publications.
3. Sartaj Sahni., (2005), *Data structures, Algorithms and Applications in C++*, 2nd edition.

Course Title: Database Management System Semester: 1
Course Code: 17PCSC14 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram, study about SQL, relational database design and internal storage structures using different file and indexing techniques which will help in physical DB design. To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure

Unit I **14 Hours**

Database System Applications – Purpose of database systems – View of Data - Database Languages – Relational Databases – Database design – Object based and semi structured Databases – Data storage and querying – Transaction Management – Database Architecture – Database users and Administrators. Overview of the design process – The Entity – Relationship Model – Constraints – Entity – Relationship diagrams – Entity – Relationship design issues – Weak entity sets – Extended E-R features – Database design for banking enterprise – Reduction to Relational Schemas –The unified modeling language UML.

Unit II **16 Hours**

Structure of relational databases – Fundamental relational Algebra Operations – Additional Relational Algebra Operations – Extended Relational Algebra Operations – Null Values – Modification of the database. Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions –NULL Values – Nested Sub Queries – Complex Queries – Views – Modification of Database – Joined Relations.

Unit III **15 Hours**

Features of Good Relational Designs –Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Decomposition using Functional dependencies - Decomposition using MultiValued Dependencies – More Normal forms – Database Design process – Modeling Temporal Data. Overview – Complex Data Types – Structured Types and Inheritance in SQL – Table Inheritance – Array and Multi set Types in SQL – Object Identity and Reference types in SQL – Implementing O-R Features – Persistent Programming Languages – Object-Oriented Versus Object-Relational.

Unit IV **16 Hours**

Transaction concept – Transaction state – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – Testing for Serializability. Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Multiple Granularity

Unit V **14 Hours**

Introduction-I/O Parallelism-Interquery Parallelism- Intraquery Parallelism-Intraoperation Parallelism- Interoperation Parallelism. Homogenous and Heterogeneous Databases-Distributed Data Storage-Distributed Transaction-Distributed Query Processing-Heterogeneous Distributed Databases.

Text Book

1. Abraham Silberschatz, Henry F. Korth., and S.Sudarshan.,(2006), *Database System Concepts*, Tata McGraw Hill,5th Edition,.

Reference Books

1. Alexis Leon, Mathews Leon, (2002), *Database Management Systems*, Leon Vikas Publications.
2. Raghu Ramakrishnan , Johannes Gehrke, (2000), *Database management systems*, McGraw Hill International, 2nd Edition,.
3. Fred R.McFadden., Jeffery A.Hoffer., and Marry B.Prescott., (2001), *Modern database Management*, Pearson Education Asia, 5th Edition.

Course Title: Datastructures Using C++ Lab Semester: 1
Course Code: 17PCSC1P Part: I Contact Hours /Week: 5 Credit: 4

Programs

1. Implementation of Stack
    a) Using Array
    b) Using Linked List
2. Implementation of Queue
    a) Using Array
    b) Using Linked List
3. Implementation of Heap Tree.
4. Implementation of Tree Traversal.
5. Implementation of BFS.
6. Implementation of DFS.
7. Implementation of Merge Sort using Divide and Conquer.
8. Implementation of Knapsack Problem using Dynamic Programming.
9. Implementation of Warshall's Algorithm using Dynamic Programming.
10. Implementation of Floyd's Algorithm using Dynamic Programming.
11. Implementation of Dijkstra's Algorithm using Greedy Technique.
12. Implementation of Prim's Algorithm using Greedy Technique.
13. Implementation of n-queens Problem using Backtracking.
14. Implementation of Assignment Problem using Branch and bound.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: Client Server Lab | Semester: 1
Course Code: 17PCSC1Q | Part: I | Contact Hours /Week: 5 | Credit: 4

PL/SQL

1. Program using conditional control, iterative controls and sequential controls.

2. Programs using exception handling.

3. Programs using explicit cursors and implicit cursors.

4. Programs using PL/SQL tables and record.

5. Programs using database triggers.

6. Programs to design procedures using in, out, inout parameter.

7. Programs to design procedures using functions.

8. Programs to design procedures using packages.

Forms&Report Writer

1. Inventory Control.

2. Banking

3. Students mark list

4. Library Maintenance.

5. Payroll.

6. Invoice

7. Railway Reservation

8. College Admission

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: Advanced Java Programming Semester: 2
Course Code: 17PCSC21 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To know about the Basics of JAVA, Applets and AWT Components. To develop and to work with swings, Servlet, session and cookies**.**

Unit I **16 Hours**

The Genesis of JAVA- Object oriented Programming- Simple type-variables-Type conversion and casting-Arrays. Arithmetic- Bitwise- Relational- Logical-Assignment- '?'Operator- Operator Precedence. Control Statements- Selection- Iteration-Jump Statements.

Unit II **16Hours**

Introducing Classes- Basics-Using super-Multilevel hierarchy-Method overriding-Abstract classes-final with inheritance. Packages and Interfaces. Fundamentals-types-Uncaught exception-Nested try-throw-throws-finally.

Unit III **10 Hours**

Java thread model-Main thread-creating a thread-Multiple threads-Priorities-Synchronization-I/O basics-reading and writing console-Print writer class-reading and writing files- Applet Basics-Applet architecture-Applet skeleton-Applet Display methods -Requesting Repainting-Status window-HTML APPLET Tag-Passing parameter to applet.

Unit IV **17 Hours**

Using AWT controls, Layout managers and Menus: Control fundamentals-Labels, buttons, check boxes, Choice controls lists, scroll bar, text field, text area, layout manager, menu bars and menus, Dialogboxes- Handling event using AWT components- JApplet-Icons and Labels-Buttons-Combo boxes-Tables-Exploring swing.

Unit V **16 Hours**

What is a java bean?-Advantages of Java bean-Application builder tools-BDK-JAR files-Introspection-Developing simple Bean Using BDK-Using Bound properties-Using Bean info Interface-Background-Lifecycle of servlet-Simple servlet-The servlet API-Javax.servlet package-Reading servlet parameters-javax.servlet.http.package-Handling HTTP requests and responses-Cookies-session tracking-security issues.

Text Book

1. Herbert Schildt, (2006), *Java-The Complete Reference*, TMH,

Reference Books

1. Balagurusamy.E, (2007), *Programming with Java*, TMH, 3rd Edition**.**
2. Mathew T.Nelson (1998), *Foundation Classes*, McGraw-Hill.
3. Somasundaram (2013), *Do 'n' Learn JAVA - A Practical Approach*, Anuradha Publications, Chennai.

Course Title: Data Communication and Networks Semester: 2
Course Code: 17PCSC22 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To understand the concepts of data communications, different layers and make the students to get familiarized with different protocols, network components, Integrated services , Routing Protocols and applications of Networks

Unit I **15 Hours**

A Brief History – Applications – Computer Networks – categories of Networks – Standards and Standards Organizations – Network Architecture – Open Systems and OSI Model – TCP/IP Architecture. Fourier analysis – Analog and Digital Data Transmission- Modulation and Demodulation – Transmission Media – Wireless Communication – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing. Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocols – High Level Data Link Control (HDLC).

Unit II **17 Hours**

Types of Networks and Topology – LAN Transmission Equipment –LAN Installation and Performance- Ethernet: IEEE Standard 802.3 – Token Bus: IEEE Standard 802.4 – Token Ring: IEEE 802.5- Fiber Distributed Data Interface (FDDI) – Distributed Queue Dual Bus (DQDB): IEEE Standard 802.6- LAN Operating Systems and Protocols – Ethernet Technologies**.** WAN Transmission Methods – WAN Carrier Types –WAN Transmission Equipment-WAN Design And Multicast Considerations-WAN Protocols.

Unit III **18 Hours**

Integrating Services-ISDN Services-ISDN Topology-ISDN Protocols-Broadband ISDN-Asynchronous Transfer Mode (ATM)-Principal Characteristics of ATM-Frame Relay-Comparison of ISDN, ATM and frame Relay. WLAN Applications-Wireless LAN Requirements-Planning for wireless LANs-Wireless LAN Architecture-IEEE 802.11 Protocol Layer-IEEE 802.11 Physical Layer-Designing the Wireless LAN Layout-WAP Services.

Unit IV **12 Hours**

Principles of Internetworking-Routing Principles-Internet work Protocols (IP)-Shortcomings of IPv4-IP Next Generation. Transport Protocols-The service TCP Provides to Applications – End –to-End Services and Datagram-Transmission Control Protocol-User Datagram Protocol.

Unit V **13 Hours**

Client Server Model-Domain Name System (DNS)-Telnet-File Transfer and Remote file access-Electronic Mail-World Wide Web (WWW). Goal of Network Management-Network Management Standards-Network Management Model-Infrastructure for network Management-Simple Network Management Protocol (SNMP)

Text Book

1. Brijendra Singh, (2006),*Data communication and Computer Networks*, PHI, Second Edition.

Reference Books

1. Andrew ST Tanenbaum, *Computer Networks*,(2006), Prentice Hall Of India, 4th Edition.
2. Prakash C.Gupta, (2005), *Data Communications and computer networks*, Prentice Hall of India
3. William Stallings, (2007), *Data and Computer communications*, PHI
4. Behrouz A.Forouzan, (2005), *Data Communication and Networking*, TMH.
5. Achyut S Godbole, (2005), *Data Communications and Networks*, Tata McGraw Hill.

Course Title: Operating System Semester: 2
Course Code: 17PCSC23 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To have an overview of different types of operating systems, components of an operating system and have a thorough knowledge of process management. Its help to understand about storage management, I/O and file systems.

Unit I **14Hours**

Introduction- OS and computer System – Efficiency, system performance and user convenience, classes of operating system – Batch processing systems – Multiprogramming systems – Time Sharing Systems – Real Time Operating System- Distributed Operating System – Modern Operating System.

Unit II **14 Hours**

Processes and programs – Programmer view of processes – OS view of processes – Threads – Case studies of processes and Threads – Interacting Process – An advanced programmer view of processes. Preliminaries – Non Preemptive Scheduling policies – preemptive scheduling policies – scheduling in practice – Real Time scheduling – scheduling in UNIX – scheduling in Linux – Scheduling in windows.

Unit III **16 Hours**

Managing the memory hierarchy – static and dynamic memory allocation – memory allocation in process –reuse of memory –contiguous memory allocation – noncontiguous memory allocation – paging –segmentation- segmentation with paging –kernel memory allocation. Virtual memory basics- Demand paging –page replacement policies –memory allocation to a process –shared pages –memory mapped files-Linux virtual memory – virtual memory in windows.

Unit IV: **15 Hours**

File Systems- File system and IOCS – File and File operations – Fundamentals file organizations- Directory structures –File protection- Allocation of disk space – virtual file system- UNIX file system –Windows file system. Overview of Security and Protection –security and protection – I/O devices –Disk Scheduling –Access methods –File processing in Linux – File processing in windows.

Unit V **16 Hours**

Process Synchronization - Message passing. Deadlocks: Definition of deadlock – Deadlocks in resource Allocation – handling deadlocks – Deadlock detection and Resolution – Deadlock prevention – Deadlock Avoidance- Deadlock handling in practice.

Text Book

1. D.M.Dhamdhere, (2006), *Operating System a Concept based approach* , TMH publishing company, New Delhi, 2nd Edition,.

Reference Books

1. William Stallings, (2008), *Operating Systems Internals and Design Principles*, PHI.
2. Pramod Chandra P.Bhatt, (2007), *An Introduction to operating Systems, Concepts and Practice*, PHI.
3. Abraham Silberschatz., Peter Baer Galvin., and Greg., *Operating System Principles***,** John Wiley & Sons**,** 7th Edition

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Course Title: Data Mining and Data Warehousing Semester: 2
Course Code: 17PCSE21 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To introduce the concept of data mining with in detail coverage of basic tasks, metrics, issues, and implication and Core topics like classification, clustering and association rules are exhaustively dealt with. Introduces the concept of data warehousing with special emphasis on architecture and design and know about Multidimensional data model.

Unit I **15 Hours**

What Motivated Data Mining? - Why is it important? - So, What is Data mining? - Data Mining – On what kind of data? - Data Mining Functionalities – What Kinds of Patterns Can Be Mined? - Are All of the Patterns Interesting? - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Database or Data Warehouse System - Major Issues in Data Mining. Why Preprocessor the Data? - Descriptive Data Summarization.

Unit II **17 Hours**

What is a Data Ware House? - A Multidimensional Data Model-Data Warehouse Architecture. Basic Concepts and a Road Map -Efficient and scalable frequent item set Mining method- Mining various kinds of association rules.

Unit III **18 Hours**

What is Classification? What is Prediction?-Issues regarding Classification and prediction-Classification by Decision tree induction-Bayesian Classification-Lazy Learners-Other classification methods-Prediction

Unit IV: **12 Hours**

What is Cluster analysis?-Types of Data in Cluster Analysis-Partitioning Methods-Hierarchical Methods-Density Methods-Grid Based methods-Outlier analysis.

Unit V **13 Hours**

Graph Mining – Multi relational Data Mining. Multidimensional analysis and Descriptive Mining of complex data objects. spatial Data cube Construction and Spatial OLAP - Mining Spatial Association and Co-location Patterns. Similarity Search in Multimedia Data – Multidimensional Analysis of Multimedia Data. Data Mining Applications**.** Self Study: Data Mining Applications**.**

Text Book

1. Jiawei Han and Micheline Kamber,(2006),*Data Mining Concepts and Techniques*, , Morgan Kaufmann Publishers, 2nd Edition.

Reference Books

1. Prabu.C.S.R., (2007), *Data warehousing, concepts, Techniques, Products and applications*, PHI.
2. Gupta. G.K., (2006), *Introduction to Data mining with Case Studies*, PHI.
3. Daniel T. Larose., and Chantal D.Larose., (2015) *Data Mining and Predictive Analytics*, John Wiley & Sons.2nd Edition.

Course Title: Computer Graphics & Multimedia Semester: 2

Course Code : 17PCSE22 Part : I Contact Hours /Week : 5 Credit : 4

Objectives

To study the graphics techniques, algorithms and the multimedia concepts and various I/O technologies. It enables the students to develop their creativity by learning various graphical input and output devices and viewing and clipping

Unit I **14 Hours**

Computer Graphic Applications – Graphics Devices– Graphical User Interface–Line Drawing Algorithms – DDA Algorithm – Bresenham's Line Drawing Algorithm – General Bresenham's Circle Generation Algorithm – Polygon Filling.

Unit II **16 Hours**

Windows and Clipping 2-D Transformation: Introduction – Representations of points in Matrix form – Representation of 2D points in any Matrix form – Transformation of points – Transformation – Transformation between coordinate systems – Translation and Homogenous coordinates- Translation – 2D Rotation –Reflexion – Scaling - Shearing.

Unit III **15 Hours**

3D Transformation – Introduction - Representation of points – Representation of 3D object in Matrix form – 3D Translation – 3D Rotation – 3D Reflection – 3D Scaling – 3D Shearing. 3D Perspective Geometry: 3D Viewing – an Introduction – Terms related to Projection – Orthographic Projection - Axonometric Projection – Oblique Projection. Hidden Surfaces: Hidden Surface and Lines – Back face Detection - Back face Removal – Z Buffer Algorithm – A Buffer Algorithm.

Unit IV **16 Hours**

Multimedia – An Overview – Introduction – Presentation and Production – Characteristics of Multimedia Presentation – Hardware and Software Requirements – Uses of Multimedia – Visual Display Systems: Introduction – Cathode Ray Tube - Video Adapter Card – Video Adapter Cable – Liquid Crystal Display – Plasma Display Panel. Introduction – Types – Unicode Standard – Font – insertion of text – Text Compression – File formats. Image: Introduction – Image Type- Seeing Color – Color Models – Basic Steps for Image Processing – Interface Standards – Color Management Systems – File formats.

Unit V **14 Hours**

Introduction – Nature – Fundamentals Characteristics of sound – Elements of audio systems – MIDI – Sound card – Audio file formats and CODECs. Video: Introduction – Analog Video Camera – Transmission of video signals - Video signal formats – Television broadcasting standards – Digital video – Digital Video Standards – Video File formats & CODECs. Compression Introduction – CODECs – Types – Lossless Compression Techniques – Lossy Compression Techniques – JPEG Image Coding Standard – MPEG Standards Overview.

Text Book

1. ISRD Group.,(2006), *Computer Graphics*, The McGraw Hill.
2. Ranjan Parekh, (2006), *Principles of Multimedia*, Tata McGraw Hill.

Reference Books

1. Malay K Pakhira., (2008), *Computer Graphics, Multimedia and Animation*, PHI.
2. Donald Hearn., and Pauline Bake., (2007), *Computer Graphics*, PHI.
3. Tay Vaughan., (2007), *Multimedia making it work*, TMH.

Course Title: JAVA Programming Lab Semester: 2
Course Code: 17PCSC2P Part: I Contact Hours /Week: 5 Credit: 5

Java Lab

1. Using multilevel inheritance process student marks
2. Package illustration
3. To illustrate built-in & user defined exceptions
4. To create multiple threads
5. String manipulation using string methods
6. GUI components
7. Event handling(Focus events, Key events, Paint events, Text events, Mouse events and Window events)
8. Animation of images
9. File-byte stream. & File – character stream
10. Applet – Graphical method& Threads
11. Design a webpage that accesses database via JDBC
12. To implement Single Client-Server Communication.
13. To implement the SQL commands using JDBC.
14. To implement the JTrees.
15. To implement the JTable.
16. To create the table using JDBC.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: UNIX Programming Lab Semester: 2
Course Code: 17PCSC2Q Part: I Contact Hours /Week: 5 Credit: 5

Unix Program Lab

1. Write programs using the Following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write programs using the I/O System calls of UNIX operating system. (open, read, write, etc)
3. Write C Program to implement fork(), getpid() and wait().
4. Write C program to simulate UNIX command: ls.
5. Write C program to simulate UNIX command: grep.
6. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for FCFS. Compute and print the average waiting time and average turnaround time.
7. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for SJF. Compute and print the average waiting time and average turnaround time.
8. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority Scheduling. Compute and print the average waiting time and average turnaround time (2 sessions).
9. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Round robin. Compute and print the average waiting time and average turnaround time (2 sessions).
10. Develop Application using Inter-Process-Communication (Using shared memory, pipes or message queues).
11. Implement the Producer-Consumer problem using semaphores (Using UNIX system calls)
12. Implement some Memory management schemes like Paging and Segmentation.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: Software Engineering Semester: 3
Course Code: 17PCSC31 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To be aware of different life cycle models, analysis modeling, specification and architectural and detailed design methods. To learn about implementation, testing strategies, verification and validation techniques.

Unit I **15 Hours**

The evolving Role of Software-Software-The Changing Nature of Software-Legacy software-Software Myths-How it all starts. Software Engineering-A Layered- Technology-A process frame work-The Capability Maturity Model Integration (CMMI) –Process Patterns - Process Assessment-Personal and Team process Models-Process Technology-Product and Process. Prescriptive Models-The Waterfall Model-Incremental Process Models-Evolutionary Process Models-Specialized Process models – The Unified Process. What is Agility-What is an Agile Process-Agile Process models-Adaptive software development-scrum-crystal model

Unit II **17 Hours**

Software Engineering Practice-Communication Practices-Planning practices-Modeling Practices. Computer based systems – the System Engineering Hierarchy – Business process engineering an Overview – System Modeling. A bridge to design and Construction-Requirements Engineering Tasks-Initiating the Requirements Engineering Process-Eliciting Requirements-Developing Use-Cases. Requirements Analysis-Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario-Based Modeling-Flow Oriented Modeling.

Unit III **18 Hours**

Design within the Context of Software Engineering-Design Process and Design Quality-Design Concepts-The Design Models-Pattern Based Software Design: Describing a design pattern. Software Architecture-Data Design-Architectural Styles and Patterns-Architectural Design. What is a component-Designing Class based components-Conducting Component-Level Design-Object Constraint Language-Designing Conventional Components. The Golden Rules-User Interface Analysis and Design-Interface Analysis.

Unit IV **12 Hours**

A Strategic Approach to Software Testing-Strategic Issues-Test Strategies for Conventional Software-Test Strategies for Object Oriented Software-Validation Testing-System Testing. Software Testing Fundamentals-Black-Box and White-Box Testing-White-box Testing-Basis Path Testing-Control Structure Testing-Black-Box Testing-Object Oriented Testing Methods-Testing Methods Applicable at the class Level.

Unit V **13 Hours**

Software Quality-A Framework for Product Metrics-Metrics for the Analysis Model-Metrics for the Design Model. Attributes of Web-based Systems and Applications-WebApp Engineering Layers-The Web Engineering Process. Formulating Web-based Systems-Planning for Web Engineering Projects-The Web Engineering Team-Project Management Issues for Web Engineering.

Text Book

1. Roger S Pressman, (2014), *Software Engineering - A Practitioners Approach*, McGraw Hill, 7th Edition.

Reference Books

1. Ian Sommerville, (2015), *Software Engineering*, Pearson Publishers, 10th edition.
2. Rod Stephens, (2015), *Beginning software Engineering*, Wiley publishers, 1st edition.
3. Renu Rajani Pradeep Oak, (2013), *Software testing-effective methods, tools & techniques*, MCgraw hill Education publishers.
4. R.A.Khan A.Agarwal, (2014), *Software Engineering - A Practitioners Approach* , Narosa Publishing house.
5. Srinivasan desikan, gopalaswamy Ramesh, (2013), *Software Testing-Principles and Practices* Pearson Publishers.

Course Title: Web Technology Semester 3
Course Code: 17PCSC32 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To provide general understanding of the concepts of working in a web based development environment, basic ideas behind in PHP and MySQL. To understand about files, directory and how a web pages developed using HTML and connected to database using MySQL.

Unit I **16 Hours**

The building blocks of PHP- Switching flow – Loops- Code blocks and browser output. Working with functions: Function introduction-Calling functions-Defining a function-Returning values from user-defined functions- Variable scope- Saving state between function calls with static Statement-More about Arguments-Testing for the existence of a function.

Unit II: **16 Hours**

Working with Arrays- Creating an Object-Object Inheritance-Working with strings, dates and time: Formatting string with PHP –Investigating Strings with PHP –Manipulating Strings with PHP-Using Date and time functions in PHP-Other String, Date and Time functions.

Unit III **14 Hours**

Creating a simple input form-Accessing form input with User defined Arrays-Combining HTML and PHP Code on a single page-Using Hidden Fields to save State- Redirecting the User-Sending Mail on Form submission-Working with file uploads. Introducing Cookies- Setting a Cookie with PHP- Deleting a Cookie with PHP-Session Function Overview- Starting a Session – Working with session variable-Passing Session IDs in the Query string –Destroying Sessions and Un Setting Variables-Using Session in an Environment with registered users.

Unit IV **16 Hours**

Including files with include()- Validating Files- Creating and Deleting Files –Opening a file for Writing, reading or Appending-Reading from files- Writing or Appending to the file- Working with Directories –Opening Pipes to and from processes using popen()- Running commands with exec()- Running commands with system() or passthru(). The importance of good database design-Types of table relationships – Understanding Normalization –Flowing the design process.

Unit V **13 Hours**

Learning the MySQL Data types- Learning the Table creation syntax- Using the Insert Command-Using the Select Command-Using Where in Queries- Selecting from Multiple Tables-Using the Update Command to modify the Records- Using t he Replace Command- Using the Delete Command- Frequently used string functions MySQL- Using Date and Time Functions in MySQL with PHP-Working with MySQL Data.

Text Book

1. Julie C.Meloni, (2012), *Sams Teach Yourself PHP, MySQL and Apache ALL in One*, Pearson Education, Fourth Edition and Sixth Impression.

Reference Books

1. Achyut Godbole., and Atul Kahate., (2013), *Web technologies*, MCgraw hill Education publishers, 3rd Edition.
2. Luke Welling., and Laura Thomson., (2010), *PHP and MySQL Web Development*, Pearson Education.
3. Larry Ullman, (2008), *PHP 6 and MySQL 5*, Pearson Education.
4. Frank P.Coyle, (2013), XML, *Webservices & the data revolution*, Pearson Publishers.
5.Jeffrey C. Jackson, (2012), *Web Technologies –A Computer Science Perspective*, Pearson Publishers.

Course Title: Information Retrieval Semester: 3
Course Code: 17PCSE31 Part: I Contact Hours /Week: 4 Credit: 4

Objectives

To study about Boolean retrieval, tolerant retrieval, text classification, clustering and system.

Unit I **12 Hours**

An example information retrieval problem- A first take at building an inverted index- Processing Boolean queries- The extended Boolean model versus ranked retrieval. Document delineation and character sequence decoding- Determining the vocabulary of terms- Faster postings list intersection via skip pointers- Positional postings and phrase queries. Search structures for dictionaries- Wildcard queries- Spelling correction- Phonetic correction.

Unit II **13 Hours**

Parametric and zone indexes- Term frequency and weighting- The vector space model for scoring- Variant tf-idf functions. Efficient scoring and ranking- Components of an information retrieval system- Vector space scoring and query operator interaction.

Unit III **12 Hours**

The text classification problem- Naive Bayes text classification- The Bernoulli model- Feature selection- Evaluation of text classification. Document representations and measures of relatedness in vector spaces- Rocchio classification-k nearest neighbour- Classification with more than two classes- The bias-variance tradeoff.

Unit IV **13 Hours**

Support vector machines: The linearly separable case- Extensions to the SVM model- Issues in the classification of text documents- Machine learning methods in ad hoc information retrieval. Clustering in information retrieval- Problem statement- Evaluation of clustering- K-means.

Unit V **10 Hours**

Hierarchical agglomerative clustering- Single-link and complete-link clustering- Group-average agglomerative clustering- Centroid clustering- Divisive clustering- Cluster labeling.

Text Book

1. Christopher D. Manning., Prabhakar Raghavan., and Hinrich Schutze., (2014), *Introduction to Information Retrieva*l, Cambridge University Press.

Reference Books

1. Christopher D.Manning, Prabhakar Raghavan, Hinrich Schutze, (2008), *Introduction to Information Retrieval*, Cambridge University press.
2. Ricardo Baeza-Yates, Massimo melucci, (2011), *Advanced topics in Information Retrieval*, Springer science and business media.
3. William B.Frakes,Richard Baeza Yates , (2009), *Information Retrieval data structures and algorithms*, Pearson Education,

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Course Title: Cryptography and Network Security Semester: 3
Course Code: 17PCSE32 Part: I Contact Hours /Week: 4 Credit: 4

Objectives

To learn about Network security, security goals, security attacks and understands the encryption techniques and algorithm. Goal of this paper is to understand about authentication system.

Unit I **13 Hours**

Security Goals – Attacks – Services and Mechanism – Techniques. Integer Arithmetic – Modular Arithmetic – Matrices – Linear Congruence - Traditional Symmetric Key Ciphers: Instruction – Substitution Ciphers – Transposition Ciphers – Stream and Block Ciphers. Modern Block Ciphers – Modern Stream Ciphers.

Unit T II **12 Hours**

Introduction – DES Structure – DES Analysis – Multiple DES – Security of DES. Introduction – Transformations – Key Expansion – Ciphers – Examples – Analysis of AES.

Unit III **11 Hours**

Introduction – RSA Crypto System. Message Integrity – Random Oracle Model – Message Authentication.

Unit IV **10 Hours**

Introduction – SHA – 512 – WHIRLPOOL. Comparison – Process – Services – Attacks on Digital Signature – Digital Signature Schemes.

Unit V **14 Hours**

Introduction – Passwords – Challenge Response – Zero Knowledge – Bio Metrics. Symmetric Key Distribution – Kerberos – Symmetric Key Agreement – Public Key Distribution.

Text Book

1. Behrouz A. Forouzan., (2011), *Cryptography and Network Security*, TheMcGraw Hill.

Reference Books

1. William Stallings, (2017), *Cryptography and networks security - Principles and practice*, Pearson publications, 7th edition.
2. Scott C.H.Hung, David Maccallum., and Ding-zhu Du., *Networks security*, Springer,
3. W.M.Arthur Conklin, Greg white, (2015), *Principles of Computer Security*, McGraw-Hill Education.
4. Eric Cole., Ronald krutz., and James W Colney, *Network Security Bible*, 2nd edition.

Course Title: Internet and Web Programming Semester: 3
Course Code: 17PCSN31 Part: III Contact Hours /Week: 6 Credit: 4

Objectives

To learn Internet, uses of the Internet, internet protocols, etc. To be aware of Hyper Text Markup Language, Dynamic HTML, java scripts, VB Script, Java Server Pages (JSP) and Active Server Page (ASP).

Unit I **14 Hours**

Basic concepts – Communicating on the internet – Internet domains – Internet server identities – Establishing connectivity on the internet – Client IP address – How IP addressing case into existence? A brief overview of TCP/IP and its services – Transmission control protocol.

Unit II: **18 Hours**

Information files creation – Web server – Web client / Browser – Hyper Text Markup Language(HTML) – Commonly used HTML commands – Titles and footers – Text Formatting – Emphasizing material in a web page – Text styles – Other text effects. Types of Lists. Using the BORDER Attribute – Using the WIDTH and HEIGHT Attribute – Using the ALIGN Attribute – Using the ALT Attribute. Introduction – Using the WIDTH and BORDER Attribute – Using the CELLPADDING Attribute – Using the CELLSPACING Attribute – Using the BGCOLOR Attribute – Using the COLSPAN and ROWSPAN Attributes. Links – Images as Hyperlinks. Introduction to Frames.

Unit III: **20 Hours**

JavaScript in Web Pages – JavaScript – Writing Java Script into HTML – Basic Programming Techniques – Operators and Expressions in Java Script – JavaScript Programming Constructs Conditional Checking – Super Controlled-Endless Loops – User Defined Functions – Placing Text in a Browser – Dialog Boxes. The Form Object – Other Built-in Objects in JavaScript – User Defined Objects. What are Cookies – Setting a Cookie.

Unit IV: **18 Hours**

Introduction – Embedding VBScript Code in an HTML Document – Comments – Variables – Operators – Procedures – Conditional Statements – Looping Constructs – Objects and VBScript – Cookies.

Unit V **20 Hours**

Introduction – Advantages of JSP – Developing First JSP – Components of JSP – Reading Requests Information – Retrieving the data posted from a HTML File to a JSP File – JSP Sessions – Cookies – Disabling Sessions. ASP Introduction – Advantages of Using ASP – First ASP Script – Processing of ASP Scripts with forms – Variables and Constructs – Subroutines – Include/Virtual – ASP Cookies – ASP Objects – Connecting to data with ASP

Text Book

1. Ivan Bayross , *Web Enabled Commercial Application Development Using HTML*, DHTML, JavaScript, Perl CGI, BPB Publications, 3rd Revised Edition,
2. N.P Gopalan., and J.Akilandeswari.,(2007), *Web Technology*, Prentice Hall of India.

Reference Books

1. Achyut Godbole., and Atul Kahate., (2013), 3rd Edition, *Web technologies* , MCgraw hill Education publishers.
2. Ramesh Bangia., (2011, *Internet technology and Wed design*, Firewall media publishers), 3rd Edition.
3. A Lexis Leon., and Mathews Leon., (2012), *Internet for everyone*, Leon vikas publishers, 15th anniversary edition.

Course Title: Web Design Lab | Semester: 3
Course Code: 17PCSC3P | Part: I | Contact Hours /Week: 5 | Credit: 4

Web Design Lab

1. Design a Web page using HTML tables.

2. Design a Web page using HTML frames.

3. Design a Web page having questionnaires using HTML forms.

4. Design a Web page using HTML.

5. Design a Web page using all multimedia components.

6. Design a Web page using Flash menus.

7. Design a Web page that has biodata using java script and do validation.

8. Design a Web page to submit employee information to a Server.

9. Design a Web page for online exam.

10. Design five pages of a e-book.

11. Create a computer dictionary using script.

12. Create a tutorial website using script.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: Python Programming Semester: 3
Course Code: 17PCSC3Q Part: I Contact Hours /Week: 5 Credit: 4

Python Programming

Section: A (Simple Program)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student, Marks obtained in each of the three subjects are to be input by the user.
3. Write a menu driven program, using user defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first 'n' terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects (Curve, Sphere, Cone, Arrow).
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs height h. The values of p and h are to be entered by the user.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

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Course Title: Digital Image Processing Semester: 4
Course Code: 17PCSC41 Part: I Contact Hours /Week: 5 Credit: 4

Objectives

To understand Digital Image Processing fundamentals, Image Transformation, Enhancement, Restoration and Compression Techniques. To implement various techniques for Segmentation of Images, Image Reconstruction operations and various Image Processing Techniques for suitable applications using MATLAB.

Unit I **10 Hours**

What is Digital Image Processing – Origin – Fundamental steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels.

Unit II **16 Hours**

Gray level transformations- Histogram Processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering –Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

Unit III **16 Hours**

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

Unit IV **17 Hours**

Image Compression Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Wavelet coding – Compression Standards - JPEG2000. Segmentation: Detection of Discontinuities – Edge Linking and Boundary detection – Region based segmentation

Unit V **16 Hours**

Case Studies Using Matlab: Introduction to Image Processing Toolbox – Practice of Image Processing Toolbox – Case studies – Various Image Processing Techniques.

Text Book

1. Rafael C. Gonzalez., and Richard E.Woods., (2010), Digital Image Processing, Pearson Education, 3rd Edition.

Reference Books

1. Anil Jain K, (2011), *Fundamentals of Digital Image Processing*, PHI Learning Pvt. Ltd.,
2. Rafael C. Gonzales, Richard E. Woods, Steven L, (2011), *Digital Image Processing Using MATLAB*, TMH Pvt. Ltd, 3rd Edition.
3. Kenneth R.Castleman, (2017), *Digital Image Processing*, Pearson Publication.

Course Title: Big Data Analytics Semester: 4
Course Code: 17PCSC42 Part: I Contact Hours /Week: 5 Credit 4

Objectives

To Understand Data Warehouse Environment, Terminologies used in Big Data Environments and Hadoop environment. It helps us to understand challenges in big data and technologies in big data.

Unit I **14 Hours**

Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data-Evolution of Big data-Challenges of Big data-Other Characteristics of Data Which are not Definitional Traits of Big Data-Why Big Data?-Are we Just an Information Consumer or Do we also produce Information?-Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment – A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?

Unit II **16 Hours**

Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics? – Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – why is Big Data Analytics Important? – What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? – Data Science – Data Scientist… Your New Best Friend – Terminologies Used in Big Data Environments – Basically Available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools.

Unit III **15 Hours**

The Big Data Technology Landscape: NoSQL (Not Only SQL) – Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS(Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN(Yet another Resource Negotiator) – Interacting with Hadoop Ecosystem.

Unit IV **16 Hours**

Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression, Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) – RCFile Implementation – SerDe – User – Defined Function (UDF).

Unit V **14 Hours**

Introduction to Machine Learning: Introduction to Machine Learning – Machine Learning Algorithms.

Text Book

1. SeemeAcharya, Subhashini Chellappan, (2015), *Big Data and Analytics*, Wiley India Pvt.Ltd, 1st Edition.

Reference Books

1. Nathan Marz, James Warren, (2015), *Big Data – Principles and best practices of scalable real-time data systems*, Manning Publication, USA.
2. Bart Baesens , (2015), *Analytics in a Big Data World: The Essential Guide to Data Science and its Applications*, Wiley India Pvt.Ltd.
3. Jared Deamn, (2015), *Big Data, Data Mining and Machine Learning*, Willey India Pvt.Ltd.

Course Title: Image Processing Lab Semester: 4
Course Code: 17PCSC4Q Part: I Contact Hours /Week: 5 Credit: 4

Image Processing Lab:

1. Implement the spatial image enhancement functions on a bitmap image – Mirroring (Inversion)
2. Implement the spatial image enhancement functions on a bitmap image – Rotation (Clockwise)
3. Implement the spatial image enhancement functions on a bitmap image – Enlargement (Double Size)
4. Implement(a) LowPassFilter(b) HighPass Filter
5. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
6. Implement Smoothing and Sharpening of an eight bit color image
7. Implement (a) Boundary Extraction Algorithm (b) Graham's Scan Algorithm
8. Implement (a) Edge Detection (b) Line Detection
9. Display an image and its histogram
10. Write a Program to Perform shrinking, zooming and cropping of an image
11. Write a Program to perform the experiment for histogram equalization.
12. Write a Program to perform blurring and de-blurring on an image.
13. Write a Program to Remove salt and pepper noise in an image.
14. Write a Program to Perform Edge detection using Operators.

Note: The above are sample problems; Instructor can add more exercises on their requirements and to the technology

Course Title: Project Work & Viva voce			Semester: 4
Course Code: 17PCSC4P	Part: I	Contact Hours /Week: 5	Credit: 5