

M. Sc. Syllabus

(Academic year 2015 onwards)

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE - 641 018

(An Autonomous) college affiliated to Bharathiar University)

M. Sc., Computer Science Syllabi and Scheme of Examinations for the Students Admitted from 2015-2016 academic year onwards

ABOUT THE COURSE

The M. Sc. (**Computer Science**) course offered by this college is a two year full time course consisting of four semesters. It is oriented towards the concepts of the theory of Computer Science and its applications in recent developments both in commercial and scientific areas.

ELIGIBILITY FOR ADMISSION

Candidates for admission to the first year course leading to the degree of Master of Science (M.Sc.) will be required: A pass with 50% of Marks in B.Sc.(CS) or B.C.A. or B.Sc.(IS) or B.Sc.(IT) or B.Sc.(CT) degree in any University recognized by the Bharathiar University.

In case of SC/ST candidates, a mere pass in the qualifying examination will be sufficient.

ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the semester examinations held at the end of each semester only on securing a minimum attendance of 75% and that the candidate's conduct has been satisfactory. If a candidate fails to secure 75% attendance and conduct has been satisfactory it shall be open to the principal or any authority delegated such powers to grant exemption to a candidate for valid reasons subject to usual conditions.

EXAMINATIONS

Semester examinations shall be conducted at the end of each semester for the subjects of study undergone by the students in that semester. UGC pattern of question paper is followed for all the theory subjects. Practical examinations will be conducted with one internal examiner and one external examiner and the question paper for practical examination will be set by both Internal and External examiners.

PASSING REQUIREMENTS

1. Single valuation (External) system will be followed to award marks.
2. A candidate shall be declared to have passed the examinations in a subject if he/she secures not less than 50% in the end of semester examination.
3. A candidate who successfully completes the course and passes the examinations prescribed in all the subjects of study and practical examinations shall be declared to have been qualified for the degree.

4. If a candidate does not complete the course successfully within a period of 4 years (8 semesters) from the date of his/her joining, he/she will be disqualified from the course.

CLASSIFICATION OF SUCCESSFUL CANDIDATES

1. All candidates securing not less than 60% of the aggregate marks shall be declared to have passed the degree in **FIRST CLASS** provided they have passed the examination in every subject including practical, project work and Viva-Voce within two years of joining the course.
2. Other successful candidates shall be declared to have passed the examinations in **SECOND CLASS**
3. He / She earns a progress certificate from the Head of the Institution of having satisfactorily completed the course

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE - 641 018
DEPARTMENT OF COMPUTER SCIENCE

M. Sc., Computer Science Syllabi and Scheme of Examinations for the Students Admitted from
2015-2016 academic year onwards

Semester	Code	Part	Paper	Title of the Paper	Hrs (wk)	Internal (CA)Mar	External (SE)Mar	Total Marks	SE - Min.	TPM	Credits
I	15MCS11C	A	I	Computer Architecture and Parallel Processing	4	25	75	100	38	50	4
	15MCS12C	A	II	Design & Analysis of Algorithms	4	25	75	100	38	50	4
	15MCS13C	A	III	Object Oriented Analysis Design & C++	4	25	75	100	38	50	4
	15MCS14C	A	IV	Computer Networks and Communications	4	25	75	100	38	50	4
	15MCS15C	A	V	Relational Database Management Systems	4	25	75	100	38	50	5
	15MCS16P	A		Practical 1 : Object Oriented Programming Lab	3	40	60	100	30	50	2
	15MCS17P	A		Practical 2 : RDBMS Lab	2	40	60	100	30	50	2
					25			700			25
II	15MCS21C	A	VI	Software Engineering Concepts	4	25	75	100	38	50	4
	15MCS22C	A	VII	Advanced Operating System Concepts	4	25	75	100	38	50	4
	15MCS23C	A	VIII	Advanced Java Programming	4	25	75	100	38	50	4
	15MCS24C	A	IX	Data Mining and Big Data Analytics	4	25	75	100	38	50	4
	15MCS25E	B	X	Elective 1:	4	25	75	100	38	50	5
	15MCS26P	A		Practical 3: Java Programming Lab	3	40	60	100	30	50	2
	15MCS27P	A		Practical 4: Linux Shell Programming Lab	2	40	60	100	30	50	2
					25			700			25
III	15MCS31C	A	XI	Client Server Technology	4	25	75	100	38	50	4
	15MCS32C	A	XII	Digital Image Processing	4	25	75	100	38	50	4
	15MCS33C	A	XIII	ASP and XML	4	25	75	100	38	50	4
	15MCS38C	A	XIV	Cryptography and Network Security	4	25	75	100	38	50	4
	15MCS35E	B	XV	Elective 2:	4	25	75	100	38	50	5
	15MCS36P	A		Practical 5: XML Programming Lab	3	40	60	100	30	50	2
	15MCS37P	A		Practical 6: Network Security Lab	2	40	60	100	30	50	2
					25			700			25
IV	15MCS41V	B	Project and Viva Voce			40	160	200	80	100	15

			Total / Credits				2300			90

**ELECTIVES FOR SECOND SEMESTER
ELECTIVE – I**

- 1.1 Principles of Compiler Design
- 1.2 Distributed Computing
- 1.3 Neural Network and Fuzzy Logic
- 1.4 Artificial Intelligence & Expert Systems
- 1.5 Software Testing
- 1.6 TCP/IP
- 1.7 Semantic Web Technology

**ELECTIVES FOR THIRD SEMESTER
ELECTIVE – II**

- 2.1 Multimedia and its Applications
- 2.2 Embedded Systems
- 2.3 Natural Language Processing
- 2.4 Simulation and Modeling
- 2.5 Enterprise Resource Planning
- 2.6 WAP
- 2.7 Cloud Computing

SEMESTER – I

Paper–I: COMPUTER ARCHITECTURE AND PARALLEL PROCESSING

UNIT – I

Introduction to parallel processing – Trends towards parallel processing – Parallelism in uniprocessor Systems – Parallel Computer structures – Architectural Classification schemes – Flynn’ Classification – Feng’s Classification – Handler’s Classification – Parallel Processing Applications.

UNIT – II

Solving Problems in Parallel: Utilizing Temporal Parallelism – Utilizing Data Parallelism – Comparison of Temporal and Data Parallel Processing – Data parallel processing with specialized Processor – Inter-task Dependency. Instructional Level Parallel Processing – Pipelining of Processing Elements – Delays in Pipeline Execution – Difficulties in Pipelining.

UNIT – III

Principles Linear Pipelining – Classification of Pipeline Processors – General Pipeline and Reservation tables – Arithmetic Pipeline – Design Examples – Data Buffering and Busing structure – Internal forwarding and Register Tagging – Hazard Detection and Resolution – Job sequencing and Collision prevention – Vector processing requirements – Characteristics – Pipelined Vector Processing methods

UNIT – IV

SIMD Array Processors – Organization – Masking and Data routing – Inter PE communications – SIMD Interconnection Networks – Static Vs Dynamic – Mesh connected Illiac – Cube interconnection network – Shuffle – Exchange and Omega networks – Multiprocessor Architecture and programming Functional structures – interconnection Networks.

UNIT – V

Parallel Algorithms: Models of computation – Analysis of Parallel Algorithms Prefix Computation – Sorting – Searching – Matrix Operations.

TEXT BOOKS

1. Kai Hwang, Faye A. Briggs, “Computer Architecture and Parallel Processing” Mc Graw – Hill Book Company, 1985 [I, III UNITS).
2. V. Rajaraman, C. Siva Ram Murthy, “Parallel Computers Architectures and Programming”, PHI, 2003 [II, IV UNITS]

REFERENCE BOOKS

1. Kai Hwang, “Advanced Computer Architecture – Parallelism, Scalability, Programmability”, McGraw Hill, 1993.
2. Michael J. Quinn, “Parallel Computing Theory and Practice”, TMCH, Second Edition, 2002.
3. Barry Wilkinson, Micheal Allen, “Parallel Programming: Techniques and Applications”, Prentice Hall, 1999.

SEMESTER – I

Paper–II: DESIGN AND ANALYSIS OF ALGORITHMS

UNIT I

Algorithm Specification –Recursive Algorithms – Performance Analysis – Space Complexity – Time Complexity -.Asymptotic Notations – Asymptotic Complexity of SUM and Recursive SUM and ADD Algorithms - Analysis of Sequential Search.

UNIT II

Elementary Data Structures- Stacks and Queues – Trees – Binary Trees – Binary Search Trees – Iterative and Recursive Search of BST – Graphs – Konigsberg Bridge Problem – Graph Representations - Graph Traversals

UNIT III

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

UNIT IV

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

UNIT V

Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

TEXT BOOK:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithm, Galgotia Publications, 2007.

REFERENCES:

1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and analysis of Computer Algorithms", Pearson Education, 1999.

SEMESTER – I

Paper–III: OBJECT ORIENTED ANALYSIS DESIGN & C++

UNIT – I

The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.

UNIT – II

Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification – identifying classes and objects – Key Abstractions and Mechanism.

UNIT – III

Introduction to C++ – Input and output statements in C++ – Declarations – control structures – Functions in C++.

UNIT – IV

Classes and Objects – Constructors and Destructors – operators overloading – Type Conversion – Inheritance – Pointers and Arrays.

UNIT – V

Memory Management Operators – Polymorphism – Virtual functions – Files – Exception Handling – String Handling – Templates.

TEXT BOOKS

1. “Object Oriented Analysis and Design with Applications” – Grady Booch, Second Edition, Pearson Education.
2. “Object Oriented Programming with ANSI & Turbo C++” – Ashok N. Kamthane, First Indian Print – 2003, Pearson Education.

REFERENCE BOOKS

1. Balagurusamy “Object Oriented Programming with C++”, TMCH, Second Edition, 2003.

SEMESTER – I

Paper–IV: COMPUTER NETWORKS AND COMMUNICATIONS

UNIT – I

Introduction to digital networks – WAN – WAN standards – Introduction TCP/IP and Internet – network technologies – TCP/IP features, protocol standards Internetworking concepts and Architectural model – Network interface layer.

UNIT – II

IP layer: Internet Address – Mapping Internet Address to Physical Address – Determining an Internet address at startup – Transparent gateways and subnet addressing – multicast addressing – client-server model of interaction – bootstrap protocol – domain name system – address discovery and binding.

UNIT – III

Internet Protocol: Connectionless Datagram delivery – data Structures and input processing. Routing IP datagrams – error and control messages – protocol layering – user datagram protocol – reliable stream transport service – fragmentation and reassembly. Routing: Cores – peers and algorithms – autonomous systems – interior gateways protocols – routing table and routing algorithms.

UNIT – IV

UDP: User datagrams. TCP: Data structures and Input processing – finite state machine implementation – output processing – timer management – flow control and adaptive retransmission – urgent data processing and the push function – socket level interfaces.

UNIT – V

Application layer: Remote login – File transfer Access – electronic mails – Internet management. X.25 networks and support protocols.

TEXT BOOKS

1. Douglas E. Comer, “Internetworking with TCP/IP Volume I”, Prentice Hall, 2003.
2. Douglas E. Comer, David L. Stevens, “Internetworking with TCP/IP Volume II”, Prentice Hall, 2003.
3. Uyles Black, “TCP/IP & Related Protocols” McGraw-Hill, 1995.

SEMESTER – I

Paper–V: RELATIONAL DATABASE MANAGEMENT SYSTEMS

UNIT I :

Introduction - Database system applications - purpose of database system – View of data – Database Languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators.

UNIT II :

Relational Databases – Relational Model – Structure of Relational Databases – Fundamental Relational Algebra Operations – Additional Relational Algebra Operations.

SQL – Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null values – Nested Subqueries – Views – Modification of the Database.

UNIT III :

Database design : Database Design and the E – R Model – Design Phases – Design Alternatives – The Entity Relationship Model – Constraints – Entity Relationship Diagrams – Extended E – R features – Specialization – Generalization – Aggregation – Reduction to Relational Schemas.

UNIT IV :

Relational Database Design – Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Keys and Functional Dependencies – Boyce – Codd Normal Form – BCNF and Dependency Preservation – Third Normal Form – Functional Dependency Theory – Lossless Decomposition – Dependency Preservation – BCNF Decomposition Algorithm – 3NF Decomposition – Multivalued Dependencies – Fourth Normal Form – 4NF Decomposition.

UNIT V :

Database System Architectures – Centralized and Client / Server Architectures – Centralized Systems – Client / Server Systems – Server System Architectures – Parallel Systems – Distributed Systems – Network Systems.

TEXT BOOK :

“ Database System Concepts “ by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Fifth edition, 2006, Mc Graw Hill International Edition.

REFERENCE BOOKS :

1. “An Introduction to Database Systems “ by Bipin c. Desai
2. “ Database Management Systems” by Elmasri and Navathe

SEMESTER – I

Practical 1: OBJECT ORIENTED PROGRAMMING LAB

1. **Book Shop Management:** Write a program to develop a shopping management system which maintains stock details of a book shop using constructor and destructor.
2. **Student details using Virtual Functions:** Write a program to maintain student particulars.
3. **Pay Slip using Functions:** Write a program to create a Pay Slip using manipulation of function.
4. Write a function called **circerea()** that finds the area of a circle. It should take an argument of type float and return an argument of the same type. Write a **main()** function that gets a radius value from the user calls **circarea()** and displays the result.
5. Create a class called time that has separate **int** member data for hours, minutes and seconds. One constructor should initialize this data to 0, and another should initialize it to fixed values. A member function should display it in 11:59:59 format. The final member function should add two objects of type time passed as arguments.

A **main()** function should create a two initialized time objects and one that isn't initialized. Then it should add the two initialized values together leaving the result in the third time variable finally it should display the value of this third variable.

6. Create a class that imitates parts of the functionality of the basic type **int** call the class **int** (not different spelling) the only data in this class is an int variable Include member functions to initialize an **int** to 0, to initialize it to an **int** value, to display (it looks just like an **int**) and to add two **int** values.

Write a program that exercise this class by creating two initialized and one uninitialized **int** values, adding these two initialized values and placing the response in the uninitialized value and then displaying this result.

7. Create a class called employee that contains a name (an array of data char) and an employee number (type long). Include a member function called **getdata()** to get data from the user for insertion into the

object, and another function called **putdata()** to display the data assume the name has no embedded blanks.

Write a **main()** program to exercise this class. It should create an array of type employee and then invite the user to input data for up to 100 employees it should print the data for all the employee.

8. Overload all five integer arithmetic operators (+, -, *, / and %) so that they operate on objects of type int. If the result of any such arithmetic operators exceed the normal range of int from -32,768 to 32,767 have the operator print a warning and terminate the program.
9. Imagine a publishing company that markets both book and audio-cassette versions of its works. Create a class publication that stores the title (a string) and price (type float) of a publication from this class derive two classes book which adds a pages count (type int) and tape, which adds a playing time in minutes (type float) each of these three classes should have a **getdata()** function to get its data from the user at the keyboard and a **putdata()** function to display its data.

Write a **main()** program to test the book and tape classes by creating instances of them, asking the user to fill in their data with **getdata()** and then displaying the data with **putdata()**.

10. Write a program that reads a group of numbers from the user and places them in an array of type float. Once the numbers are stored in the array the program should average them and print the result. Use pointer notation wherever possible.
11. In the Distance class create an overloaded * operator, so that two distance can be multiplied together, make it a friend function so that you can use such expressions as
$$\text{dist1} = 7.5 * \text{dist2};$$
you'll need a one-argument constructor to convert floating point values into distance value. Write a **main()** program to test this operator in several ways.
12. **Exception Handling in C++:** Write a program to implement stack operations.

SEMESTER – I

Practical 2: RDBMS LAB

LIST OF PRACTICALS

SQL – ORACLE, SQL SERVER

1. Working with DDL and DML commands of SQL for creation and manipulation of single, multiple tables.
2. Working with PL/SQL- Triggers and stored procedures.
3. Developing a Package using a database.

SEMESTER – II

Paper–VI: SOFTWARE ENGINEERING CONCEPTS

UNIT – I

Introduction to Software Engineering : The evolving role of software – The changing nature of software – Software myths – A process frame work – Process technology – Process model – Agile process model.

UNIT – II

Applying Web Engineering: Attributes of web based systems and applications – Webapp engineering layers – Process – Practices – Web based systems – Planning web engineering projects – Team issues – Requirement analysis for webapp – Models – Architecture design – Object oriented hyper media design method – Testings.

UNIT – III

Project Management: The management spectrum – Estimation – Resources – Decomposition techniques – Empirical estimation models – Project scheduling – Defining the tasks – Risk management – Quality management – Concepts – Assurance – Reviews – Change management – Software configuration management – The SCM process.

UNIT – IV

Advanced topic in Software Engineering : Formal methods – Basic concepts – Mathematical preliminaries – Mathematical notations – Formal specification languages – Object constraint languages – The Z specifications – The ten commandments of formal methods – The clean room approach – Functional specification – Clean room design – Clean room testing.

UNIT – V

Component Based Development: Engineering of component based systems – The CBSE process – Domain engineering – Component based development – Classifying and retrieving components – Economics of CBSE – Re-engineering: Business process re-engineering – Software re-engineering – Reverse engineering – Restructuring – Forward engineering – The economics of re-engineering.

TEXT BOOKS

1. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, 6th edition, McGraw Hill International Edition, 2005.

SEMESTER – II

Paper–VII: ADVANCED OPERATING SYSTEM CONCEPTS

UNIT – I

Introduction – Evolution of Operating systems – Serial, Simple Batch, Mutiprogrammed Batch , Timesharing, Distributed and Real time operating systems – Computer Hardware review – Interrupts – Operating System Concepts – Processes – Model – Creation – Termination – Process Hierarchy – Process States – Implementation of Processes – Threads – Thread Usage – Multi threading.

UNIT – II

Inter Process Communication – Race condition – Critical Region – Mutual Exclusion – Sleep and wakeup – Semaphores – Mutexes – Message Passing. Classical IPC Problems: The Dining Philosophers Problem – The Readers and Writers Problem – The Sleeping Barber Problem – Producer Consumer problem.

UNIT – III

UNIX : Architecture of Unix Operating System – Introduction to system concepts – Kernel data structures – Internal representation of Files – Inodes – Algorithms for allocation and Releasing inode – Structure of a Regular file – Directories – Super block.

UNIX – IV

UNIX: Algorithm for assigning new Inode and freeing Inode – Allocation of Disk blocks – Process states and transition – Layout of system memory – The context of a Process. Process Control in Unix – Algorithm for Fork system call – Algorithm for Exit – Algorithm for Wait – Algorithm for Exec – Uses of Exec system call.

UNIX – V

UNIX: Algorithm for Booting the Unix system – Algorithm for Init process – Process scheduling algorithm – Example of Process scheduling in Unix. Example C programs by using fork, execl, wait, exit system calls. Memory management policies in UNIX – Swapping – Demand paging.

TEXT BOOKS

1. Andrew S.Tanenbaum, "Modern Operating Systems", PHI/Pearson Education Asia, Second Edition, 2001 [Units I, II].
2. Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2002. [Units III, IV, V]

REFERENCE BOOKS

1. William Stallings, "Operating Systems", Prentice Hall of India, Second Edition, 2000.

SEMESTER – II

Paper–VIII: ADVANCED JAVA PROGRAMMING

UNIT – I

Overview of Java – Data types – Operators – Declarations – Control Structures – Arrays and Strings – Java Classes – Fundamentals – Methods – Constructors – Scope rules – this keyword – Object based and Object oriented programming – Inheritance – Reusability – Composing class – Method overloading – Abstract Classes – Virtual functions.

UNIT – II

Packages and Interfaces – packages – Access protection – Importing packages – Interface – Defining and implementing interface – Applying interface – Variable in Interface.

Exception Handling : Fundamentals – Exception types – Uncaught exceptions – Using try and catch – Multiple catch clauses – Nested try statements – Throw – Throws – Java Built in Exception – Creating your own sub classes.

UNIT – III

Multithreaded Programming: Java thread model – Priorities – Synchronization – Messaging – Thread class and runnable interface – Main thread – Creating the thread – Synchronization – Interthread communication – Deadlock.

UNIT – IV

I/O Applets : I/O basics – Stream – Stream Classes – Predefined stream – Reading/Writing console input – Applet fundamentals – Native methods – GUI components – Applets – Java Scripts – Java development kit – Java API - **JAVABEANS:** Preparing a class to be a JavaBean – Creating a JavaBean – Adding Beans and Properties to a JavaBean – Connecting Beans with Events in the BeanBox – the BeanInfo class.

UNIT – V

Introduction to Java Network Connections: Basic structure of JDBC – Socket Programming - Overview of Servlet technology - Handling HTTP GET and POST requests – Session tracking – RMI: defining, implementing the RMI – Define the Client – Compile Execute the server and the client – Networking: Reading a file on a web server – Establishing a simple server and a simple client (using stream sockets) – Random and BitSet Class – Class arrays – Interface Collection and Class Collections – Sets – Maps.

REFERENCE BOOKS

1. Patric Naughton and Herbert Schildt, “Java: The Complete Reference”, Tata McGraw Hill, 1997.
2. Deitel and Deitel, “JAVA – How to Program “, Prentice Hall International Inc, 1998.
3. Wiiliam Stanek and Peter Norton, “Peter Norton’s Guide to Java Programming”, Tech media Publications, 1997.
4. Mark Grand, “Java Language Reference”, O’Reily & Associates Inc. 1997.

SEMESTER – II
Paper–IX: DATA MINING AND BIG DATA ANALYTICS

Objectives

- To know the basic concepts of Data Mining and Big Data Analytics.

UNIT – I

Introduction – Data Mining – Relational Databases – Data Warehouses – Transactional databases – Data Mining functionalities – Classification of Data Mining systems – Major Issues in Data Mining.

UNIT – II

Data Preprocessing – Data cleaning – Missing value, noising data and inconsistent data – Data integration and Transformation – Data reduction – Data cube aggregation – Dimensionality reduction and data compression – Data mining primitives.

UNIT – III

Classification and predictions – Issues regarding classification and prediction – Classifications by decision tree induction – Classification by Back propagation – Other classification methods

UNIT – IV

Cluster Analysis – Types of Data in Cluster Analysis – Interval – Scaled variables, Binary variables, Nominal ordinal and ratio-scaled variables – Clustering methods – Partitioning methods – K-means, k-medoids and CLARANS – Hierarchical methods – Agglomerative and Divisive, BIRCH, CURE – Outlier analysis – Data Mining applications.

UNIT-V

The Big Deal about Big Data: What is Big Data-Why Is Big data important- Big Data. Applying Big Data to Business problems: A sampling of use cases-Big Data use cases-IT for IT – Customer state. Analytics for Big Data at Rest: The Big Data platform for high performance deep analytics- Appliance simplicity – Hardware Acceleration-Balance, massively parallel architecture- Modular design.

TEXT BOOKS

1. Jinweihan, Micheline Kambler, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers, New Delhi. (For Unit I, II, III and IV).
2. Paul C Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, David Corrigan, James Giles, "Harness the Power of Big Data", The McGraw-Hill Publications, 2013, First Edition. (For Unit V).

REFERENCE BOOKS

1. Pieter Adriaans, Dolf Zantinge, "Data Mining", Addison Wesley, 1998.
2. Sam Anohory, Dennis Murrey, "Dataware housing in the real world", Pearson, 2004.

SEMESTER – II
Practical 3: JAVA PROGRAMMING LAB

- 1 Employee Details
- 2 Menu Driven Program
- 3 Moving and Blinking Banner
- 4 Telephone Billing using Constructor
- 5 Radio Button
- 6 Multiple Selection List Box
- 7 Moving shapes according to Key Press
- 8 Wishes by Pressing Key
- 9 Web Page
- 10 Mouse Events

SEMESTER – II
Practical 4: LINUX SHELL PROGRAMMING LAB

1. Arithmetic Operation
2. Employee Details
3. Electricity Bill Preparation
4. Sorting
5. Factorial
6. Sum of Numbers
7. Exponent using shell Program
8. Swapping of two numbers
9. Greatest among three numbers
10. Odd or Even
11. Testing the files and directories
12. Expansion and Substitution

SEMESTER – III

Paper–XI: CLIENT/SERVER TECHNOLOGY

UNIT – I

Client / Server Computing: Main frame – Centric Client / Server Computing – Down sizing and Client / Server Computing. **Advantages of Client / Server Computing:** The Advantages of Client / Server Computing – Technology Revolution – Connectivity – User Productivity – Ways to Improve Performance – How to Reduce Network Traffic – Vendor Independence – Faster Delivery of System.

UNIT – II

Components of Client / Server Applications: The Client – The Role of the Client – Client Services – Request for services. **Components of Client / Server Applications:** The Server – The Role of the server – Server Functionality in Detail – The Network operating system – What are the available Platforms? – The Server Operating System.

UNIT – III

Components of Client / Server Applications Connectivity: Open Systems Interconnect – Communications interface Technology – Interprocess Communication – Wide Area Network Technologies. **Client / Server Systems Development-Software:** Factors Driving Demand for Application Software Development – Rising Technology Staff Costs – Need to Improve Technology Professional's Productivity – Need for Platform Migration and Reengineering of Existing Systems – Need for a Common Interface Across Platforms – Increase in Applications Development by Users.

UNIT – IV

Client / Server System Development - Hardware: Hardware / Network Acquisition – PC-Level processing units – Macintosh – Notebooks – Pen – Unix Workstation – X-Terminals – Server hardware – Data storage – Mirrored disk – Network Interface Cards (NICs) – Ethernet – FDDI – CDDI – Power production Devices – Uninterruptible Power Supply [UPS] – Surge protectors. **Client / Server system development - Service and Support:** System Administration – Availability – Reliability – Serviceability – Software Distribution – Performance – Network Management – Help Desk – Remote Systems Management – Security – LAN and Network Management Issues – Licensing.

UNIT – V

Client / Server System Development – Training: Training Advantages of GUI Application – System Administrator Training – Programmer's Resistance to new Technologies – Database Administrator Training – End users training – Training Delivery Technology. **The Future of Client / Server Computing:** What's in store for Networking – Everyone's a peer! – What's in store for Software Development – Everything's an object! – Enabling Technologies – Transformational Systems – The Challenge of the 1990's.

TEXT BOOKS

1. "Client / Server computing", Patrick Smith, Steve Guengerich, Second Edition, Prentice-Hall of India (P) Ltd., 2002.

REFERENCE BOOKS

1. Robert Orfali, Dan Harkey and Jerri Edwards, "Essential Client / Server Survival Guide", John Wiley & Sons Inc., 1996.
2. Joe Salami, "Client / Server Databases".
3. Patrick Smith et.al., "Client / Server Computing".
4. Larry I. Vaughn, "Client / Server System Design and Implementation".

SEMESTER – III

Paper–XII DIGITAL IMAGE PROCESSING

UNIT – I

Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.

UNIT – II

Image Enhancement in the Spatial Domain: Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.

UNIT – III

Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.

UNIT – IV

Image Compression: Fundamentals – Image compression models – Elements of Information Theory – Error Free compression – Lossy compression – Image compression standards.

UNIT – V

Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.

TEXT BOOKS

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Second Edition, PHI/Pearson Education.

REFERENCE BOOKS

1. B. Chanda, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
2. Nick Efford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.

SEMESTER – III

Paper–XIII: ASP and XML

UNIT – I

XML: Introduction to XML Markup – Parsers and Well formed XML Documents – Parsing a Document with msxml – Characters – Markup – CDATA Sections – XML Namespaces – Case study: A Day Planner Application. **Document Type Definition (DTD):** Introduction – Parsers, Well formed and valid XML Documents – Document Type Declaration – Element Type Definitions – Attribute Types – Conditional Selection – White space characters – Case Study: Writing a DTD for the Day Planner Application.

UNIT – II

Schemas: Introduction – Schemas Vs DTD – Microsoft XML Schema: Describing Elements – Describing Attributes – Data Types – W3C XML Schema – Case Study: Writing a Microsoft XML Schema for the Day Planner Application. **Document Object Model (DOM):** Introduction – DOM Implementation – DOM and Java Script – Setup – DOM Components – Creating Nodes – Traversing the DOM – Modifying the Day Planner Application to use DOM.

UNIT– III

XML Technologies and Applications: Introduction – XML Query Language – Directory Services Markup Language – Resource Definition Framework – XML Topic Maps – Virtual Glossary – Channel Definition Format – Information and Content Exchange Protocol – Rich Site Summary – P3P – Blocks Extensible Exchange Protocol – XML Digital Signatures – Extensible Tights Markup Language – XML Metadata Interchange – W3C’s XML Protocol – XAML.

UNIT – IV

ASP.NET: Introduction – .NET Framework – ASP – Operating Systems – Servers – ASP Objects – ADO and ADO.NET Objects – ASP Components – Relational DBMS and Other Data Sources – Developing Distributed Online Application – Client/Server or Tiered Applications. **Programming ASP.NET with Visual Basic .NET:** VB .NET Programming Language Structures – Built in ASP .NET Objects and Interactivity – Using the Response Object – The ASP Server Object.

UNIT -V

Web Forms and ASP .NET: Programming Web Forms – Web Forms Capabilities – Web Forms Processing – Web Forms and Events – Creating Web Forms Events Handlers – Building Interactive Applications with VS .NET – Solutions and Project in VS .NET – Solution Explorer – Creating a Web Form.

TEXT BOOKS

1. Dave Mercer, “ASP.NET: A Beginner’s Guide”, Tata McGraw-Hill Publishing Company Limited Edition 2002.
2. H.M. Deitel P.J.Deitel T.R. Nieto T.M. Lin P.Sadu, “XML How to Program“.

REFERENCE BOOK

1. AI Williams, Kim Barber, ”ASP Solutions” , DreamTech Press 2000.

SEMESTER – III

Paper–XIV: CRYPTOGRAPHY AND NETWORK SECURITY

UNIT – I

Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm – Stream cipher and Block cipher – Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

UNIT – II

Public-key Cryptosystem: Introduction to Number Theory – RSA Algorithm – Key Management - Diffie-Hell man Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

UNIT – III

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

UNIT – IV

Web Security – Secure Socket Layer – Secure Electronic Transaction. System Security – Intruders and Viruses – Firewalls– Password Security

UNIT – V

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit – Other Security Mechanism: Introduction to: Stenography – Quantum Cryptography – Water Marking – DNA Cryptography.

TEXT BOOKS

1. William Stallings, “Cryptography and Network Security”, PHI/Pearson Education.

REFERENCE BOOKS

1. Bruce Schneir, “Applied Cryptography”, CRC Press.
2. A.Menezes, P Van Oorschot and S.Vanstone, “Hand Book of Applied Cryptography”, CRC Press, 1997 (Free Downloadable).
3. Ankit Fadia, ”Network Security”, MacMillan.

SEMESTER – III
Practical 5: XML PROGRAMMING LAB

LIST OF PRACTICALS

- 1 XML Document Using Elements and Attributes
- 2 XML Document Using DTD
- 3 XML Document implementing Schema
- 4 XML Document to implement Cascading Style Sheet
- 5 XML Document implementing Entities
- 6 Employee Details
- 7 Department Store details using W3C Scheme
- 8 Patient Details
- 9 Company Details
- 10 Student Details

SEMESTER – III
Practical 6: NETWORK SECURITY LIST OF PRACTICALS

- 1 Trace out Debug Message
- 2 Random Number checking
- 3 Password Checking
- 4 Generate Public Key and Private Key
- 5 Ceaser Cipher
- 6 RSA Algorithm
- 7 DSA Algorithm

ELECTIVE – I

1.1 PRINCIPLES OF COMPILER DESIGN

UNIT – I

Introduction – Structure of a Compiler – Compiler writing Tools – Basic constructs of High level Programming languages: Data structures, Parameter transmission. Lexical analysis – Role of lexical analyser – Finite automata – Regular expressions to Finite automata – NFA to DFA – Minimising the number of states of a Deterministic Finite Automata – Implementation of a Lexical Analyser.

UNIT – II

Parsing techniques – Context free grammars – Derivations and Parse trees – Ambiguity – Capabilities of Context free grammars – Top down and Bottom up parsing – Handles – Shift Reduce parsing – Operator precedence parsing – Recursive descent parsing – Predictive parsing.

UNIT – III

Automatic parsing techniques – LR parsers – Canonical collection of LR(0) items – Construction of SLR parsing table – LR(1) sets of items Construction – Construction of canonical LR Parsing Tables.

UNIT – IV

Syntax Direction Translation – Semantic actions – Implementation of Syntax Directed Translators – Intermediate Code: Postfix notation, Quadruples, Triples, Indirect triples – Methods of translation of Assignment statements, Boolean expressions.

UNIT – V

Symbol tables and Code generation: Representing information in a Symbol Table – Data Structures for Symbol table – Introduction to Code Optimization: Basic blocks – DAG representation – Error detection and recovery – Introduction to Code Generation.

TEXT BOOKS

1. Aho A. V. R, Ullman J. D., Compilers, Principles, Techniques and Tools, Addison Wesley, 2002.

REFERENCE BOOKS

1. Dhamdhare D. M., Compilers construction Principles and Practice, Macmillan India Ltd.

ELECTIVE – I

1.2 DISTRIBUTED COMPUTING

UNIT – I

Distributed Systems: Fully Distributed Processing Systems – Networks and Interconnection Structures – Designing a Distributed Processing System.

UNIT – II

Distributed Systems: Pros and Cons of Distributed Processing – Distributed Databases – The Challenge of Distributed Data – Loading Factors – Managing the Distributed Resources – Division of Responsibilities.

UNIT – III

Design Considerations: Communication Line Loading – Line Loading Calculations – Partitioning and Allocation – Data Flow Systems – Dimension Analysis – Network Database Design Considerations – Ration Analysis – Database Decision Trees – Synchronization of Network Databases.

UNIT – IV

Client/Server Network Model: Concept – File Server – Printer Server – an e-mail Server.

UNIT – V

Distributed Databases: An overview – Distributed Databases – Principles of Distributed Databases – Levels of Transparency – Distributed Database Design – The R* Project Technique Problems of Heterogeneous Distributed Databases.

TEXT BOOKS

1. John A. Sharp, “An Introduction to Distributed and Parallel Processing”, Blackwell Scientific Publications, 1987 (For UNIT I & UNIT III).
2. Uyles D. Black, “Data Communications & Distributed Networks”, (UNIT II).
3. Joel M. Crichlow, “Introduction to Distributed & Parallel Computing”, (UNIT IV).
4. Stefans Ceri, Ginseppe Pelagatti, “Distributed Databases Principles and systems”, McGraw Hill Book Co., New York, 1985 (UNIT V).

ELECTIVE – I

1.3 NEURAL NETWORKS AND FUZZY LOGIC

UNIT – I

Fundamentals of Neural Networks: Basic concepts of Neural Networks –Human Brain – Model of an Artificial Neuron – Neural Network Architectures – Characteristics of Neural Networks – Learning methods – Taxonomy of Neural Network Architectures – History of Neural Network Research – Easy Neural Network Architectures – Some Application domains.

UNIT – II

Back propagation Networks: Architecture of a Back propagation Network – Back propagation Learning – Illustration – Applications – Effect of Tuning parameters of the Back propagation Neural Network – Selection of various parameters in BPN – Variations of standard Back Propagation algorithm.

UNIT – III

Adaptive Resonance Theory: Introduction: Cluster Structure, Vector Quantization, Classical ART Networks, Simplified ART Architecture. **ART1:** Architecture of ART1–Special features of ART1 Models-ART1 Algorithms-illustration. **ART2:** Architecture of ART2– ART2 Algorithms-illustration- Applications.

UNIT – IV

Fuzzy Set Theory: Fuzzy versus crisp, **Crisp sets:** Operation on Crisp sets- Properties of Crisp sets- Partition and Covering. **Fuzzy sets:** Membership Function – Basic fuzzy set Operations-properties of fuzzy sets. **Crisp relations:** Cartesian product-Other Crisp Relation-Operations on Relations. **Fuzzy relations:** Fuzzy Cartesian product- Operations on Fuzzy Relations.

UNIT – V

Fuzzy Systems: Crisp logic: Laws of Propositional Logic-Inference in propositional Logic. **Predicate logic:** Interpretations of Predicate Logic Formula – Inference in Predicate Logic. **Fuzzy logic:** Fuzzy Quantifiers – Fuzzy Inference, Fuzzy rule based system – Defuzzification Methods.

TEXT BOOKS

1. S.Rajasekaran, G.A.Vijayalakshmi Pai – “Neural Networks, Fuzzy logic, and Genetic Algorithms Synthesis and Applications, PHI, 2003.

REFERENCE BOOKS

1. James A. Freeman, David M. Skapura – “Neural Networks – Algorithms, Applications, and Programming Techniques”, Pearson Education.
2. Fredric M. Ham, Ivica Kostanic, “Principles of Neuro computing for science of Engineering”, TMCH.
3. Simon Haykin – “Neural Networks-a comprehensive foundation”, PHI/Pearson Edition.

ELECTIVE – I

1.4 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

UNIT – I

Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

UNIT – II

Heuristic Search techniques: Generate and Test – Hill Climbing – Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

UNIT – III

Using Predicate logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge.

UNIT – II

Statistical reasoning: Probability and Bayes Theorem- Certainly Factors and Rule- Based systems- Bayesian Networks- Dempster-Shafer Theory-Fuzzy logic .

Knowledge representation: Syntactic-Semantic Spectrum of Representation-Logic and Slot-and Filter Structures- Other Representational Techniques – Planning – Understanding.

UNIT – II

Learning – Common sense – Perception and Action – Expert System.

TEXT BOOKS

1. Elaine Rich and Kevin Knight, " Artificial Intelligence", Tata McGraw Hill Publishers company Pvt. Ltd, Second Edition, 1991. (Chapters 1 – 6 only).

REFERENCE BOOKS

1. George F Luger, "Artificial Intelligence", 4th Edition, Pearson Education Publ., 2002.

ELECTIVE – I

1.5 SOFTWARE TESTING

UNIT – I

Developing a test approach – Addressing software system business risk – Defining a software system strategy – Developing software system testing tactics – Testing a software using a life cycle methodology – Requirements phase testing.

UNIT – II

Design phase testing – Program phase testing – Desk debugging and program peer view test tools – Evaluating test results – Installation phase testing – Acceptance testing.

UNIT – III

Testing methodology for software maintenance – Testing the correctness of the installing a software change – Testing the validity of a software cost estimate – Testing the progress of the software system – Inspecting test plan and test cases.

UNIT – IV

Accessing Client–Server and LAN risks – A testing strategy for a rapid prototyping – Testing techniques – Testing tools.

UNIT – V

Test documentation – Reporting test results – Final test reporting – Evaluating test effectiveness – Use of testing metrics – Improving test process.

TEXT BOOKS

1. William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, Inc., 1995.

REFERENCE BOOKS

1. Renu & Pradeep “Software Testing: Methodologies, Tools and Processes”, Tata McGraw Hill Publishing Co. Ltd.

ELECTIVE – I

1.6. TCP/IP

UNIT – I

A Brief History: Arpanet – (TCP/IP) – Milnet – Csnnet – Nsfnet – Ansnet – Protocols and Standards – Standards Organisations – TCP/IP Protocol Suite – Addressing – Connection Devices. Introduction – Classful addressing – Subnetting – Supernetting – Classless addressing

UNIT – II

ARP & RARP – ARP over ATM – Proxy ARP. ARP Package – RARP – Internet Protocol (IP) – Datagram – Fragmentation – options – Checksum: IP Package. Internet Control Messang Protocol (ICMP) – Types of Message – Message format – error Reporting – Query – Checksum – ICMP Package

UNIT – III

Group Management – IGMP Message: IGMP operation – Process to Process Communication – UDP Operation – TCP services – Flow control – Multicast Routing: Multicast routing protocols. Bootp & DHCP – Booth – UDP Ports – using TFTP – Dynamic host Configuration Protocols (DHCP) – Domain Name system (DNS) – Name Space – Domain Name Space – distribution of Name space – DNS in the Internet – Resolution – DNS Message – Types of records

UNIT – IV

File Transfer Protocol (FTP): Connections – Communication Command Processing – file Transfer – User interface – Anonymous FTP. Simple Mail Transfer Protocol (SMTP): User Agent (UA) – Addresses – delayed Delivery – Aliases – Mail transfer agent (MTA) – Commands and Responses – Mail Transfer Phases – Multipurpose Internet Mail Extensions (MIME) – Mail Delivery – Mail Access Protocols

UNIT – V

Simple Network Management Protocols: (SNMP) – Concept – Management Components – SMI – MIB – SNMP – Messages – UDP Ports – Security. IP over ATM: ATM Wans – Carrying Datagram in cells – Routing the cells – Atmarp – Logical IP Subnet (LIS). Mobile IP: Addressing – Agents – Three Pahses – Agent Discovery – Registration – Data Transfer – Inefficiency in Mobile IP. – Virtual Private Networks (VPN).

TEXT BOOKS

1. Behrouz A. Forouzan, “TCP/IP Protocol Suite”, Second edition, Tata Mcgraw – Hill Publishing Company

REFERENCE BOOKS

1. W. Richard Stevens, “TCP/IP Illustrated Volume1, The Protocols”, Pearson Education.
2. Comer, “Internetworking with TCP / IP, Vol 1: Principles, Protocols & Architecture, “ Fourth Edition, Pearson Education.

ELECTIVE – I

1.7 SEMANTIC WEB TECHNOLOGY

UNIT – I

INTRODUCTION: Current Web - Transition to the Semantic Web – Examples - Semantic Web Technologies - A Layered Approach. (5+4)

STRUCTURED WEB DOCUMENTS IN XML: Introduction - The XML Language - Structuring - Namespaces - Addressing and Querying XML Documents - Processing. (6+6)

UNIT – II

DESCRIBING WEB RESOURCES IN RDF: Introduction - RDF: Basic Ideas, XML-Based Syntax - RDF Schema: Basic Ideas, The Language - RDF and RDF Schema in RDF Schema - An Axiomatic Semantics for RDF and RDF Schema - A Direct Inference System for RDF and RDFS. (6+4)

UNIT – III

ONTOLOGY ENGINEERING: Introduction - Constructing Ontologies Manually - Reusing Existing Ontologies - Using Semiautomatic Methods - On-To-Knowledge Semantic Web Architecture. (6+4)

WEB ONTOLOGY LANGUAGE: Introduction - The OWL Language - Examples - OWL in OWL - Future Extensions. (5+4)

UNIT – IV

LOGIC AND INFERENCE: Rules - Introduction - Example of Monotonic Rules: Family Relationships - Monotonic Rules: Syntax, Semantics, Nonmonotonic Rules: Motivation and Syntax - Example of Nonmonotonic Rules: Brokered Trade - Rule Markup in XML: Monotonic Rules, Nonmonotonic Rules. (9+4)

UNIT – V

APPLICATIONS: Introduction - Horizontal Information Products at Elsevier - Data Integration at Audi - Skill Finding at Swiss Life - Think Tank Portal at EnerSearch - e-Learning - Web Services - Other Scenarios. (8+4)

TEXT BOOK:

1. Grigoris Antoniou and Frank van Harmelen, “Semantic Web Primer”, MIT press, USA, 2008.
2. Michael C Daconta, Leo J Obrst and Kevin T Smit, “The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley, USA, 2003.

REFERENCES:

1. John Davies, Rudi Studer and Paul Warren, “Semantic Web Technologies: Trends and Research in Ontology-based Systems”, Wiley, USA, 2006.

ELECTIVE – II

2.1 MULTIMEDIA AND ITS APPLICATIONS

UNIT – I

What is Multimedia –Where to use Multimedia- Introduction to making Multimedia – The Stages of Project- What you need to making Multimedia - Macintosh and Windows Production platforms – **Basic Software tools:** Text Editing and Word processing Tools-OCR Software-Painting and Drawing Tools-3-D Modeling and Animation Tools-Image Editing Tools-Sound Editing Tools-Animation, Video and Digital Movie Tools.

UNIT – II

Multimedia authoring tools: Making Instant Multimedia –Types of Authoring Tools – Card and Page Based Authoring tools- Icon and Object based Authoring Tools-Time Based Authoring tools-Cross-Platform Authoring Notes. **Multimedia building blocks: Text:** About Font and Faces- using Text in Multimedia-Computers and Text-Font editing and Design Tools-Hypermedia and Hypertext.

UNIT – III

Sound: The Power of Sound- Multimedia System Sounds-Digital Audio-Audio File Formats-Making MIDI Audio-MIDI versus Digital Audio-Adding Sound to your Multimedia project. **Images:** Making Still Images-Color-Image File Formats. **Animation:** Principles of Animation – Making Animation That Work. **Video:** Broadcast Video Standards-Analog Video-Digital Video-Video Recording and Tape Formats-shooting And editing Videos.

UNIT – IV

Multimedia and the Internet: The Internet and how it works – **Tools for World Wide Web:** Web Servers-Web Browsers- Web Page Makers and Site Builders- Plugs-in and Delivery Vehicles. **Designing for the World Wide Web:** working on the Web- Text for the Web-Images for the Web-Sound for the Web-Animation for the Web

UNIT – V

Planning and Costing: The Process of Making Multimedia- Scheduling-Estimating-REPs and Bid Proposals. **Content and Talent:** Acquiring Content- Using Content Created by Others-Using Talent. **Delivering:** Testing Preparing For Delivery-Delivering on CD-ROM- Delivering on the World Wide Web.

TEXT BOOKS

1. Tay Vaughan, “Multimedia making it work”, Fifth Edition, Tata McGraw Hill.

REFERENCE BOOKS

1. Judith Jeffloat, “Multimedia in Practice (Technology and Applications)”, PHI, 2003.
2. John F. Koegel Bufford, “Multimedia Systems”, Pearson Education.

ELECTIVE – II

2.2 EMBEDDED SYSTEMS

UNIT – I

8051 Microcontroller: Introduction – 8051 Architecture – Input / Output Pins, Ports and Circuits - External Memory – Counters / Timers – Serial Data Input / Output – Interrupts.

UNIT – II

Instruction Set and Programming Moving Data – Addressing Modes – Logical operations – Arithmetic Operation – Jump and Call Instructions – Simple Program. Applications: Keyboard Interface – Display Interface – Pulse Measurements – DIA and AID Conversions – Multiple Interrupts.

UNIT – III

Concepts on RTOS: Introduction to RTOS – Selecting an RTOS – Task and Task states – Tasks and data – Semaphores and shared data. MORE operating systems services: Interrupt Process communication – Message Queues, Mailboxes and pipes – Timer Functions – Events – Memory Management – Interrupt Routines in an RTOS Environment.

UNIT – IV

Basic Design using a RTOS: Principles – Encapsulating semaphores and Queues – Hard real time scheduling considerations – Saving memory space and power – introductions to RTL & QNX.

UNIT – V

Software Tools: Embedded Software Development Tools: Hosts and Target Machines – Linker/Locators for Embedded software-getting Embedded software into the Target systems. Debugging Techniques: Testing on your Host machine – Instruction set simulators – The assert macro – using laboratory tools.

TEXT BOOKS

1. David.E.Simon, "An Embedded Software Primer", Pearson Education, 2001.
2. The 8051 Microcontroller and Architecture Programming and Application II Edition -Kenneth J Ayala, Penram International.

ELECTIVE – II

2.3 NATURAL LANGUAGE PROCESSING

UNIT – I

Introduction to natural language processing – the study of language, applications of natural language understanding, evaluating language understanding systems. Syntactic Processing: Linguistic background: An outline of English syntax – words, the elements of simple noun phrases, verb phrases and simple sentences.

UNIT – II

Grammars and parsing – grammars and sentence structure, a top down parser, a bottom up chart parser, transition network grammars. Features and Augmented grammars – featured system and augmented grammars, some basic feature systems for English, morphological analysis and the lexicon, a simple grammar using features, Grammars for natural language – auxiliary verbs and verb phrases, movement phenomena in language, handling questions in context free grammar, the hold mechanism in ATN's gap threading.

UNIT – III

Toward Efficient – human preferences in parsing, encoding uncertainty, a deterministic parser, techniques for efficient encoding of ambiguity, partial parsing, Ambiguity Resolution: statistical methods – basic probability theory, estimating probabilities, part of speech tagging, obtaining lexical probabilities, probabilistic context free grammars, best firing parsing, a simple context.

UNIT – IV

Semantic Interpretation: Semantic and logical form – semantics and logical form, word senses and ambiguity, the basic logical form language, encoding ambiguity in the logical form, verbs and states in logical form, thematic roles, speech acts and embedded sentences, linking syntax and semantics – semantic interpretation and compositionality, a simple grammar and lexicon with semantic interpretation, prepositional phrases and verb phrases, lexicalized semantic interpretation and semantic roles, ambiguity resolution – selectional restrictions, semantic filtering using selectional restrictions, semantic networks, statistical word sense disambiguation, statistical semantic preferences, combining approaches to disambiguation.

UNIT – V

Other strategies for semantic Interpretation – grammatical relations, smenatic grammars, template matching, semantically driven parsing techniques, scoping and the Interpretation of noun phrases – scoping phenomena, definite descriptions and scoping, a method for scoping while parsing, co-references and binding constraints, adjective phrases, relational nouns and nominalizations.

TEXT BOOKS

1. “Natural Language Understanding” - James Allen, Second edition, Pearson Education.

ELECTIVE – II

2.4 SIMULATION AND MODELING

UNIT – I

Principle of computer modeling and simulation, Monte Carlo simulation. Nature of computer modeling and simulation. Limitations of simulation, areas of application. System and environment – components of a system – Discrete and continuous systems. Models of a system – A variety of modeling approaches.

UNIT – II

Random number generation, technique for generating random numbers – Midsquare method – The midproduct method – Constant multiplier technique – Additive congruential method – Linear congruencies method – Tests for random number – The Kolmogorov Smirnov test – The chi-square test. Random variable generation – Inverse transform technique – Exponential distribution – Uniform distribution – Weibull distribution, empirical continuous distribution – Generating approximate normal variants.

UNIT – III

Empirical discrete distribution – Discrete uniform distribution – Poisson distribution – Geometric distribution – Acceptance – Rejection technique for Poisson distribution – Gamma distribution.

UNIT – IV

Design and evaluation of simulation experiments – Input – Output analysis – Variance reduction technique – Verification and validation of simulation models. Discrete event simulation – Concepts in discrete – event simulation – Manual simulation using event scheduling, single channel queue, two server queue, simulation of inventory problems.

UNIT V

Simulation languages – GPSS – SIMSCRIPT – SIMULA – Programming for discrete event systems in GPSS and C. Case Study: Simulation of LAN – Manufacturing system – Hospital management system.

TEXT BOOKS

1. Jerry Banks and John S. Carson II, “Discrete Event System Simulation”, Prentice Hall Inc, 1984.
2. Narsingh Deo, “System Simulation with Digital Computer”, Prentice Hall of India, 1979.

REFERENCE BOOKS

1. Francis Neelamkovil, “Computer Simulation and Modeling”, John Wiley & Sons, 1987.
2. Averil M. Law and W. David Kelton, “Simulation Modeling and Analysis”, McGraw Hill International Editions, 1991.

ELECTIVE – II

2.5 ENTERPRISE RESOURCE PLANNING

UNIT - I

Introduction to ERP: Introduction – Evolution of ERP – What Is ERP – Reasons For The Growth of The ERP Market – The Advantages of ERP – Why do Many ERP Implementations Fail – Why are ERP Packages Being used now. Enterprise – An Overview: Introduction – Integrated Management Information – Business Modeling – Integrated Data Model.

UNIT - II

ERP and Related Technologies: Introduction – Business Process Reengineering – Management Information System – Decision Support System – Executive Information Systems – Data Warehousing – Data Mining – Online Analytical Processing – Supply Chain Management. ERP A Manufacturing Perspective: Introduction – ERP CAD / CAM – Materials Requirement Planning – Bill of Material – Closed Loop – Manufacturing Resource Planning – Distribution Requirements Planning – JIT and Kanban Product Data Management – Data Management – Benefits Of PDM – Make to Order and Make to Stock – Assemble to Order – Engineer to Order – Configure to Order.

UNIT - III

ERP Modules: Introduction – Finance – Plant Maintenance – Quality Maintenance – Material Management. Benefits of ERP: Introduction – Reduction of Lead Time – On Time Shipment – Reduction in Cycle Time – Improved Resource Utilization – Better Customer Satisfaction – Improved Supplier Performance – Increased Flexibility – Reduced Quality Costs – Improved Information Accuracy and Decision Making Capability.

UNIT - IV

ERP Market: Introduction – SAP AG – Baan Company – Oracle Corporation – People Soft – JD Edwards World Solutions Company – System Software Associate QAD. ERP Implementation Life Cycle: Introduction – Preevaluation Screening – Package Evaluation – Project Planning Phase – Gap Analysis – Reengineering Configuration – Implementation Team Training – Testing – Going Live – End User Training – Post Implementation.

UNIT – V

Vendors, Consultants and Users: Introduction – In House Implementation – Pros and Cons – Vendors – Consultants – End Users. Future Directions In ERP: Introduction – New Markets – New Channels – Faster Implementation Methodologies – Business Models and Bapis Convergence on Windows NT – Application Platforms – New Business Segments – More Features – Web Enabling – Market Snapshot.

TEXT BOOKS

1. “Enterprise Resource Planning”, Alexis Leon, Tata McGraw Hill, 2002.

ELECTIVE – II

2.6 WIRELESS APPLICATION PROTOCOL (WAP)

UNIT – I

The Rise of Mobile Data: Market Convergence Enabling Convergence – Key Services for the Mobile Internet. **Overview of the Wireless Application Protocol:** The Origins of WAP – Overview of the WAP Architecture – Components of the WAP Standard – Network Infrastructure Services Supporting WAP Clients – WAP Architecture Design Principles – Relationship to Other Standards.

UNIT – II

The Wireless Markup Language: Overview – The WML Document Model – WML Authoring – URLs Identify Content – Markup Basics – WML – Basics – Basic Content – Events, Tasks and Bindings

UNIT – III

Variables – Other Content you can Include – Controls – Miscellaneous Markup – Sending Information – Application Security – **Other Data:** The Meta Element – Document Type Declarations – Errors and Browser Limitations – Content Generation – WML Version Negotiation.

UNIT – IV

User Interface Design: Making Wireless Applications, **Easy to Use:** Web Site Design: Computer Terminals Vs Mobile Terminals – Designing a Usable WAP Site – Structured Usability Methods – User Interface Design Guidelines – Design Guidelines for Selected WML Elements.

UNIT – V

Wireless Telephony Applications: Overview of the WTA Architecture – WTA Client Framework – WTA Server & Security – Design Considerations – Application Creation Toolbox – Future WTA Enhancements. **The Mobile Internet Future:** Better Content, Easier Access – Beyond Browsing – Beyond Cellular – Mobile Data Unleashed.

TEXT BOOKS

1. Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan, Stefan Hild, “The Wireless Application Protocol”, Pearson Education, 2003.

ELECTIVE – II

2.7 CLOUD COMPUTING

UNIT – I

Introduction to Parallel and Distributed Computing: Introduction, Architecture and Distributed computing models and technologies SOA, Web Services

Grid, Cluster and Utility Computing: Introduction, Architecture, Pros & Cons, Real time applications.

UNIT – II

Introduction To Cloud Computing: Definition, History, Comparison of Cloud Computing with Grid, Cluster and Utility Computing, Deployment models – Private, Public, Hybrid and Community - Pros and Cons of Cloud Computing. SaaS, PaaS, IaaS etc.

UNIT – III

Virtualization: Types of Virtualization, Tools for Virtualization, Architecture of VMM, Virtualization for Cloud.

Advanced Web Technologies: AJAX and Mashup – Programming examples using applications.

UNIT – IV

Map Reduce Paradigms: Introduction, GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon's (key value) pair storage and Microsoft's Azure infrastructure, Map reduce programming examples

UNIT – V

Cloud Computing Framework: Amazon EC3, S3 storage services, Aneka framework, IBM blue Cloud.

Applications: Distributed search engine and distributed data mining in the cloud.

TEXT BOOKS:

1. Anthony T Velte, Toby J Velte and Robert Elsenpeter, "Cloud Computing : A Practical Approach", Tata McGraw Hill, New Delhi, 2010
2. Liu M L, "Distributed Computing Principles and Applications", Pearson Education, New Delhi, 2009.

MODEL QUESTION PAPER

Question Paper Pattern (External 75 marks)

- Section-A** 20 marks (10 Short answer Type Questions of 2 mark each; No choice)
(10 X 2 = 20)
- Section-B** 25 marks (5 Questions either or type of 5 marks each)
(5 X 5 = 25)
- Section-C** 30 marks (Three Questions out of 5 Questions, 10 marks each)
(3 X 10 = 30)

Question Paper Pattern (Internal 50 marks)

- Section-A** 10 marks (5 Short answer Type Questions of 2 mark each; No choice)
(5 X 2 = 10)
- Section-B** 20 marks (4 Questions either or type of 5 marks each)
(4 X 5 = 20)
- Section-C** 20 marks (Two Questions out of 3 Questions, 10 marks each)
(2 X 10 = 20)

M. Sc. Syllabus

(Academic year 2018-2019 onwards)

M.Sc. COMPUTER SCIENCE**PG - SCHEME OF EXAMINATIONS: CBCS PATTERN****(For the Students admitted during the Academic Year 2018-2019 and onwards)**

Sub Code	Part	Title of the Paper	Hrs (wk)	Internal (CA) Marks	External Marks	Total Marks	Ext- Min.	Total Pass Mark	Credits
Semester – I									
18MCS11C	A	Core I: Parallel and Distributed Computing	5	25	75	100	38	50	4
18MCS12C	A	Core II: Advanced Data Structures and Algorithms	5	25	75	100	38	50	4
18MCS13C	A	Core III: Object Oriented Analysis Design and C++	5	25	75	100	38	50	4
18MCS14C	A	Core IV: Computer Networks and TCP/IP	5	25	75	100	38	50	4
18MCS15C	A	Core V: Relational Database Management Systems	5	25	75	100	38	50	5
18MCS16P	A	Core Practical 1 : C++Lab	3	40	60	100	30	50	2
18MCS17P	A	Core Practical 2 : RDBMS Lab	2	40	60	100	30	50	2
			30			700			25
Semester – II									
18MCS21C	A	Core VI: Soft Computing	5	25	75	100	38	50	4
18MCS22C	A	Core VII: Advanced Operating Systems	5	25	75	100	38	50	4
18MCS23C	A	Core VIII: Advanced Java Programming	5	25	75	100	38	50	4
18MCS24C	A	Core IX: Data mining with R Programming	5	25	75	100	38	50	4
18MCS25E	B	Elective – 1:	5	25	75	100	38	50	5
18MCS26P	A	Core Practical 3 : Data mining With R Programming Lab	3	40	60	100	30	50	2
18MCS27P	A	Core Practical 4 : Lab : Advanced Java Programming Lab	2	40	60	100	30	50	2
			30			700			25

Sub Code	Paper	Title of the Paper	Hrs (wk)	Internal (CA) Marks	External Marks	Total Marks	Ext- Min.	Total Pass Mark	Credits
Semester – III									
18MCS31C	A	Core X : Digital Image Processing	5	25	75	100	38	50	4
18MCS32C	A	Core XI: Cryptography and Network Security	5	25	75	100	38	50	4
18MCS33C	A	Core XII: Web Programming Essentials	5	25	75	100	38	50	4
18MCS34C	A	Core XIII: Mobile Applications Development	5	25	75	100	38	50	4
18MCS35E	B	Elective – II:	5	25	75	100	38	50	5
18MCS36P	A	Core Practical 5: Digital Image Processing Lab	3	40	60	100	30	50	2
18MCS37P	A	Core Practical 6: Mobile Application development Lab	2	40	60	100	30	50	2
			30			700			25
Semester – IV									
18MCS41C	A	Core XIV: Software Development Tools (C# and ASP.NET)	5	25	75	100	38	50	3
18MCS42P	A	Core Practical 7: Software Development Lab	5	40	60	100	30	50	2
18MCS43V	A	Project Viva Voce	20	40	160	200	80	100	10
			30			400			15
Total /Credits						2500			90

Core -Includes core theory, practical and electives

Includes 25/40 continuous Internal Assessment Marks for Theory and Practical papers respectively

Project evaluation done by both Internal and External examiner for 80 Marks

ELECTIVES FOR SECOND SEMESTER

ELECTIVE – I

- 1.1 Principles of Compiler Design
- 1.2 Software Engineering Concepts
- 1.3 Software Testing
- 1.4 Distributed Computing
- 1.5 Artificial Intelligence & Expert Systems
- 1.6 Semantic Web Technology
- 1.7 Big Data Analytics
- 1.8 Python Programming

ELECTIVES FOR THIRD SEMESTER

ELECTIVE – II

- 2.1 Software Project Management
- 2.2 Computer Optimization Techniques
- 2.3 Cloud Computing
- 2.4 IOT Architecture and Protocols
- 2.5 Wireless Application Protocols (WAP)
- 2.6 Enterprise Resource Planning
- 2.7 Embedded Systems
- 2.8 Multimedia and its Applications

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	PARRALLEL AND DISTRIBUTED COMPUTING	I	18MCS11C

Objective:

- To study the fundamental concepts of Parallel and Distributed computing systems.
- To study the Parallel Computer Architectures, Parallel Programming Models and Parallel algorithms.
- To study the types of distributed computing models and distributed programming algorithms.

UNIT – I

INTRODUCTION: Forms of Computing – Monolithic – Distributed – Parallel-Cooperative - Computational demands of parallel processing, Flynn’s classification – Terminology.
PARALLEL COMPUTER ARCHITECTURES: Classification – Inter connection networks – Vector computers – Shared memory parallel computers – Cache coherence – Distributed shared memory parallel computers – Message passing parallel computers – Cluster of workstations.

UNIT –II

PARALLEL PROGRAMMING MODELS: Shared memory model, Message passing model - Synchronous and Asynchronous message passing models, Leader-Election algorithm, Breadth-First Search. Shortest Paths, Broadcast and Converge cast, Data Parallel model.

UNIT –III

PARALLEL ALGORITHMS : Models of parallel computation including PRAM - CRCW, CREW, ERCW, EREW models, Design and analysis of Parallel algorithms: : Automatic vs. Manual Parallelization – Understand the Problem and the Program – Partitioning – Communications – Synchronization – Data Dependencies – Load Balancing – Granularity – I/O – Limits and Costs of Parallel Programming – Performance Analysis and Tuning – Parallel Examples – Array Processing Matrix multiplication, Sorting, Searching, Merging, Minimum spanning tree, Prime numbers.

UNIT- IV

DISTRIBUTED COMPUTING: Introduction to Distributed Programming - System *Models*- Architectural models - Client-server model, Peer-to-peer model- Variations of the above models -Distributed computing paradigms – Inter process communication - The API for the Internet protocols - External data representation and marshalling - Group communication - Case study: inter process communication in UNIX - Distributed file systems.

UNIT- V

DISTRIBUTED PROGRAMMING ALGORITHMS: Fundamental issues and concepts - Synchronization, Mutual Exclusion, Termination Detection, Clocks, Event ordering, Locking.

TEXT BOOKS:

1. Quinn Michael J, "Designing Efficient Algorithms for Parallel Computers", Tata McGraw Hill, 2004.

2. Wilkinson B and Allen M, "Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers", Prentice Hall, 2005.

REFERENCES:

1. Hariri and Parashar, "Tools and Environments for Parallel and Distributed Computing", John Wiley, 2004.
2. Jean Dollimore, TimKindberg and George Coulouris, "Distributed Systems: Concepts and Design", Addison Wesley, 2011.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	ADVANCED DATA STRUCTURES AND ALGORITHMS	I	18MCS12C

Objective:

- To learn the concepts of basic and advanced data structures.
- To learn Graphs and algorithm design and analysis and to increase the knowledge of usage of data structures in algorithmic perspective.

UNIT I: LINEAR DATA STRUCTURES

Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II: NON-LINEAR TREE STRUCTURES

Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree – Heap- Heap operations- - Hash set.

UNIT III: GRAPHS

Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra’s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV: ALGORITHM DESIGN AND ANALYSIS

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall’s Algorithm for Finding Transitive Closure.

UNIT V: ADVANCED ALGORITHM DESIGN AND ANALYSIS

Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem.

TEXT BOOKS:

1. Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education, 2015
2. E. Horowitz, S.Sahni and Dinesh Mehta, “Fundamentals of Data structures in C++”, University Press, 2007
3. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, University Press, 2007
4. M. A. Weiss, “Data Structures and Algorithm Analysis in Java”, Pearson Education Asia, 2013
5. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Thrid Edition, PHI Learning Private Ltd, 2012

6. Tanaenbaum A.S., Langram Y. Augestein M.J, “Data Structures using C” Pearson Education, 2004.
7. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	OBJECT ORIENTED ANALYSIS DESIGN AND C++	I	18MCS13C

Objective:

- To study the fundamentals of Object Oriented Programming concepts and techniques and its benefits in object-oriented design.
- To learn the concept of Classes and Objects, Inheritance, File handling and String handling.

UNIT – I

The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects - Nature of Class – Relationship Among classes - Classification: The importance of Proper Classification – identifying classes and objects – Key Abstractions and Mechanism.

UNIT – II

Introduction to C++ – Programming Paradigms – Key Concepts of Object Oriented Programming - Input and output statements in C++- Declarations –Data Types. Control Structures - Functions in C++ - Passing Arguments - LValues and RValues - Default Arguments - Inline Functions - Function Overloading.

UNIT - III

Classes and Objects: Structures in C++ - Classes in C++- Declaring Objects - The public Keyword - The private Keyword - The protected Keyword - Defining Member Functions- Function Inline - Data Hiding or Encapsulation - Static Member Variables and Functions - Array of Objects -Objects as Function Arguments - Friend Functions - Constructors and Destructors.

UNIT - IV

Operator Overloading and Type Conversion: Introduction - Overloading Unary Operators - Overloading Increment and Decrement Operators - Overloading Binary Operators - Overloading with friend Function - Type Conversion.

Inheritance: Introduction - Access Specifiers and Simple Inheritance - Protected Data with Private Inheritance - Types of Inheritances - Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Constructors, Destructors and Inheritance

UNIT - V

Binding, Polymorphism and Virtual Functions: Introduction - - Pointer Declaration - Pointer to Object - this Pointer - Virtual Functions. .

Generic Programming with Templates: Class Template - Function Template - Working of Function and Class Templates.- Exception Handling Mechanism - **Application with Files:** File Stream Classes - File Opening Modes - Sequential Read and Write Operations - Random Access Operation

TEXT BOOKS

1. Grady Booch, “Object Oriented Analysis and Design with Applications”, Second Edition, Pearson Education.
2. Ashok N. Kamthane, “Object Oriented Programming with ANSI & Turbo C++”, First Indian Print, Pearson Education, 2003.

REFERENCE BOOKS

1. Balagurusamy “Object Oriented Programming with C++”, TMCH, Second Edition, 2003.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	COMPUTER NETWORKS AND TCP/IP	I	18MCS14C

Objective:

- To impart knowledge of Computer Networks and its applications and to better understand the TCP/IP network architecture and layers.
- To learn to exploit its functionality, and what technical difficulties will be encountered.

UNIT - I

INTRODUCTION: Network goals - Applications of Networks - Design issues for the layers - OSI Reference Model - Types of Network - Network Topologies- Analog and Digital data transmission- Data encoding- Bandwidth and data rate-.Bit Rate, Baud Rate

UNIT - II

DATA COMMUNICATION: Multiplexing - Synchronous and Asynchronous TDM – FDM – CDM - Switching, Circuit Switching, Packet Switching **TRANSMISSION OF DIGITAL DATA:** Transmission Impairments - Single and Multiple bit error correction-Error Detection and Correction - Cyclic Redundancy Check Code - Hamming Code

UNIT - III

DATA LINK CONTROL AND PROTOCOLS: Line Discipline - Flow Control - Sliding Window Protocol -Random Access protocols- Ethernet – Fast Ethernet – Gigabit Ethernet – Wireless LANs- Internetworking- LAN -LAN Connections – Repeaters- Hubs - Bridge – Spanning tree-Switches – Routers.

UNIT - IV

IP: TCP/IP Protocol Structure - Internet Protocol – IP addressing- ARP –ICMP **ROUTING:** Distance vector routing _ Link state Routing – RIP – OSPF

UNIT - V

TRANSPORT LAYER- TCP concepts - Port number - UDP – TCP-Congestion control-Quality of services. **APPLICATIONS:** DHCP, SNMP, SMTP - MIME , DNS, HTTP

TEXT BOOKS

1. Behrouz A Forouzan, “Data Communications and Networking”, Tata McGraw Hill, New Delhi, 2012
2. Behrouz A Forouzan, “TCP/ IP Protocol Suite”,4th edition, Tata McGraw Hill, New Delhi, 2010.

REFERENCES

1. Kevin Fall R and Richard Stevens W, "TCP/IP Illustrated, Volume 1: The Protocols", Addison-Wesley, Ann Arbor, 2011.
2. James F. Kurose, Keith Ross, “Computer Networking: A Top-Down Approach”, 7th edition, Pearson Addison-Wesley, Boston, 2017.
3. Douglas Comer, “Internetworking with TCP/IP”, 6th edition, Prentice Hall, New Delhi, 2014.
4. William Stallings, "Data and Computer Communications", 9th edition, Prentice Hall, New Delhi, 2014.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	RELATIONAL DATABASE MANAGEMENT SYSTEMS	I	18MCS15C

Objective:

- Learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- Understand the Relational Database design and different Normal Form techniques.
- To become familiar with the basic concepts of Relational Database Management System, Relational Database design, System Implementation Techniques and Client-Server communication.

UNIT I:

Introduction - Database system applications - purpose of database system – View of data – Database Languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators.

UNIT II:

Relational Databases – Relational Model – Structure of Relational Databases – Fundamental Relational Algebra Operations – Additional Relational Algebra Operations. SQL – Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null values – Nested Sub queries – Views – Modification of the Database.

UNIT III:

Database design: Database Design and the E – R Model – Design Phases – Design Alternatives – The Entity Relationship Model – Constraints – Entity Relationship Diagrams – Extended E – R features – Specialization – Generalization – Aggregation – Reduction to Relational Schemas.

UNIT IV:

Relational Database Design – Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Keys and Functional Dependencies – Boyce – Codd Normal Form – BCNF and Dependency Preservation – Third Normal Form – Functional Dependency Theory – Lossless Decomposition – Dependency Preservation – BCNF Decomposition Algorithm – 3NF Decomposition – Multivalued Dependencies – Fourth Normal Form – 4NF Decomposition.

UNIT V:

Database System Architectures – Centralized and Client / Server Architectures – Centralized Systems – Client / Server Systems – Server System Architectures – Parallel Systems – Distributed Systems – Network Systems.

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan “Database System Concepts” Tata McGraw Hill, 2011

REFERENCE BOOKS:

1. Bipin C. Desai “An Introduction to Database Systems”, Galgotia Publication, 2010.
2. Elmasri and Navathe, “Database Management Systems”

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 1: C++ LAB	I	18MCS16P

Objective:

- To understand the Object-Oriented paradigm.
- To be aware of the Object-Oriented design technique.
- To be exposed to the file processing and exception handling techniques of C++.
- To develop programming skill and to solve real time problems using Object Oriented Programming Concepts.

LIST OF PRACTICALS

1. Write a function called **area()** that finds the area of a circle. It should take an argument of type float and return an argument of the same type. Write an another function **area()** that finds area of a rectangle, that takes two arguments of type float and return an argument of same type. Write another function **area()** that takes single argument as an integer and returns area of square. Write a **main() function to call all these functions and display the appropriate result.**
2. Create a class called time that has separate **int** member data for hours, minutes and seconds. One constructor should initialize this data to 0, and another should initialize it to fixed values. A member function should display it in 11:59:59 format. The final member function should add two objects of type time passed as arguments. A **main()** function should create a two initialized time objects and one that isn't initialized. Then it should add the two initialized values together leaving the result in the third time variable finally it should display the value of this third variable.
3. Create a class that imitates parts of the functionality of the basic type **int** call the class **int** (not different spelling) the only data in this class is an int variable Include member functions to initialize an **int** to 0, to initialize it to an **int** value, to display (it looks just like an **int**) and to add two **int** values. Write a program that exercise this class by creating two initialized and one uninitialized **int** values, adding these two initialized values and placing the response in the uninitialized value and then displaying this result.
4. Create a class called employee that contains a name (an array of data char) and an employee number (type long). Include a member function called **getdata()** to get data from the user for insertion into the object, and another function called **putdata()** to display the data assume the name has no embedded blanks. Write a **main()** program to exercise this class. It should create an array of type employee and then invite the user to input data for up to 100 employees it should print the data for all the employee.
5. Overload all five integer arithmetic operators (+, -, *, / and %) so that they operate an objects of type int. If the result of any such arithmetic operators exceed the normal range of int from -32,768 to 32,768 have the operator print a warning and terminate the program.

6. Imagine a publishing company that markets both book and audio-cassette versions of its works. Create a class publication that stores the title (a string) and price (type float) of a publication from this class derive two classes book which adds a pages count (type int) and tape, which adds a playing time in minutes (type float) each of these three classes should have a **getdata()** function to get its data from the user at the keyboard and a **putdata()** function to display its data. Write a **main()** program to test the book and tape classes by creating instances of them, asking the user to fill in their data a with **getdata()** and then displaying the data with **putdata()**.
7. Write a program that reads a group of numbers from the user and places them in an array of type float. Once the numbers are stored in the array the program should average them and print the result. Use pointer notation wherever possible.
8. In the Distance class create an overloaded * operator, so that two distance can be multiplied together, make it a friend function so that you can use such expressions as
$$\text{dist1} = 7.5 * \text{dist2};$$
you'll need a one-argument constructor to convert floating point values into distance value. Write a **main()** program to test this operator in several ways.
9. Implement Exception Handling in C++
10. Create a Class to implement the data structure STACK. Write a Constructor to initialize the TOP of the Stack to 0. Write a member function PUSH() to insert an element and a member function POP() to delete an element. Check for overflow and underflow conditions.
11. Create a class ARITH which consists of a FLOAT and an INTEGER variable. Write member functions ADD(), SUB(), MUL(), DIV(), MOD() to perform addition, subtraction, multiplication, division and modulus respectively. Write member functions to get and display values.
12. Create a class MAT has a 2-D matrix and R & C represents the rows and columns of the matrix. Overload the operators +, -, *, to add, subtract and multiply two matrices. Write member functions to get and display MAT object values.
13. Create a class STRING. Write member functions to initialize, get and display strings. Overload the operator + to concatenate two strings, == to compare 2 strings and a member function to find the length of the string.
14. Create a class which consist of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member function to calculate da, hra, pf depending on the grade and display the Payslip in a neat format using console I/O.
15. Create a class SHAPE which consist of two VIRTUAL FUNCTIONS Cal_Area() and Cal_Per to calculate Area and Perimeter of various figures. Derive three classes SQUARE, RECTANGLE AND TRIANGLE from the class SHAPE and calculate Area and Perimeter of each class separately and display the result.
16. Create two classes which consist of two private variables, one Integer and one Float variable in each class. Write member functions to get and display them. Write a FRIEND function

common to both classes which takes the object of the above two classes as arguments and the Integer and Float values of both the objects separately and display the result.

17. Book Shop Management: Write a program to develop a shopping management system which maintains stock details of a book shop using constructor and destructor.
18. Student details using Virtual Functions: Write a program to maintain student particulars.
19. Pay Slip using Functions: Write a program to create a Pay Slip using manipulation of function.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 2: RDBMS LAB	I	18MCS17P

Objective:

- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To present the concepts and techniques relating to query processing by SQL engines.
- To present the concepts and techniques relating to ODBC and its implementations.

LIST OF PRACTICALS

1. DDL & DML – data types, create, alter, drop table, integrity constraints
2. Insert, delete and update commands
3. DCL & TCL – grant, revoke, rollback and commit
4. Select command with operators like arithmetic, comparison, logical, order by, group by etc.
5. SQL Functions – date, numeric, character, conversion, avg, max, min, sum, count
6. Set operations – union, intersect and minus
7. Join query concept – simple, equi, non–equi, self, outer join
8. Complex and sub queries
9. Database objects – view, synonym, index, sequence – create, alter and drop
10. Report writer using SQL
11. PL/SQL – Introduction – character set, data types – execution
12. PL/SQL attributes %type, %rowtype, function comparison, if condition, loop, for, while and goto etc.
13. Record management using cursors
14. Function – definition and implementation
15. Database triggers – syntax, parts and types of triggers

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	SOFT COMPUTING	II	18MCS21C

Objective: The Students are trained to

- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Apply genetic programming.
- Discuss hybrid soft computing

UNIT I: INTRODUCTION

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models – important technologies – applications. Fuzzy logic: Introduction – crisp sets- fuzzy sets – crisp relations and fuzzy relations: Cartesian product of relation – classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction – biological background – traditional optimization and search techniques – Genetic basic concepts.

UNIT II: NEURAL NETWORKS

McCulloch-Pitts neuron – linear separability – hebb network – supervised learning network: perceptron networks – adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network –unsupervised learning networks: Kohonen self-organizing feature maps, LVQ – CP networks, ART network.

UNIT III: FUZZY LOGIC

Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts – methods – fuzzy arithmetic and fuzzy measures: fuzzy arithmetic – extension principle – fuzzy measures – measures of fuzziness -fuzzy integrals – fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules- decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems- overview of fuzzy expert system-fuzzy decision making.

UNIT IV: GENETIC ALGORITHM

Genetic algorithm and search space – general genetic algorithm – operators – Generational cycle – stopping condition – constraints – classification – genetic programming – multilevel optimization – real life problem- advances in GA

UNIT V: HYBRID SOFT COMPUTING TECHNIQUESAPPLICATIONS

Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems – simplified fuzzy ARTMAP – Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing-based hybrid fuzzy controllers.

TEXT BOOKS

1. J.S.R.Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI / Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt Ltd, 2011.

REFERENCES

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications”, Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications” Prentice Hall, 1997.
3. David E. Goldberg, “Genetic Algorithm in Search Optimization and Machine Learning” Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2005.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	ADVANCED OPERATING SYSTEM	II	18MCS22C

Objective:

- To learn the advanced concepts in Operating System.
- To gain knowledge in the Operating file system and programming for inter process communication and Classical IPC Problems.
- To provide knowledge about architecture of UNIX operating system, system calls, memory management policies and its working principles.

UNIT – I

Introduction – Evolution of Operating systems – Serial, Simple Batch, Multi programmed Batch, Timesharing, Distributed and Real time operating systems – System calls- Structure of Operating System – Interrupts- Processes Model – Creation – Termination – Process Hierarchy – Process States – Implementation of Processes – PROCESS AND THREADS: Relationship between process and threads – Thread State – Thread Synchronization – Types of Thread – Multithreading model

UNIT – II

Inter Process Communication – Concurrent Process – Deadlock - Race condition – Critical Region – Mutual Exclusion – Sleep and wakeup – Semaphores – Mutexes – Message Passing. Classical IPC Problems: The Dining Philosophers Problem – The Readers and Writers Problem – The Sleeping Barber Problem – Producer Consumer problem - Deadlock Prevention, Avoidance and Detection and recovery.

UNIT – III

MEMORY MANAGEMENT: Memory hierarchy – Linking and Loading the process – Memory Management requirement - Fixed partitioning - Dynamic partitioning – Buddy Systems – Simple paging – Multilevel paging – Simple Segmentation – segmentation and paging.

VIRTUAL MEMORY MANAGEMENT: Need for Virtual Memory management – Demand Paging – Copy on write - Page Fault handling – Demand Segmentation – Combined demand segmentation and paging - Thrashing- working set model

UNIT – IV

FILE SYSTEM MANAGEMENT: Files – Access methods - File System Architecture – Functions of File Management –Directory and disk structure – file sharing – File system implementation – directory implementation - File Allocation – free space management.

I/O MANAGEMENT AND DISK SCHEDULING: Organization of I/O function – Evolution of I/O function – Types of I/O devices – Logical Structure of I/O functions – I/O Buffering – Disk I/O – Disk Scheduling algorithms – Disk Cache.

UNIT – V

UNIX: Algorithm for Booting the UNIX system – Algorithm for Init process – Process scheduling algorithm – Example of Process scheduling in UNIX- Example C programs by using fork, execl, wait, exit system calls. Memory management policies in UNIX – Swapping – Demand paging.

TEXT BOOKS

1. William Stallings, "Operating Systems", Prentice Hall of India, Second Edition, 2000. [Units I, II, III, IV].
2. Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2002. [Units V]

REFERENCE BOOKS

1. Andrew S.Tanenbaum, "Modern Operating Systems", PHI/Pearson Education Asia, Second Edition, 2001.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Wiley, 2013

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	ADVANCED JAVA PROGRAMMING	II	18MCS23C

Objective:

- To introduce the concepts and principles of Java Programming language and to design and implement object-oriented solutions.
- To introduce the concepts of Applets, JDBC and Java Scripts

UNIT - I

An Overview of Java – Data types – Variable – Operators – Expressions – Arrays – Control Statements. Java Classes: Fundamentals – Methods – Constructors – this Keyword – Method Overloading, Nested and inner classes.

Inheritance: Basics, using super – Method Overriding – Abstract Classes.

UNIT – II

Packages and Interfaces: Packages and Member Access – Importing packages.

Interface: Defining and Implementing Interface – Applying interface – Variables in Interface.

Exception Handling: Fundamentals – Exception types – Uncaught exceptions – Using try and catch – Multiple catch clauses – Nested try statements – Java Built in Exception – Creating your own sub classes.

UNIT – III

Multi threaded Programming: Java thread model – Thread Class and runnable interface – Main thread – Creating the thread – Creating multiple threads – Synchronization – Inter thread communication.

I/O basics – Stream Classes – Predefined streams – Reading/Writing console input/output.

Java Library: String handling – Utility Classes- Input/Output.

UNIT – IV

Applet fundamentals – Introduction of AWT - AWT Classes – Window fundamentals – Working with frame windows – Introducing graphics – Working with Colour – Working with Fonts.

Accessing database with JDBC: Relationship databases – creating a database in MySQL – Manipulating databases with JDBC – Transaction processing.

UNIT – V

JavaScript: Introduction – Syntax – Types – JavaScript Variables, Operators, Control and Looping Structures – Strings and Numbers – Display methods – Popup boxes – Date & Time – Function – Event Handlers – Document formatting – Math strings.

TEXT BOOKS

1. Herbert Schildt, “The Complete Reference Java”, 9th Edition Tata McGraw-Hill Pub. Company Ltd.
2. Deitel and Deitel, “Java How to Program”, Seventh Edition, Pearson Education Asia.
3. Steven Bright, “Fundamentals of JavaScript”.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	DATA MINING WITH R PROGRAMMING	II	18MCS24C

Objectives:

- On successful completion of course, the students should have learnt the concept of Data Mining Techniques, R tool and Data analytics.

UNIT-I: Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Association rule mining: Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various kinds of association rules.

UNIT-II: Classification and Clustering: Classification and Prediction - Basic Concepts- Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation Cluster Analysis - Types of Data – Categorization of Major Clustering Methods–K-means-Partitioning Methods – Hierarchical Methods – Clustering High Dimensional Data- Constraint Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

UNIT-III: Big Data Analytics: Introduction to the Big Data Era – Description of Big Data – Industry Examples of Big Data – Descriptive power and predictive Pattern Matching – The Value of Data – Big Data Analytics – Architectures, Frameworks, and Tools – Big Data Analytics Methodology – Challenges – Big Data Analytics in Healthcare.

UNIT-IV: Getting Started with R- R Nuts and Bolts - Getting Data in and Out of R - Using Textual and Binary Formats for Storing Data- Interfaces to the Outside World- Subsetting R Objects - Vectorized Operations - Managing Data Frames with the dplyr package.

UNIT-V: Control Structures -Functions- Scoping Rules of R - Loop Functions- Debugging Tool in R- Profiling R Code- Simulation.

TEXT BOOKS

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Second Edition, Elsevier, 2007. (Unit I and II)
3. Stephan Kudyba Foreword by Thomas H.Davenport, “Big Data, Mining, and Analytics”, CRC Press, 2015. (Unit III)
4. Roger D. Peng, “R Programming for Data Science” Lean Publishing, 2014. (Unit IV & V)

REFERENCE BOOKS

1. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
3. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters, “A Beginner’s Guide to R”, Springer, 2009.
4. Graham Williams, “Data Mining with Rattle and R”, Springer Science, 2011.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 3: DATA MINING WITH R PROGRAMMING LAB	II	18MCS26P

Objective:

- To understand the concepts of Data mining techniques practically
- To learn the R Programming environment and basics of R's syntax are used to implement the Data mining techniques.

LIST OF PRACTICALS

1. Write an R program for classification using decision tree using PARTY PACKAGE.
2. Write an R program for clustering using K-Means.
3. Write an R program for Partitioning around Medoid (PAM) Clustering.
4. Write an R program for Hierarchical clustering.
5. Write an R program for Association Rule Mining.
6. Write an R program for outlier detection.
7. Write an R program to visualize the data using histogram.
8. Write an R Program to visualize the data using Box plot.
9. Write an R program to visualize the data using Scatter plot.
10. Write an R program to implement pre processing concept

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 4: ADVANCED JAVA PROGRAMMING LAB	II	18MCS27P

Objective:

- To execute the various programming Techniques in Java practically

LIST OF PRACTICALS

1. Write a java program to create a class, objects using constructor.
2. Write a java program to implement inheritance.
3. Write a java program to illustrate run time exception and I/O exception.
4. Write a java program to create a package.
5. Create an Employee package to maintain the information about the employee. Use the Constructors to initialize the Employee number and use Overloading method to get the Basic pay of the employee. By using package create a java program.
6. Write a java program to implement multithreading.
7. Write a java program to create GUI components.
8. Write a java program to draw images and animate them.
9. Write a java program that connects to a database using JDBC and performs addition, deletion, modification and retrieval operation.
10. Write a java program to design a web page using applet and HTML.
11. Write a java Script to perform all arithmetic operations.
12. Write a java Script to search and element in an array.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	DIGITAL IMAGE PROCESSING	III	18MCS31C

Objective:

- To study the various concepts, methods and algorithms of digital image processing such as image transformation, image enhancement, image restoration, image compression and Segmentation techniques

UNIT – I

Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels.

UNIT – II

Image Enhancement in the Spatial Domain: Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters.

UNIT – III

Color Image Processing: Color Fundamentals-Color Models-Pseudocolor Image Processing-Color transformations-Smoothing and Sharpening-Color Segmentation-Noise in Color Images.

UNIT – IV

Morphological Image processing: Preliminaries-Dilation and Erosion-Opening and Closing-The Hit-or-Miss Transformation-Some Basic Morphological Algorithms. Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary detection – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds.

UNIT – V

Image Processing with OpenCV-Python: Introduction to OpenCV-Python-OpenCV GUI-Basic operations on Images-Arithmetic operations on Images – Image Processing in OpenCV: Changing Color Spaces- Geometric Transformation of Images – Smoothing Images – Morphological Transformations – Image Gradients-Edge Detection – Contours – Histograms.

TEXT BOOKS

- Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Second Edition, PHI/Pearson Education.
- Alexander M., Abid K., “OpenCV-Python Tutorials”, 2017.

REFERENCE BOOKS

- B. Chanda, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
- Nick Efford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	CRYPTOGRAPHY AND NETWORK SECURITY	III	18MCS32C

Objective:

- To understand the various types of security attacks and need of Network Security.
- To learn the security issues in computer networks and mastering the cryptographic algorithm.

UNIT – I

Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm – Stream cipher and Block cipher – Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

UNIT – II

Public-key Cryptosystem: Introduction to Number Theory – RSA Algorithm – Key Management - Diffie-Hell man Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

UNIT – III

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

UNIT – IV

Web Security – Secure Socket Layer – Secure Electronic Transaction. System Security – Intruders and Viruses – Firewalls– Password Security

UNIT – V

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit – Other Security Mechanism: Introduction to: Steganography – Quantum Cryptography – Water Marking – DNA Cryptography.

TEXT BOOKS

1. William Stallings, “Cryptography and Network Security”, PHI/Pearson Education.

REFERENCE BOOKS

1. Bruce Schneir, “Applied Cryptography”, CRC Press.
1. A.Menezes, P Van Oorschot and S.Vanstone, “Hand Book of Applied Cryptography”, CRC Press, 1997 (Free Downloadable).
3. Ankit Fadia, ”Network Security”, MacMillan.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	WEB PROGRAMMING ESSENTIALS	III	18MCS33C

Objective:

- To provide fundamental concept of Internet, HTML5, CSS3, JavaScript, PHP with a view to developing professional software development skills

UNIT I: INTRODUCTION TO WWW

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

UNIT II

Markup Language (HTML5): Basics of Html -Syntax and tags of Html- Introduction to HTML5 -Semantic/Structural Elements -HTML5 style Guide and Coding Convention– Html Svg and Canvas – Html API's - Audio & Video - Drag/Drop - Local Storage - Web socket API– Debugging and validating Html.

Cascading Style Sheet (CSS3): The need for CSS – Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS -Responsive Web Design - Introduction to LESS/SASS

UNIT III**OVERVIEW OF JAVASCRIPT**

Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements Functions - Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form validations.

UNIT IV**ADVANCED FEATURES OF JAVASCRIPT**

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX- Bootstrap - Bootstrap components.

UNIT V PHP

Introduction - How web works - Setting up the environment (LAMP server) - Programming basics Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML - Establishing connectivity with MySQL database.

TEXT BOOKS:

- David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O'Reilly Media, 2011
- Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How To Program”, Fifth Edition, Pearson Education, 2011

3. James Lee, BrentWare, “Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP” Addison Wesley, Pearson 2009
4. Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, 2010
5. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013
6. Thomas A Powell, “Ajax: The Complete Reference”, McGraw Hill, 2008

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	MOBILE APPLICATIONS DEVELOPMENT	III	18MCS34C

Objective:

- To understand the components and structure of mobile application development frameworks for Android.
- To learn the SQLite on Android.

UNIT-I

INTRODUCTION: Introduction to mobile applications - Importance of mobile applications – Strategies and challenges – Software and hardware requirements for developing mobile applications – Types of mobile applications – Benefits of creating mobile applications – Marketing and advertising mobile applications

UNIT-II

MOBILE USER INTERFACE DESIGN: Mobile application users – Social aspect of mobile interfaces - Accessibility – Design patterns – Designing for the platforms.

UNIT-III

MOBILE APPLICATIONS ARCHITECTURE: Smart Client – Smart Client Architecture – Messaging Architecture – The Model-View-Controller Model - Delegate Pattern- Building Smart Client Applications-Design, Development, implementation, testing and deployment phase- MVVM mobile architecture design.

UNIT - IV

MOBILE APPLICATION DEVELOPMENT: Introduction to Android Platform – Android architecture overview - Application life cycle - UI design for Android - UI fragments - Different types of layouts – Widgets – List view – View pager - Dialogs.

UNIT-V

DATABASE: Files and database – SQLite on Android – Loading asynchronous data - Map API.

TEXT BOOKS:

1. Jeff McWherter and Scott Gowell , “Professional Mobile Application Development”, John Wiley & Sons, 2012.
2. Bill Philips, Kristin Marsicano and Chris Stewart, “Android Programming: The big Nerd Ranch guide”, O’Reilly, 2017.
3. Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley, 2003

REFERENCES:

1. Ronan Schwarz, Phil Dutson, James Steele and Nelson To, “The Android Developer's Cookbook -Building Applications with the Android SDK”, Addison Wesley, 2013.
2. Mark Murphy, “The Busy Coder's Guide to Android Development”, Commons Ware, 2009.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 5: DIGITAL IMAGE PROCESSING LAB	III	18MCS36P

Objective:

- To implement various Image Processing Techniques using Python.

LIST OF PRACTICALS

- 1) Write a python program to read an image file and write into different image formats.
- 2) Write a python program to find the neighbor pixels N_4, N_8 & N_d at particular pixel (i, j).
- 3) Write a python program to perform the following basic gray level transformations,
 - a) Image negatives
 - b) Log transformation
- 4) Write a python program to display the histogram of an image and manipulate using histogram equalization.
- 5) Write a python program to perform the following basic image operations.
 - a) Access pixel values and modify
 - b) Access image properties
 - c) Setting Region of Image (ROI)
 - d) Splitting and Merging images
 - e) Making image Borders
- 6) Write a python program to show the output following image arithmetic operations.
 - a) Image Addition
 - b) Image Subtraction
 - c) Bit-wise operations
- 7) Write a python program to convert the images from one color space to another and plot the result.
- 8) Write a python program to apply the simple and adaptive thresholding on any input gray scale image and show the result.
- 9) Write a python program to apply different geometric transformations to images like scaling, rotation, translation, etc.
- 10) Write a python program implement following filters.
 - a) Smoothing filters
 - b) Sharpening filters
- 11) Write a python program to perform the following morphological operations.
 - a) Erosion
 - b) Dilation
 - c) Opening
 - d) Closing
- 12) Write a python program to apply any two image gradient filters and plot the input and output images.
- 13) Write a python program apply the canny edge detection algorithm.
- 14) Write a python program to perform the image segmentation using watershed algorithm.
- 15) Write a python program to calculate the any five features of different images.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 6: MOBILE APPLICATION DEVELOPMENT LAB	III	18MCS37P

Objective:

- To understand the components and structure of mobile application development frameworks for Android practically.
- To understand the capabilities and limitations of mobile devices.

LIST OF PRACTICALS

1. Android SDK installation and study
2. Defining Layouts
3. Single Activity Application, Application with multiple activities, using intents to Launch Activities
4. Application using GUI Widgets
5. Application with Notifications
6. Creating and Saving Shared Preferences and Retrieving Shared Preferences
7. Usage of SQLite Databases for storage
8. Case Study: Developing mobile applications for problems in the field like e-learning, banking, insurance, sales and health services.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	SOFTWARE DEVELOPMENT TOOLS (C# and ASP.NET)	IV	15MCS41C

Objective:

- To provide fundamental concept of .NET, C#, HTML, ASP.NET with a view to developing professional software development skills

UNIT-I

Introduction to .Net: Introduction, Architecture of .Net Framework-Common Language Runtime, common type system, class libraries- Microsoft Intermediate Languages, JIters, Unmanaged code.

Introduction to C#: Evolution of C#, Characteristics of C#, how does C# differ from C++ and Java, Data types, Variables and Literals, Boxing and unboxing, Operators and Expressions, Type conversions, Mathematical functions, Decision making and branching, Decision making and looping.

UNIT – II

Object Oriented Programming in C#: Methods, Classes and objects, access specifier, Inheritance, abstract class, sealed classes, interfaces, delegates, namespaces, exceptions.

UNIT – III

Advanced Features of C#: Multithreading, Reflection Attributes, Properties and Indexers.

Window Based Programming: Win Forms, Textbox, Buttons, Message Box, List Box, Handling events. **ADO.NET:** ADO.Net Object Model - Connecting with database, retrieving results, updating data in database, Deletion.

UNIT – IV

WORKING WITH ASP.NET: The Feature of ASP.NET – The Anatomy of ASP.NET Pages: The Code Structure of ASP.NET – Execution Stages and State Management – The Events Models for the Page Class - Introducing Web Forms – VS.NET Web Applications and Other IDE Basics – Separating Content and Code – the code – Behind Feature – Application Configuration: Structure and Configuration of the Global .aspx File.

UNIT -V

Using HTML Controls: HTMLForm – HTMLAnchor - HTMLButton - HTMLGeneric Control – HTMLImage - HTMLInputButton- HTMLInputCheckBox - HTMLInputFile- HTMLInputHiden – HTMLInputImage - HTMLInputRadioButton- HTMLInputText - HTMLSelect - HTML Table, HTMLTableCell, and HTMLTableRow – HTMLTextArea.

TEXT BOOKS

- E. Balagurusamy, “Programming in C#” A Primer Second Edition.
- Ian Griffiths, Matthew Adams and Jesse Liberty, “Programming C# 4.0”, O’Reilly Sixth Edition.
- C. Komalavalli and Sanjib K. Sahu, “Essentials of .NET programming”, Ane books Pvt. Ltd, 2013.
- Matt J Crouch, “ASP.NET and VB.NET web programming”, Pearson Education, 2005.

REFERENCE BOOK

1. Stanley B.Lippman, "C# Primer A Practical Approach", Pearson Education, 2002.
2. Tom archer, "Inside C#", Microsoft Press, 2001.
3. "Microsoft C# Language Specification", Microsoft Press, 2001.
4. AI Williams, Kim Barber,"ASP Solutions", DreamTech Press 2000.
5. Dave Mercer, "ASP.NET: A Beginner's Guide", Tata McGraw-Hill Publishing Company Limited Edition 2002.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	Core Practical 7: SOFTWARE DEVELOPMENT LAB	IV	18MCS42P

Objective:

- To implement various Programming techniques of C# and ASP .NET in problem solving.

LIST OF PRACTICALS

1. Write a C# program to perform arithmetic operations
2. Write a C# program to Calculate nCr and nPr values.
3. Write a C# program to Find the area and circumference of circle.
4. Write a C# program to implement the Student details using inheritance.
5. Write a C# program Sales bill preparation using interface.
6. Write a C# program to display the clock time using delegates and events.
7. Write a C# program to find the area of square, triangle, and rectangle using method overloading.
8. Write a C# program to Pass values from one form to another form.
9. Write a C# program to implement Calculator.
10. Write a C# program to Insert record using data grid view.
11. Write a C# program to calculate the Cutoff mark.
12. Write a ASP .NET program to Create a login form, to expire, if the user does not type the Password within 100 seconds.
13. Write a ASP .NET program to Create an advertisement for a bookshop.
14. Create a course registration form with name, address and list of available courses. Reply with the corresponding course fees on selection of a single course or a collection of courses.
15. Create an employee database and manipulate the records using command object in ASP.

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	PROJECT VIVA VOCE	IV	18MCS43V

Guidelines for Internal Assessment

Total Marks: 100

1) Title and Abstract submission (10 Marks)

- The Abstract should have at least 2 Pages.
- No Marks will be given if submitted after due date

2) Review: 1 (25 Marks)

- * The Student should submit the following to the Respective Guides during this Review meeting

1) System Study / Analysis

- Existing System
- Proposed System
- Feasibility Analysis

2) System design (Which ever applicable to your Project)

- Data Flow Diagram
- System Flow Design
- ERD
- Table Design
- Input Design
- Modules Design

3) Review: 2 (25 Marks)

- * The Students should submit the following to the respective Guides without fail

1) System Implementation

- About the Software used
- Implementation of modules

4) Review: 3 (25 Marks)

- * The Students should submit the following to the respective Guides without fail

1) System Testing

- Testing Strategies
- Test Plan
- Testing Report of your Software

5) Rough Project Report Submission for correction (15 Marks)

6) Project Report Submission Total Marks 100*

***Note:**

1. 100 Marks will be converted into 40 marks.
2. If the Student fails to attend Review Meeting, respective marks will not be awarded and treated as “Absent”.
3. The Student cannot submit project report, if they are absent for all Reviews.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.1 PRINCIPLES OF COMPILER DESIGN	II	18MCS25E

Objective:

- On successful completion of the subject the students should have understood the different phases of compiler and to implement compiler.

UNIT – I

Introduction – Structure of a Compiler – Compiler writing Tools – Basic constructs of High level Programming languages: Data structures, Parameter transmission. Lexical analysis – Role of lexical analyzer – Finite automata – Regular expressions to Finite automata – NFA to DFA – Minimizing the number of states of a Deterministic Finite Automata – Implementation of a Lexical Analyzer.

UNIT – II

Parsing techniques – Context free grammars – Derivations and Parse trees – Ambiguity – Capabilities of Context free grammars – Top down and Bottom up parsing – Handles – Shift Reduce parsing – Operator precedence parsing – Recursive descent parsing – Predictive parsing.

UNIT – III

Automatic parsing techniques – LR parsers – Canonical collection of LR(0) items – Construction of SLR parsing table – LR(1) sets of items Construction – Construction of canonical LR Parsing Tables.

UNIT – IV

Syntax Direction Translation – Semantic actions – Implementation of Syntax Directed Translators – Intermediate Code: Postfix notation, Quadruples, Triples, Indirect triples – Methods of translation of Assignment statements, Boolean expressions.

UNIT – V

Symbol tables and Code generation: Representing information in a Symbol Table – Data Structures for Symbol table – Introduction to Code Optimization: Basic blocks – DAG representation – Error detection and recovery – Introduction to Code Generation.

TEXT BOOKS

- Aho A. V. R, Ullman J. D., Compilers, Principles, Techniques and Tools, Addison Wesley, 2002.

REFERENCE BOOKS

- Dhamdhare D. M., Compilers construction Principles and Practice, Macmillan India Ltd.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.2 SOFTWARE ENGINEERING CONCEPTS	II	18MCS25E

Objective:

- To provide basic concepts of Software Engineering, Various models, Software Design, Software Development and Various Testing Strategies.

UNIT I

SOFTWARE ENGINEERING: Software Engineering – A Layered Technology – A Process Framework - CMMI – **PROCESS MODELS:** Prescriptive Models – The Waterfall Model – Incremental Process Model – Evolutionary Process Model - Specialized Process Model. **SYSTEM ENGINEERING:** The System Engineering Hierarchy. **REQUIREMENTS ENGINEERING:** Requirements Engineering Tasks – Initiating the Requirements Engineering Process.

UNIT II

BUILDING THE ANALYSIS MODEL: Requirements Analysis - Data Modeling Concepts – Flow Oriented Modeling. **DESIGN ENGINEERING:** Design Process – Design Concepts – Design Model. **ARCHITECTURAL DESIGN:** Software Architecture – Architectural Styles and Patterns - Architectural Design. **COMPONENT- LEVEL DESIGN:** Component – Designing Class Based Components. **UI DESIGN:** The Golden Rules - UI Analysis and Design.

UNIT III

METRICS FOR PROCESS AND PROJECTS: Metrics in the Process and Project Domains – Software Measurement – Metrics for Software Quality. **ESTIMATION FOR SOFTWARE PROJECT:** Resources – Decomposition Techniques. **PROJECT SCHEDULING:** Project Scheduling - Defining a Task Set for the Software Project.

UNIT IV

RISK MANAGEMENT: Software Risks – Risk Identification – Risk Projection. **QUALITY MANGEMENT:** Quality Concepts – Software Quality Assurance - Formal Technical Reviews – Software Reliability. **CHANGE MANAGEMENT:** Software Configuration Management – The SCM Process.

UNIT V

SOFTWARE TESTING: A Strategic Approach to Software Testing – Test, Test Case and Test Suite – Verification and Validation – Alpha, Beta and Acceptance Testing – Functional Testing – Structural Testing – Levels of Testing – Validation Testing – The Art of debugging – Testing Tools.

TEXT BOOKS

- Roger S. Pressman, “Software Engineering – A Practitioners Approach”, McGraw Hill International, 6th Edition, 2005 (UNITS: I, II, III & IV).
- K.K. Aggarwal, Yogesh Singh, “Software Engineering”, 3rd Edition, New Age International Publishers, 2008. (UNIT: V).

REFERENCE BOOKS

1. Ian Sommerville, “Software Engineering”, Eighth Edition, Pearson Education, South Asia, 2009.
2. Srinivasan Desikan and Gopalasamy Ramesh, “Software Testing for Principles and Practices”, Pearson Education, South Asia, 2007.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.3 SOFTWARE TESTING	II	18MCS25E

Objective:

- To develop software testing ability and to learn about the test approach, testing phase, test cases, testing methodology, testing tools, testing report and software maintenance.

UNIT – I

Developing a test approach – Addressing software system business risk – Defining a software system strategy – Developing software system testing tactics – Testing a software using a life cycle methodology – Requirements phase testing.

UNIT – II

Design phase testing – Program phase testing – Desk debugging and program peer view test tools – Evaluating test results – Installation phase testing – Acceptance testing.

UNIT – III

Testing methodology for software maintenance – Testing the correctness of the installing a software change – Testing the validity of a software cost estimate – Testing the progress of the software system – Inspecting test plan and test cases.

UNIT – IV

Accessing Client–Server and LAN risks – A testing strategy for a rapid prototyping – Testing techniques – Testing tools.

UNIT – V

Test documentation – Reporting test results – Final test reporting – Evaluating test effectiveness – Use of testing metrics – Improving test process.

TEXT BOOKS

- William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, Inc., 1995.

REFERENCE BOOKS

- Renu & Pradeep “Software Testing: Methodologies, Tools and Processes”, Tata McGraw Hill Publishing Co. Ltd.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.4 DISTRIBUTED COMPUTING	II	18MCS25E

Objective:

- To study the functional concepts of Distributed Computing systems
- To learn the Principles of Distributed Database.

UNIT – I

Distributed Systems: Fully Distributed Processing Systems – Networks and Interconnection Structures – Designing a Distributed Processing System.

UNIT – II

Distributed Systems: Pros and Cons of Distributed Processing – Distributed Databases – The Challenge of Distributed Data – Loading Factors – Managing the Distributed Resources – Division of Responsibilities.

UNIT – III

Design Considerations: Communication Line Loading – Line Loading Calculations – Partitioning and Allocation – Data Flow Systems – Dimension Analysis – Network Database Design Considerations – Ration Analysis – Database Decision Trees – Synchronization of Network Databases.

UNIT – IV

Client/Server Network Model: Concept – File Server – Printer Server – an e-mail Server.

UNIT – V

Distributed Databases: An overview – Distributed Databases – Principles of Distributed Databases – Levels of Transparency – Distributed Database Design – The R* Project Technique Problems of Heterogeneous Distributed Databases.

TEXT BOOKS

1. John A. Sharp, “An Introduction to Distributed and Parallel Processing”, Blackwell Scientific Publications, 1987 (For UNIT I & UNIT III).
2. Uyles D. Black, “Data Communications & Distributed Networks”,(UNIT II).
3. Joel M. Crichlow, “Introduction to Distributed & Parallel Computing”, (UNIT IV).
4. Stefans Ceri, Ginseppe Pelagatti, “Distributed Databases Principles and systems”, McGraw Hill Book Co., New York, 1985 (UNIT V).

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.5 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	II	18MCS25E

Objective:

- To Understand the problem states and AI, state space methods, problem reduction search methods, predicate calculus, Heuristic techniques, reasoning and knowledge engineering in expert systems.

UNIT – I

Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

UNIT – II

Heuristic Search techniques: Generate and Test – Hill Climbing – Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

UNIT – III

Using Predicate logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge.

UNIT – IV

Statistical reasoning: Probability and Bayes Theorem- Certainly Factors and Rule- Based systems- Bayesian Networks- Dempster-Shafer Theory-Fuzzy logic.

Knowledge representation: Syntactic-Semantic Spectrum of Representation-Logic and Slot-and Filter Structures- Other Representational Techniques – Planning – Understanding.

UNIT – V

Learning – Common sense – Perception and Action – Expert System.

TEXT BOOKS

- Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publishers company Pvt. Ltd, Second Edition, 1991. (Chapters 1 – 6 only).

REFERENCE BOOKS

- George F Luger, "Artificial Intelligence", 4th Edition, Pearson Education Publ., 2002.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.6 SEMANTIC WEB TECHNOLOGY	II	18MCS25E

Objective:

- To discover the capabilities and limitations of semantic web technology for different applications.

UNIT – I

INTRODUCTION: Current Web - Transition to the Semantic Web – Examples - Semantic Web Technologies - A Layered Approach.

STRUCTURED WEB DOCUMENTS IN XML: Introduction - The XML Language - Structuring - Namespaces - Addressing and Querying XML Documents - Processing.

UNIT – II

DESCRIBING WEB RESOURCES IN RDF: Introduction - RDF: Basic Ideas, XML-Based Syntax - RDF Schema: Basic Ideas, The Language - RDF and RDF Schema in RDF Schema - An Axiomatic Semantics for RDF and RDF Schema - A Direct Inference System for RDF and RDFS.

UNIT – III

ONTOLOGY ENGINEERING: Introduction - Constructing Ontologies Manually - Reusing Existing Ontologies - Using Semiautomatic Methods - On-To-Knowledge Semantic Web Architecture.

WEB ONTOLOGY LANGUAGE: Introduction - The OWL Language - Examples - OWL in OWL - Future Extensions.

UNIT – IV

LOGIC AND INFERENCE: Rules - Introduction - Example of Monotonic Rules: Family Relationships - Monotonic Rules: Syntax, Semantics, Non-monotonic Rules: Motivation and Syntax - Example of Non-monotonic Rules: Brokered Trade - Rule Markup in XML: Monotonic Rules, Non-monotonic Rules.

UNIT – V

APPLICATIONS: Introduction - Horizontal Information Products at Elsevier - Data Integration at Audi - Skill Finding at Swiss Life - Think Tank Portal at EnerSearch - e-Learning - Web Services - Other Scenarios.

TEXT BOOK:

1. Grigoris Antoniou and Frank van Harmelen, “Semantic Web Primer”, MIT press, USA, 2008.
2. Michael C Daconta, Leo J Obrst and Kevin T Smit, “The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley, USA, 2003.

REFERENCES:

1. John Davies, Rudi Studer and Paul Warren, “Semantic Web Technologies: Trends and Research in Ontology-based Systems”, Wiley, USA, 2006.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.7 BIG DATA ANALYTICS	II	18MCS25E

Objective:

- To impart knowledge in Fundamentals of Big Data Analytics, Technologies and databases.

UNIT-I

OVERVIEW– Big Data era – characteristics - Definition of data features – Big data value – Development – Challenges – Intelligent data analysis - Nature of data - Evolution of database - Limitations of existing solutions.

UNIT-II

RELATED TECHNOLOGIES–Cloud computing – Relationship between cloud computing and big data - Internet of Things (IOT): IOT preliminaries – relationship between IOT and Big data; Data Centre – Hadoop – Preliminaries and Big Data – NoSQL - Hadoop eco system - Data loading techniques – Flume - Sqoop– Hive - Pig Latin - Mahout – HDFS- Map and Reduce.

UNIT-III

BIG DATA GENERATION AND ACQUISITION: – Enterprise data – IOT data – Internet data – Biomedical data – Data generation from fields - Data Collection – Transportation - Preprocessing.

UNIT-IV

BIG DATA ANALYSIS AND MINING: Traditional – Analytic methods – Architecture: Real-time vs Offline – analysis at different levels – different complexity – Stream Concepts – Stream data model and architecture – stream computing – sampling data in a stream – filtering streams – counting distinct elements in a stream – estimating moments – Real time analytics platform (RTAP) applications.

UNIT-V

MASSIVE DATA ANALYTICS: Map-reduce for machine learning, Nearestneighbor classifier, Multi-task learning, Topic model. **APPLICATIONS** – Application evolution – Fields: Structured, Text, Web, Multimedia, Network, Mobile traffic; Social Network.

TEXT BOOKS:

1. Min Chen, Shiven Mao, Yin Zhang, Victor CM Leung, “Big Data: Related Technologies, Challenges and Future Prospects”, Google(ebook), Springer.
2. EMC² Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley, 2015
3. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2013
4. VlasiosTsiatsis, IoannisFikouras, Stefan Avesand, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, Academic Press Inc, 2014

REFERENCES:

1. Ravi Kannan, John Hopcroft, “Foundations of Data Science”, 2013.
2. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer-Verlag, 2011.

ELECTIVE – I

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	1.8 PYTHON PROGRAMMING	II	18MCS25E

Objective:

- To introduce object-oriented programming using an easy-to-use language.
- To use iterators and generators.
- To test objects and handle changing requirements.
- To be exposed to programming over the web.

UNIT I: INTRODUCTION TO PYTHON

Function Declaration - Import - Objects - Indenting as Requirement - Exceptions – Unbound Variables - Case Sensitive - Scripts - Native Data Types - Booleans - Numbers - Lists -Tuples - Sets - Dictionaries - Comprehensions - List Comprehensions – Dictionary Comprehensions - Set Comprehensions

UNIT II: STRINGS

Strings - Unicode - Formatting - String Methods - Bytes - Encoding - Regular Expressions - Verbose - Case Studies

UNIT III: CLASSES

Closures - List of Functions - List of Patterns - File of Patterns - Generators – Defining Classes - Instantiating Classes - Instance Variables - Iterators – Itertools - Assert – Generator Expressions

UNIT IV: TESTING AND FILES

Test Case - Testing Invalid Inputs - Refactoring - Handling Changing Requirements - Reading and Writing Text Files - Binary Files - Stream Objects - Standard Input, Output and Error.

UNIT V: XML, SERIALIZATION AND WEB SERVICES

XML - Atom Feed - Parsing HTML - Searching for Nodes - html - Generation - Serializing Objects - Pickle Files - Versions - Debugging - Serializing to JSON - HTTP Web Services - Features – urllib2

TEXT BOOKS:

1. Mark Pilgrim, —Dive into Python 3, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, —How to Think Like a Computer Scientist Learning with Python, Green Tea Press, 2002.

REFERENCES BOOK:

1. John V. Guttag, —Introduction to Computation and Programming using Python, Prentice Hall of India, 2014.
2. Mark Lutz, —Learning Python: Powerful Object-Oriented Programming, Fifth Edition, O'Reilly, Shroff Publishers and Distributors, 2013.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.1 SOFTWARE PROJECT MANAGEMENT	III	18MCS35E

Objective:

- To learn various types of Software projects and to evaluate project analysis and technical planning.
- To understand the cost evaluation techniques.
- To learn the concepts of project planning and monitoring.
- To understand the concepts of organizing teams for software projects.

UNIT - I

INTRODUCTION: Software Projects various other types of projects - Problems with software projects - an overview of project planning - Project evaluation - Project Analysis and technical planning

UNIT - II

Project estimates - Preparation of Estimates - COCOMO model - Function Point Analysis - Putnam Model - Non-development overheads.

UNIT- III

ACTIVITY PLANNING: Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration - Identifying critical activities.

UNIT- IV

RISK MANAGEMENT: Resource allocation - Monitoring and Control - Managing people and organizing teams - Planning for small projects - Handling large projects - Divide and Conquer - Software Project survival.

UNIT- V

SOFTWARE CONFIGURATION MANAGEMENT: Basic functions, responsibilities, standards, configuration Management, Prototyping - Models of prototyping.
Case study using Project management tools.

TEXT BOOKS:

1. Mike Cotterell and Bob Hughes, "Software Project Management - Inclination", Tata McGraw Hill, 2014.
2. Robert K Wysocki, Robert Beck Jr and David B Crane, "Effective Project Management", John Wiley, 2012.

REFERENCES:

1. Steve McConnell, "Software Project Survival Guide", Microsoft Press, 2011.
2. Gerald M Weinberg, "Quality Software Management:Systems Thinking", Dorset House, 2014.
3. Gerald M. Weinberg, "Quality Software Management:First Order Measurement", Dorset House, 2009.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.2 COMPUTER OPTIMIZATION TECHNIQUES	III	18MCS35E

Objective:

- To impart the mathematical concepts and numerical methods required for Information Technology.
- To make the student solve real life problems in Business and Management.

UNIT I

OPERATION RESEARCH: Basics of OR – OR & Decision Making -Linear Programming-Mathematical Formulation - Graphical Solution – Canonical & Standard Forms of LPP.

UNIT II

SIMPLEX METHOD: Simplex Method for $<$, $=$, $>$ constraints – Charne's Method of Penalties–Transportation Problem and its Solution.

UNIT III

MATHEMATICAL LOGIC: Propositions - Precedence Rules for Operators - Tautologies-Laws of Equivalence –Substitution Rules - Natural Deduction System - Developing Natural Deduction System Proofs.

UNIT IV

INTERPOLATION: Lagrange's and Newton Interpolation - Interpolating Polynomials using Finite Difference **NUMERICAL INTERGRATION:** Trapezoidal, Simpson's rules and Romberg Integration.

UNIT V

NUMERICAL METHODS: Polynomial Equation: Brige - Vieta, Graeffe's Root Squaring Methods. **INTEGRATION:** Gauss Lagrange – Gauss Chebyshev- Gauss Hermite Methods.

TEXT BOOKS:

- 1) Manmohan & Gupta, "Operations Research", Sultan Chand Publishers, New Delhi, 2002. (UNIT I)
- 2) Kanti Swarup-Gupta-ManMohan: Operations Research - Seventh edition 1994. (UNIT II)
- 3) David Gries, "The Science of Programming", Narosa Publishers, House, New Delhi, 1993. Chapters1, 2, 3.1 to 3.3 (UNIT III)
- 4) M.K.Jain, S.R.K. Lyengar, R.K.Jain," Numerical Methods for Scientific and Engineering Computation", 3rd ED., New Age Publication. New Delhi, 1992, Chapters: 2.8, 5.8 (UNITS IV & V.)

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.3 CLOUD COMPUTING	III	18MCS35E

Objective:

- To Provide Understanding on Concepts & Technologies Associated with Cloud Computing

UNIT – I

Introduction to Parallel and Distributed Computing: Introduction, Architecture and Distributed computing models and technologies SOA, Web Services

Grid, Cluster and Utility Computing: Introduction, Architecture, Pros & Cons, Real time applications.

UNIT – II

Introduction to Cloud Computing: Definition, History, Comparison of Cloud Computing with Grid, Cluster and Utility Computing, Deployment models – Private, Public, Hybrid and Community - Pros and Cons of Cloud Computing. SaaS, PaaS, IaaS etc.

UNIT – III

Virtualization: Types of Virtualization, Tools for Virtualization, Architecture of VMM, Virtualization for Cloud.

Advanced Web Technologies: AJAX and Mashup – Programming examples using applications.

UNIT – IV

Map Reduce Paradigms: Introduction, GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon's (key value) pair storage and Microsoft's Azure infrastructure, Map reduce programming examples

UNIT – V

Cloud Computing Framework: Amazon EC3, S3 storage revises, Aneka frame work, IBM blue Cloud.

Applications: Distributed search engine and distributed data mining in the cloud.

TEXT BOOKS:

- Anthony T Velte, Toby J Velte and Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw Hill, New Delhi, 2010
- Liu M L, "Distributed Computing Principles and Applications", Pearson Education, New Delhi, 2009.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.4 IoT ARCHITECTURE AND PROTOCOLS	III	18MCS35E

Objective:

- To understand the basics of Internet of Things and its Architecture
- To understand the IOT protocols

UNIT I – OVERVIEW IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

UNIT II – REFERENCE ARCHITECTURE: IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT III – IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS: PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT IV – TRANSPORT & SESSION LAYER PROTOCOLS: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP) - (TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V – SERVICE LAYER PROTOCOLS & SECURITY: Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4, 6LoWPAN, RPL, Application Layer

REFERENCE:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1 st Edition, Academic Press, 2014.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118- 47347-4, Willy Publications
5. Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1 st Edition, VPT, 2014.
6. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htm

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.5 WIRELESS APPLICATION PROTOCOL (WAP)	III	18MCS35E

Objective:

- On successful completion of this subject, the students should have understood wireless networks WAP architecture

UNIT – I

The Rise of Mobile Data: Market Convergence Enabling Convergence – Key Services for the Mobile Internet. **Overview of the Wireless Application Protocol:** The Origins of WAP – Overview of the WAP Architecture – Components of the WAP Standard – Network Infrastructure Services Supporting WAP Clients – WAP Architecture Design Principles – Relationship to Other Standards.

UNIT – II

The Wireless Markup Language: Overview – The WML Document Model – WML Authoring – URLs Identify Content – Markup Basics – WML – Basics – Basic Content – Events, Tasks and Bindings

UNIT – III

Variables – Other Content you can Include – Controls – Miscellaneous Markup – Sending Information – Application Security – **Other Data:** The Meta Element – Document Type Declarations – Errors and Browser Limitations – Content Generation – WML Version Negotiation.

UNIT – IV

User Interface Design: Making Wireless Applications, **Easy to Use:** Web Site Design: Computer Terminals Vs Mobile Terminals – Designing a Usable WAP Site – Structured Usability Methods – User Interface Design Guidelines – Design Guidelines for Selected WML Elements.

UNIT – V

Wireless Telephony Applications: Overview of the WTA Architecture – WTA Client Framework – WTA Server & Security – Design Considerations – Application Creation Toolbox – Future WTA Enhancements. **The Mobile Internet Future:** Better Content, Easier Access – Beyond Browsing – Beyond Cellular – Mobile Data Unleashed.

TEXT BOOKS

1. Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan, Stefan Hild, “The Wireless Application Protocol”, Pearson Education, 2003.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.6 ENTERPRISE RESOURCE PLANNING	III	18MCS35E

Objective:

- To understand the need for ERP in business
- To incorporate information technology in business

UNIT - I

Introduction to ERP: Introduction – Evolution of ERP – What Is ERP – Reasons for The Growth of The ERP Market – The Advantages of ERP – Why do Many ERP Implementations Fail – Why are ERP Packages Being used now. Enterprise – An Overview: Introduction – Integrated Management Information – Business Modeling – Integrated Data Model.

UNIT - II

ERP and Related Technologies: Introduction – Business Process Reengineering – Management Information System – Decision Support System – Executive Information Systems – Data Warehousing – Data Mining – Online Analytical Processing – Supply Chain Management. ERP A Manufacturing Perspective: Introduction – ERP CAD / CAM – Materials Requirement Planning – Bill of Material – Closed Loop – Manufacturing Resource Planning – Distribution Requirements Planning – JIT and Kanban Product Data Management – Data Management – Benefits of PDM – Make to Order and Make to Stock – Assemble to Order – Engineer to Order – Configure to Order.

UNIT - III

ERP Modules: Introduction – Finance – Plant Maintenance – Quality Maintenance – Material Management. Benefits of ERP: Introduction – Reduction of Lead Time – On Time Shipment – Reduction in Cycle Time – Improved Resource Utilization – Better Customer Satisfaction – Improved Supplier Performance – Increased Flexibility – Reduced Quality Costs – Improved Information Accuracy and Decision-Making Capability.

UNIT - IV

ERP Market: Introduction – SAP AG – Baan Company – Oracle Corporation – People Soft – JD Edwards World Solutions Company – System Software Associate QAD. ERP Implementation Life Cycle: Introduction – Preevaluation Screening – Package Evaluation – Project Planning Phase – Gap Analysis – Reengineering Configuration – Implementation Team Training – Testing – Going Live – End User Training – Post Implementation.

UNIT – V

Vendors, Consultants and Users: Introduction – In House Implementation – Pros and Cons – Vendors – Consultants – End Users. Future Directions In ERP: Introduction – New Markets – New Channels – Faster Implementation Methodologies – Business Models and Bapis Convergence on Windows NT – Application Platforms – New Business Segments – More Features – Web Enabling – Market Snapshot.

TEXT BOOKS

1. “Enterprise Resource Planning”, Alexis Leon, Tata McGraw Hill, 2002.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.7 EMBEDDED SYSTEMS	III	18MCS35E

Objective:

- To enable the students to learn the concepts of Architecture, designing of Embedded Systems and its tools

UNIT – I

8051 Microcontroller: Introduction – 8051 Architecture – Input / Output Pins, Ports and Circuits - External Memory – Counters / Timers – Serial Data Input / Output – Interrupts.

UNIT – II

Instruction Set and Programming Moving Data – Addressing Modes – Logical operations – Arithmetic Operation – Jump and Call Instructions – Simple Program. Applications: Keyboard Interface – Display Interface – Pulse Measurements – DIA and AID Conversions – Multiple Interrupts.

UNIT – III

Concepts on RTOS: Introduction to RTOS – Selecting an RTOS – Task and Task states – Tasks and data – Semaphores and shared data. MORE operating systems services: Interrupt Process communication – Message Queues, Mailboxes and pipes – Timer Functions – Events – Memory Management – Interrupt Routines in an RTOS Environment.

UNIT – IV

Basic Design using a RTOS: Principles – Encapsulating semaphores and Queues – Hard real time scheduling considerations – Saving memory space and power – introductions to RTL & QNX.

UNIT – V

Software Tools: Embedded Software Development Tools: Hosts and Target Machines – Linker/Locators for Embedded software-getting Embedded software into the Target systems. Debugging Techniques: Testing on your Host machine – Instruction set simulators – The assert macro – using laboratory tools.

TEXT BOOKS

- David.E.Simon, "An Embedded Software Primer", Pearson Education, 2001.
- The 8051 Microcontroller and Architecture Programming and Application II Edition - Kenneth J Ayala, Penram International.

ELECTIVE – II

Year	Subject Title	Sem.	Sub Code
2018 -19 Onwards	2.8 MULTIMEDIA AND ITS APPLICATIONS	III	18MCS35E

Objective:

- To understand the basic concepts of Multimedia and its tools
- To understand the multimedia text, sound, video and animation
- To learn the Multimedia application in the Internet

UNIT – I

What is Multimedia –Where to use Multimedia- Introduction to making Multimedia – The Stages of Project- What you need to making Multimedia - Macintosh and Windows Production platforms – **Basic Software tools:** Text Editing and Word processing Tools-OCR Software-Painting and Drawing Tools-3-D Modeling and Animation Tools-Image Editing Tools-Sound Editing Tools-Animation, Video and Digital Movie Tools.

UNIT – II

Multimedia authoring tools: Making Instant Multimedia –Types of Authoring Tools – Card and Page Based Authoring tools- Icon and Object based Authoring Tools-Time Based Authoring tools - Cross-Platform Authoring Notes. **Multimedia building blocks: Text:** About Font and Faces- using Text in Multimedia-Computers and Text-Font editing and Design Tools-Hypermedia and Hypertext.

UNIT – III

Sound: The Power of Sound- Multimedia System Sounds-Digital Audio-Audio File Formats-Making MIDI Audio-MIDI versus Digital Audio-Adding Sound to your Multimedia project. **Images:** Making Still Images-Color-Image File Formats. **Animation:** Principles of Animation – Making Animation That Work. **Video:** Broadcast Video Standards-Analog Video-Digital Video-Video Recording and Tape Formats-shooting and editing Videos.

UNIT – IV

Multimedia and the Internet: The Internet and how it works – **Tools for World Wide Web:** Web Servers-Web Browsers- Web Page Makers and Site Builders- Plugs-in and Delivery Vehicles. **Designing for the World Wide Web:** working on the Web- Text for the Web-Images for the Web-Sound for the Web-Animation for the Web

UNIT – V

Planning and Costing: The Process of Making Multimedia- Scheduling-Estimating-REPs and Bid Proposals. **Content and Talent:** Acquiring Content- Using Content Created by Others-Using Talent. **Delivering:** Testing Preparing for Delivery-Delivering on CD-ROM- Delivering on the World Wide Web.

TEXT BOOKS

1. Tay Vaughan, “Multimedia making it work”, Fifth Edition, Tata McGraw Hill.

REFERENCE BOOKS

1. Judith Jeffloat, “Multimedia in Practice (Technology and Applications)”, PHI, 2003.
2. John F. Koegel Bufford, “Multimedia Systems”, Pearson Education.

MODEL QUESTION PAPER

Question Paper Pattern (External 75 marks)

- Section-A** **20 marks** (10 Short answer Type Questions of 2 mark each; No choice)
(10 X 2 = 20)
- Section-B** **25 marks** (5 Questions either or type of 5 marks each)
(5 X 5 = 25)
- Section-C** **30 marks** (Three Questions out of 5 Questions, 10 marks each)
(3 X 10 = 30)

Question Paper Pattern (Internal 50 marks)

- Section-A** **10 marks** (5 Short answer Type Questions of 2 mark each; No choice)
(5 X 2 = 10)
- Section-B** **20 marks** (4 Questions either or type of 5 marks each)
(4 X 5 = 20)
- Section-C** **20 marks** (Two Questions out of 3 Questions, 10 marks each)
(2 X 10 = 20)
