

SRINIVAS



UNIVERSITY

City Campus, Pandeshwar,
Mangalore – 575 001.

**INSTITUTE OF COMPUTER SCIENCE &
INFORMATION SCIENCE**

SCHEME & SYLLABUS
of
MASTER OF COMPUTER APPLICATIONS
(M.C.A.)
DUAL SPECIALIZATION
I Semester

2022

I SEMESTER MCA SCHEME

S. No.	Subject Code	Title	Teaching Hrs/Week			Examination			
			Theory	Practical	Credits	Duration	Marks		
							IA	Exam	Total
Core Subjects									
1	22MCA11	Linux System Administration	04	-	04	02	50	50	100
2	22MCA12	.NET Framework and C#	04	-	04	02	50	50	100
3	22MCA13	Web Frameworks	04	-	04	02	50	50	100
Data Science Specialization									
4	22MCA141	Database Systems	04	-	04	02	50	50	100
5	22MCA151	Statistics for Data Science	04	-	04	02	50	50	100
Lab Subjects									
6	22MCA16	Database Systems & Linux Lab	-	04	02	02	50	50	100
7	22MCA171	.Net Framework Lab	-	04	02	02	50	50	100
8	22MCA181	Web Frameworks Lab	-	04	02	02	50	50	100
Skill Development Activities									
12	22MCA191	Professional Communication & Ethics	-	01	01	-	50	-	50
13	22MCA192	Employability Skill Development-I	-	01	01	-	50	-	50

I SEMESTER MCA SYLLABUS

Paper Code: 22MCA11 Theory/Week: 4 Hours Credits: 4	LINUX SYSTEM ADMINISTRATION	Hours: 40 IA : 50 Exam: 50
Course Objectives: <ul style="list-style-type: none"> The course is an overview on Operating System Linux and System Administration. It deals with the common paradigms in Linux OS and in particular Red Hat Linux system administration issues, managing the system resources, users and setting up the system as an enterprise server and managing it. This course will guide students to get RedHat certification 		
Course Outcomes: After the completion of the course, students will be able CO1: To get Administration Skills in Linux OS CO2: To make students industry ready with RedHat Certification		
UNIT – I: 8hrs		
Introduction, Linux Distributions, Operating Systems and Linux, Open Source Software, File Systems, System Directories, Listing File Attributes, Listing Directory Attributes, File Management, File Permissions, Absolute Paths, Relative Paths, The Security Implications, Changing File Permissions, Directory Permissions, Changing File Ownership.		
Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
Installing Red Hat Linux, Basic Disk Structure, Partitioning Tool, Device name allocation, Unix filesystem and Mount points, Partitions and Mount points, partitioning issues, Installing GRUB/LILO, Booting the Installation Program, Selecting an installation method, The graphical interface, Installation types, Disk Partitioning, Disk Druid Window, Controlling Disk Druid, Firewall Configuration, Setting the root password, Authentication, Package group selection.		
Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material Laboratory Exercise		
UNIT – III: 8hrs		
Managing Users and Groups, User Private Group, Shadow passwords, Managing Users in a Graphical Environment, Command Line Tools for Managing Users and Groups, The Process on command useradd, Creating Group Directories, Gaining Privileges, The su Command, The sudo Command. Registering the System and Attaching Subscriptions, subscription-manager commands, Managing Software Repositories, Removing Subscriptions, Accessing Support Using the Red Hat Support Tool, Installing the Red Hat Support Tool, Registering the Red Hat Support Tool Using the Command Line.		
Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		

Video Lectures
UNIT – IV: 8hrs
<p>Installing and Managing Software, Yum the Red Hat package manager, Checking For and Updating Packages, Checking For Updates, Updating Packages, Updating a Single Package, Updating the rpm package, Updating All Packages and Dependencies, Updating Security-Related Packages, Preserving Configuration File Changes, Upgrading the System Off-line with ISO and Yum, Working with Packages, Installing Packages, Removing Packages. Managing Services with systemd, Features of Systemd, Managing System Services, Working with systemd Targets, Changing to Rescue Mode, Emergency Mode, Shutting Down, Suspending, and Hibernating the System.</p> <p>Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise</p>
UNIT – V: 8hrs
<p>OpenSSH, SSH Protocol, SSH Features, Event Sequence of an SSH Connection, Authentication, Channels, Configuring OpenSSH Configuration Files, Starting an OpenSSH Server, SSH for Remote Connections, OpenSSH Clients, Using ssh Utility, Using scp Utility, Using the sftp Utility, X11 Forwarding, Port Forwarding. Web Servers, Apache HTTP Server, Updating the Configuration, Running httpd Service, Verifying Service Status, Setting Up Virtual Hosts.</p> <p>Teaching Methodology: Chalk and Board Power Point presentation Video Lectures Laboratory Exercise</p>

Reference Books:

1. Linx System Administration Compiled Study Material from Subrahmanya Bhat, SIMS
2. Red Hat Enterprise Linux 7 System Administrator's Guide - Maxim Svistuno v, Stephen Wadeley.
3. The Definitive Guide to CentOS - Peter Membrey, Tim Verhoeven, and Ralph Angenendt.
4. NPTL material from www.nptl.ac.in.
5. Mourani, G. (2000). *Securing and Optimizing Linux: RedHat Edition*. Open Network Architecture® and OpenDocs Publishing.

Paper Code: 22MCA12 Theory/Week: 4 Hours Credits: 4	.NET FRAMEWORK AND C#	Hours: 40 IA: 50 Exam: 50
Course Objectives: <ul style="list-style-type: none"> To demonstrate students to gain the skills to exploit the capabilities of C# and of the .NET Framework. To develop programs useful for a broad range of console and desktop applications. 		
Course Outcomes: After the completion of the course, students will be able CO1: Analyze the use of .Net Framework Components depending on the problem statement. CO2: Apply delegates, event and exception handling to .Net Applications. CO3: Implement & develop a Console based application.		
UNIT – I : 8hrs		
Introduction to application, Types of Application Architectures, Evolution of .NET and .NET Framework, Introduction to .NET Framework, .NET suit, .NET products, .NET services, and the .NET Framework, advantages of .NET framework, Components of the .NET Framework, .NET Framework Class Library (FCL) and Common Language Runtime (CLR), Framework Class Library (FCL), Common Language Runtime, Compilation and execution of a .NET application, Visual Studio .NET, Creating a Project in Visual Studio .NET, User Interface Elements of Visual Studio .NET IDE Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
Introduction to C#, Features of C#, Simple C# program, Executing the program, Console application using AppWizard, Namespaces, Comments, Using aliases for namespace, classes, Passing string objects to WriteLine method, Command Line arguments, Main with a Class, Providing interactive input, Program structure, Literals and Variables, Data Types, Manipulating Strings, mutable and immutable strings, String methods, Array of strings, Regular Expressions, Handling Arrays, Single-dimensional arrays, Creation of Arrays, Initialization of arrays, Multi-dimensional arrays, Variable-size arrays, ArrayList class Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material Laboratory Exercise		
UNIT – III: 8hrs		
Methods in C#, Method parameters, Pass by value, Pass by reference, Output parameters, Variable argument lists, Method overloading, Classes and Objects, Defining a class, Adding variables, Adding methods, Member class modifiers, Creating objects, Accessing class members, Constructors, Overloaded constructors, Private constructors, Copy constructors, Destructors, Static data members, static member function, Static constructors, this reference, Constant members, Read-only members, Properties, Indexers Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures		

UNIT – IV: 8hrs Introduction to Inheritance, Classical form of inheritance, Containment inheritance Polymorphism, Types of Inheritance, Defining a subclass, Visibility Control, Defining subclass constructors, Overriding Methods, Hiding methods, Abstract classes, Abstract Methods, Sealed classes, sealed methods, Introduction to Interfaces, Defining an interface, extending an interface, Implementing Interfaces, Explicit Interface Implementation Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise
UNIT – V: 8hrs Implementing polymorphism in C#, Managing Errors and Exceptions, types of errors, Exception, Syntax of exception handling, multiple catch statements, Exception hierarchy, General catch handler, Using finally statement, nested try blocks, throwing our own exceptions, Introduction to Delegates, Declaring Delegates, Instantiating Delegates, Using Delegates, Types of Delegates, Multicast Delegates, Introduction to Events, Using Delegates and events, Defining an event, Notifying subscribed objects, Subscribing to an events. Teaching Methodology: Chalk and Board Power Point presentation Video Lectures Laboratory Exercise

Reference Books:

1. .NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiely-Dream Tech Press.
2. Paul Deitel and Harvey Deitel: C# 2010 for Programmers, 4th Edition, Pearson Education.
3. Andrew Trolsen: Pro C# 5.0 and the .NET 4.5 Framework, 6th Edition, Wiely-Appress.
4. Hebert Shildt: Programming in C# 4.0, Tata McGraw Hill.
5. Net, S., Sempere, R., Delmont, A., Paluselli, A., & Ouddane, B. (2015). Occurrence, fate, behavior and ecotoxicological state of phthalates in different environmental matrices. *Environmental Science & Technology*, 49(7), 4019-4035.

Paper Code: 22MCA13 Theory/Week: 4 Hours Credits: 4	WEB FRAMEWORKS	Hours: 40 IA : 50 Exam: 50
Course Objectives: <ul style="list-style-type: none"> To practice mark-up and embedded dynamic scripting on client-side Internet Programming and to learn how to work different frameworks for website application and explore the basic syntax and semantics of different frameworks. It enables the learner to become a Web Designer. 		
Course Outcomes: After the completion of the course, students will be able CO1: Demonstrate the development of XHTML documents using JavaScript and CSS. CO2: Illustrate the use of React JS. CO3: Design and implement user interactive dynamic web based applications.		
UNIT – I : 8hrs		
JavaScript Introduction: JavaScript History, JavaScript Features, JavaScript Applications, JavaScript Data Types, JavaScript Variables, JavaScript Output statements, JavaScript Operators, JS syntax, JS comments, JavaScript Types Are Dynamic, JavaScript Strings, JavaScript Numbers, JavaScript Booleans, Null, Undefined Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
JavaScript control statements, conditional statements, looping statements. JavaScript Functions, JavaScript Scopes, JavaScript Arrays, Why Using an Array? Creating an Array, Using the JavaScript Keyword new, Accessing Array Elements, changing an Array Element, Access the Full Array, Arrays are Objects, Array Elements Can Be Objects, Array Properties and Methods, the length Property, Accessing the First Array Element, Accessing the Last Array Element, Looping Array Elements, Adding Array Elements, Associative Arrays the Difference Between Arrays and Objects, when to Use Arrays. When to use Objects. JavaScript new Array (), JavaScript Array Methods, Popping and Pushing, JavaScript Array shift (), JavaScript Array unshift (), JavaScript Array delete (), Splicing and Slicing Arrays. JavaScript Objects Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material Laboratory Exercise		
UNIT – III: 8hrs		
Introduction to Forms, referencing forms, Submitting the form Login Form, Signup Form, JavaScript Form Validation, JavaScript Can Validate Numeric Input, Automatic HTML Form Validation, Data Validation, HTML Constraint Validation, Constraint Validation HTML Input Attributes, Constraint Validation CSS Pseudo Selectors, JavaScript DOM, JavaScript Events, JavaScript OOPs Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures		
UNIT – IV: 8hrs		

React JS Introduction, React History, React JS Features, React JS Pros and Cons, what is React? Why React? React version history, React 16 vs React 15, Just React – Hello World, Using create-react-app, Anatomy of react project, Running the app, Debugging first react app React JSX, React Components, react state and props, React Constructor

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

Video Lectures

Laboratory Exercise

UNIT – V: 8hrs

React event handling: Understanding React event system, Understanding Synthetic event, passing arguments to event handlers, React Forms, React List, React Tables, React CSS, React Animation, React Flux and MVC, React Redux

Teaching Methodology:

Chalk and Board

Power Point presentation

Video Lectures

Laboratory Exercise

Reference Books:

1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education, 2012.
2. M. Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012.
3. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
4. <http://www.w3schools.com>
5. <http://www.tutorialspoint.com>
6. <http://www.javaoint.com>

Paper Code: 22MCA141 Theory/Week: 4 Hours Credits: 4	DATABASE SYSTEMS	Hours: 40 IA: 50 Exam: 50
Course Objectives: <ul style="list-style-type: none"> The objective of the course is to enable students to understand and use a relational database system. Introduction to Databases. Conceptual design using ERD. Functional dependencies and Normalization. Relational Algebra are covered in detail. Students learn how to design and create a good database and use various SQL operations. 		
Course Outcomes: After the completion of the course, students will be able CO1: Apply the basic concepts of database management in designing the database for the given problem. CO2: Formulate and execute SQL queries to the given problem. CO3: Apply normalization techniques to improve the database design to the given problem.		
UNIT – I: 8hrs		
Data Modelling: Introduction to database and DBMS, File Systems versus a DBMS, Advantages of a DBMS, Conceptual Data Modelling Using the ER Model and EER Model, Relational Data Model and Relational Database Constraints, Relational Database Design by ER- and EER-to-Relational Mapping, introduction to object relational databases.		
Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
Database Design: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General definitions of Second and Third Normal Forms, Boyce Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.		
Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material Laboratory Exercise		
UNIT – III: 8hrs		
Introduction to Oracle9i, Oracle9i Application Server, Oracle9i Database, Communicating with a RDBMS Using SQL, Relational Database Management System, SQL statements, Writing Basic SQL SELECT Statements, Capabilities of SQL SELECT Statements, Basic SELECT Statement, Selecting All Columns and Specific Columns, Column Heading Defaults, Arithmetic Expressions, Defining a Column Alias, Concatenation Operator, Literal Character Strings, Eliminating Duplicate Rows, Displaying Table Structure, Restricting and Sorting Data, Single-Row Functions – character, number, date, conversion, general		
Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures		

UNIT – IV: 8hrs
<p>Displaying Data from Multiple Tables, Cartesian Products, different types of Joins, Aggregating Data Using Group Functions, Types of Group Functions, Subqueries, different types of subqueries, Manipulating Data - insert, update, delete, merge, Creating and Managing Tables, Including Constraints, Creating Views</p> <p>Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise</p>
UNIT – V: 8hrs
<p>Other Database Objects – Sequence, index, synonyms, Controlling User Access – Privileges, Role, Enhancements to the GROUP BY Clause - GROUP BY with ROLLUP and CUBE operators, Hierarchical Retrieval, Oracle9i Extensions to DML and DDL Statements</p> <p>Teaching Methodology: Chalk and Board Power Point presentation Video Lectures Laboratory Exercise</p>

Reference Books:

1. Güting, R. H. (1994). An introduction to spatial database systems. *the VLDB Journal*, 3(4), 357-399.
2. Paton, N. W., & Diaz, O. (1999). Active database systems. *ACM Computing Surveys (CSUR)*, 31(1), 63-103.
3. Coronel, C., & Morris, S. (2016). *Database systems: design, implementation, & management*. Cengage Learning.
4. Elmasri, R., Navathe, S. B., Elmasri, R., & Navathe, S. B. (2000). *Fundamentals of Database Systems*. Addison-Wesley/publisher.
5. Garcia-Molina, H. (2008). *Database systems: the complete book*. Pearson Education India.

Paper Code: 22MCA151 Theory/Week: 4 Hours Credits: 4	STATISTICAL FOUNDATION FOR DATA SCIENCE	Hours: 40 IA : 50 Exam: 50
Course Objectives: <ul style="list-style-type: none"> In this course, students gain the skills to exploit the capabilities of Statistics and application of statistics for data science. 		
Course Outcomes: After the completion of the course, students will be able CO1: Students will demonstrate proficiency with statistical analysis of data CO2: Students will develop the ability to build and assess data-based models.		
UNIT – I : 8hrs		
Introduction to Statistics, Population vs sample, Types of data and levels of measurement, Categorical variables, Visualization techniques for categorical variables, Numerical variables. Frequency distribution table, histogram charts, Cross table and scatter plot, Mean, median, mode, Skewness, Variance, standard deviation, and coefficient of variation, Covariance, Correlation coefficient, Practical Example - Descriptive Statistics Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
Introduction, what is a distribution, Normal Distribution, Standard Normal Distribution, Central limit theorem, Standard error, Estimators and estimates Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material		
UNIT – III: 8hrs		
Definition of confidence intervals, calculating confidence intervals within a population with a known variance, z-score, Confidence Interval Clarifications, Student's T Distribution, Calculating confidence intervals within a population with an unknown variance, t-score, Margin of error, calculating confidence intervals for two means with independent samples, calculating confidence intervals for two means with dependent samples, Practical Example - Confidence Intervals Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures		
UNIT – IV: 8hrs		
Introduction, Null vs Alternative, Establishing a rejection region and significance level, Type I error vs type II error, Test for the mean, Population variance known, p-value, Test for the mean, Population variance unknown, Test for the mean. Dependent samples, Test for the mean. Independent samples, Practical Example - Hypothesis Testing Teaching Methodology:		

Chalk and Board Power Point presentation Activity based Teaching Video Lectures
UNIT – V: 8hrs The fundamentals of regression analysis, Correlation and causation, linear regression model, What is the difference between correlation and regression, A geometrical representation of the linear regression model, Subtleties of regression analysis, What is Rsquared and how does it help us, The ordinary least squares setting and its practical applications, Studying regression tables, The multiple linear regression model, Adjusted R-squared, What does the F-statistic show us and why we need to understand it, Assumptions for linear regression analysis - Linearity, No endogeneity, Normality and homoscedasticity, No autocorrelation, No multicollinearity Teaching Methodology: Chalk and Board Power Point presentation Video Lectures

Reference Books:

1. Banker, R. D. (1993). Maximum likelihood, consistency and data envelopment analysis: a statistical foundation. *Management science*, 39(10), 1265-1273.
2. Crane, H. (2018). *Probabilistic foundations of statistical network analysis*. Chapman and Hall/CRC.
3. Blum, A., Hopcroft, J., & Kannan, R. (2016). Foundations of data science. *Vorabversion eines Lehrbuchs*, 5(5).
4. Cielen, D., & Meysman, A. (2016). *Introducing data science: big data, machine learning, and more, using Python tools*. Simon and Schuster.
5. Peyré, G., & Cuturi, M. (2019). Computational optimal transport: With applications to data science. *Foundations and Trends® in Machine Learning*, 11(5-6), 355-607.

Paper Code: 22MCA191 Theory/Week:1 Hours Credits: 1	PROFESSIONAL COMMUNICATION AND ETHICS	Hours: 20 IA : 50
Course Objectives: <ul style="list-style-type: none"> • The primary aim of this paper is to introduce the learner on to the requisites of interpersonal interactional capabilities. • The subject deeply imparts various discourses involving presentations and team work. It also prepares the learner towards the approach of self-analysing oneself in communication. The subject also educates the delicate logic of etiquettes for the learners as well as speaks about various interaction methodologies. • At the end of study, students will gain confidence to carry or present themselves in the competitive atmosphere. 		
Course Outcomes: After the completion of the course, students will be able CO1: Cultivates the art of speaking fluently by making use of proper gestures, tone and voice modulation, adding humour to the speech. CO2: Enable the students to be aware of self-knowledge by exposure to soft skills, values, behaviour, attitudes, temperamental changes, and a positive attitude to life		
UNIT – I : 8hrs		
Communication Process, Role of Communication in Business, Process of Human Communication, Verbal and Non-Verbal Communication, Observation Skills, Listening Process, Reading Process, Speaking and Conversational Process, Rumours and Grapevine Communication, Focus and Concentration Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching		
UNIT – II: 8hrs		
Business Etiquettes and Conversational Skills in Effective Writing, Viewpoints, positive language, and courtesy in Effective Writing, Basics of Report Writing, Factors Involved and Gathering Information, Organizing Information and Finally Writing Report, Block and Indented Forms of Business Letter, E-Mail Writing, Process of Job Application and Registration, Cover Letters and CV / Resume, Facing Interviews Teaching Methodology: Chalk and Board Power Point presentation Self-Study Material Laboratory Exercise		
UNIT – III: 8hrs		
Introduction to Group Communication Skills, Team Communications and Group Discussions, Introduction to Presentation Skills, Presentation Strategies, Purpose, Analysing Audience and Place, Content Organization and Using Audio-Visual Aids, Understanding Presentation Delivery, Introduction to Body-Language and Etiquettes, Professional Inter-personal Relationships, Time Management, Meeting Skills (Face to Face and Group), Critical Thinking and Problem Solving, Conflict Resolutions & Negotiations, Deal-Making and Bargaining Skills. Teaching Methodology: Chalk and Board		

Power Point presentation Activity based Teaching Video Lectures
UNIT – IV: 8hrs
Attitude, Art of posing questions, Art of submitting answers, People Networking and Collaborations, Cultural Diversity, Feedback, Opinion and Reply Skills, Extempore, Goal Setting, Career Planning, Aptitude, Self-Awareness, People Networking and Collaborations, Goal Setting and Career Planning. Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise
UNIT – V: 8hrs
Overview of Professional Ethics and Values, Professional Ethics in the Business World, Ethics in IT and ITES, Ethics for IT Professionals, Ethics for IT Users, Meaning of Ethical Behaviour and Morals, Ethical Behaviour in Business World, Ethical Behaviour in IT and ITES, Ethical Behaviour for IT Professionals, Ethical Behaviour for IT Users Teaching Methodology: Chalk and Board Power Point presentation Video Lectures Laboratory Exercise

Reference Books

1. Meenakshi Raman and Sangeeta Sharma: Technical Communication-Principles and Practices, Oxford University Press, 2004.
2. George Reynolds: Ethics in Information Technology, 2nd Edition, Thomson Course Technology, 2007.
3. Lesikar and Flatley : Communication-Basic Business Communication Skills for Empowering the Internet Generation 9th Edition, Tata McGraw-Hill Edition, 2002.
4. Harold Koontz and Heinz Weihrich: Management-Essentials of Management, 9th Edition, McGraw-Hill International Edition, 2012.
5. Arnett, R. C., Fritz, J. M. H., & Bell, L. M. (2009). *Communication Ethics: Literacy Dialogue and Difference*. Sage Publications.