Parle Tilak Vidyalaya Association's

MULND COLLEGE OF COMMERCE (AUTONOMOUS)

|| आ नो भद्राः क्रतवो यन्तु विश्वतः ||

Syllabus for S.Y. B.Sc.(C.A)

Programme: B.Sc.(Computer Applications)

Code:

BASED ON LEARNING OUTCOME CURRICULUM FRAMEWORK (LOCF) and NEP

Semester IV

with effect from the academic year

2024 – 2025

Semester – IV			
Course Code	**Course Type**	**Course Title**	**Credits**
MCCSCT205	Major	Java and Spring Framework	4
MCCSCT208	Major	PHP	4
MCCSCT222	Major	Software Testing Tools	4
MCCSCT218	Minor	TCP/IP Protocol & Vulnerabilities	4
MCCSB114	GE/OE	E-commerce & Digital Marketing	2
MCCSCT219		Management Information Systems	
MCCBAF221		IT Returns Filing	
MCCSCT225	SEC	Fullstack Vue	2
MCCSCT224		NODE with express JS	
MCCLANG206	AEC	Vyavaharik Hindi Lekhan, Batcheet aur Prastuti	2
MCCLANG205		Vyavaharik va Upayojik Marathi Lekhan, Sambhashan va Sadarikaran	
MCCLANG207		Sanskrit Proficiency Course	
		Total Credits	**22**

GE / OE: General Elective / Open Elective

AEC: Ability Enhancement Course

SEC: Skill Enhancement Course

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MCCSCT220 Embedded Systems .....**Error! Bookmark not defined.**

MCCSCT214 Design and Analysis of Algorithm.....**Error! Bookmark not defined.**

MCCMATH106 Numerical Methods.....**Error! Bookmark not defined.**

MCCBAF222 Advanced Tally .....**Error! Bookmark not defined.**

MCCFM110 Personal Finance Management.....**Error! Bookmark not defined.**

MCCSCT221 Linux Operating System.....**Error! Bookmark not defined.**

MCCLANG203 Hindi Lekhan Kaushal .....**Error! Bookmark not defined.**

MCCLANG202 Marathi Lekhan Kaushalya .....**Error! Bookmark not defined.**

MCCLANG204 Sanskrit Parichayah .....**Error! Bookmark not defined.**

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SEMESTER IV

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MCCSCT205 Java and Spring Framework

B.Sc. (Computer Applications)		**Semester – IV**		
Course Name: Java and Spring Framework		**Course Code: MCCSCT205**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**03**		
Practical per week (1 Period is 60 minutes)		**02**		
Credits		**04**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**40**	**16**
	End Semester Examination	**2**	**60**	**24**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**2**	**30**	**12**

Course Objectives:

1. Students will demonstrate proficiency in Java programming fundamentals, including class declaration, method implementation, inheritance, and interface usage.
2. Students will be able to design and develop Java applications utilizing advanced concepts such as access control, static members, nested classes, and interfaces.

3. Students will be proficient in the fundamental concepts and practical application of the Spring Framework, including dependency injection, configuration, testing, and integration.
4. Students will be able to design and develop advanced Spring applications, including aspects such as persistence, web development, integration with external systems, and REST API development.
5. Students will have an advanced understanding of Spring Framework features and integration techniques, including dynamic languages, Spring Data, messaging, and mobile development. And, Students will be proficient in utilizing Spring I/O technologies, including Spring Boot and Spring XD, to simplify application development and integration processes.

Module	Name	Lectures
1	**Object-Oriented Programming Essentials: Classes, Methods, and Advanced Concepts**	**9**
2	**Object-Oriented Programming: Inheritance, Interfaces, and Package Management**	**9**
3	**Spring Framework Fundamentals: Dependency Management, Configuration, and Testing**	**9**
4	**Advanced Spring Framework: Persistence, Web Integration, and External System Connectivity**	**9**
5	**Mastering Spring Framework: Advanced Integration, Messaging, and Spring Boot**	**9**
	Total	**45**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create		
Unit	**Details**	**Level of Knowledge Applicable as per Blooms Taxonomy**
I	**<u>Object-Oriented Programming Essentials: Classes, Methods, and Advanced Concepts</u>** **A) Introducing Classes**: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword **B) Methods and Classes:** Overloading Methods, Using Objects as Parameters**,** A Closer Look at Argument Passing**,** Returning Objects**,** Introducing Access Control**,** Understanding static**,** Introducing final, ,Introducing Nested and Inner Classes, Using Command-Line Arguments, Varargs(Variable-Length Arguments), Overloading Vararg Methods	**A) R, U, A** **B) R, U, A, CR**
II	**<u>Object-Oriented Programming: Inheritance, Interfaces, and Package Management</u>** A) **Inheritance:** Inheritance Basics, Member Access and Inheritance, Using super, Creating a Multilevel Hierarchy, Method Overriding, Dynamic	**A) R, U, A,CR**

	Method Dispatch, Using Abstract Classes, Using final with Inheritance, B) **Packages and Interfaces:** Packages, Packages and Member Access, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface, Private Interface Methods.	**B) R, U, A,AN,CR**
III	**Spring Framework Fundamentals: Dependency Management, Configuration, and Testing** **A)Spring Framework Basics:** Working with Classes and Dependencies, Applying Different Configurations, Using Beans Scopes, Working with Collections and Custom Types, Using Resource Files, Testing Your Spring Application.	**A) R, U, A**
IV	**Advanced Spring Framework: Persistence, Web Integration, and External System Connectivity** **A) Spring Framework:** Give Advice to Your Spring Application, Adding Persistence to Your Spring Application, Showing Your Spring Application on the Web. Integrating Your Spring Application with External Systems, Exposing a REST API, Adding E-mail and Scheduling Tasks.	**A) R, U, A, CR**
V	**Mastering Spring Framework: Advanced Integration, Messaging, and Spring Boot** **A) Advanced Spring Framework:** Using Dynamic Languages, Spring Data Within Your Spring Application, Messaging with Your Spring Application, Be Social and Go Mobile **B)Spring I/O:** Spring and Groovy, Spring Boot, Simplifying Everything, Your First Spring XD Application.	**A) R, U, EV,A** **B) R, U, A, CR**

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	**Java Fundamentals:** a. Create a Java class named Student with attributes name and age. Implement a constructor to initialize these attributes and a method displayInfo() to print the details. b. Demonstrate the use of the this keyword in a Java class.	CR, U, AN
2.	**Method Overloading and Argument Passing:** a. Create a Java class Calculator with overloaded methods for addition, one that takes two integers and another that	CR, U, AN

	takes two doubles. Test these methods with different arguments. b. Write a Java method modifyString(String str) that appends "Hello" to the provided string. Test this method by passing a string argument and observe the changes.	
3.	**Inheritance**: a. Define a base class Shape with a method calculateArea(). Create derived classes Circle and Rectangle inheriting from Shape and override calculateArea() to compute area for each shape. b. Implement dynamic method dispatch by creating a base class Animal with a method makeSound(), and derived classes Dog and Cat. Demonstrate calling makeSound() on objects of type Animal.	CR, U, AN
4.	**Packages and Interfaces:** a. Create a package named com.example.geometry and move the Shape class from the previous question into this package. Demonstrate importing and using this package in another class. b. Define an interface Drawable with a method draw(). Implement this interface in classes Circle and Rectangle, each providing its own implementation of draw().	CR, U
5.	**Java Nested and Inner Classes:** a. Create an outer class Outer and define an inner class Inner within it. Demonstrate accessing members of the inner class from the outer class. b. Implement a nested class LinkedList that represents a linked list data structure. Include methods to add elements, remove elements, and display the contents of the list.	CR, U
6.	**Spring Framework External Integration:** a. Integrate a Spring application with a third-party payment gateway API (e.g., PayPal or Stripe) to process payments for a fictional e-commerce platform. b. Develop a Spring application that consumes data from a public REST API (e.g., weather data or news headlines) and displays relevant information to the user.	CR, U, AN, EV
7.	**Spring Framework Basics:** a. Configure a Spring bean Car with properties make and model. Inject dependencies using XML configuration and demonstrate accessing this bean in a Spring application. b. Write a JUnit test to verify the functionality of a Spring bean Calculator that performs addition of two numbers.	CR, U, AN
8.	**Persistence and Web Integration with Spring:**	CR, U, AN, EV

	a. Create a Spring application with Hibernate integration for managing a database of Employee objects. Implement CRUD operations (Create, Read, Update, Delete) for the Employee entity. b. Develop a Spring MVC application to expose a RESTful API for managing student records, including endpoints for CRUD operations.	
9.	**Advanced Spring Framework:** a. Implement messaging functionality using Spring Integration to send and receive messages between components of a Spring application. b. Integrate Spring Data with MongoDB to perform CRUD operations on a collection of documents representing products.	CR, U, AN, EV
10.	**Spring I/O:** a. Develop a Spring Boot application that exposes REST endpoints for a bookstore, allowing users to perform operations like adding a book, retrieving book details, and updating book information. b. Create a Spring XD application that consumes data from a Kafka topic and stores it in a Redis cache.	CR, U, AN, EV

Learning Outcome:

1. Students will have a comprehensive understanding of Java fundamentals, including classes, methods, inheritance, packages, and interfaces. And, Students will be proficient in utilizing advanced Java features such as access control, static methods, final keyword, and nested classes for effective application development.
2. Students will have a comprehensive understanding of the core concepts and features of the Spring Framework, including dependency injection, configuration management, bean scopes, testing strategies, and application deployment.
3. Students will be proficient in leveraging advanced features of the Spring Framework for building robust and scalable enterprise applications, such as persistence integration, web application development, integration with external systems, RESTful API creation, and email and task scheduling.
4. Students will have an advanced understanding of leveraging advanced Spring Framework features and integrations to enhance the functionality and scalability of their applications.
5. Students will be proficient in utilizing Spring I/O technologies for simplifying application development, integrating dynamic languages, Spring Boot, and Spring XD for building efficient and modern applications.

Books and References:

1. Gutierrez, F. (n.d.). Introducing Spring Framework. Apress.
2. Schildt, H. (2019). Java: The Complete Reference (11th ed.). McGraw-Hill Education.
3. Ramgir, M. (2020). Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap (4th ed.). Wiley.
4. Ullenboom, C. (2023). Spring Boot 3 and Spring Framework 6. SAP Press.

5. Agarwal, S., & Gupta, V. (2022). Java for Web Development: Create Full-Stack Java Applications with Servlets, JSP Pages, MVC Pattern, and Database Connectivity. BPB Publications.
6. Sarin, A. (2018). Getting Started with Spring Framework: Covers Spring 5. Independently published.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	**20**	**20**	**20**	**10**	**10**	**20**	**100%**

MCCSCT208 PHP

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: PHP		**Course Code: MCCSCT208**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**03**		
Practical per week (1 Period is 60 minutes)		**02**		
Credits		**04**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**40**	**16**
	End Semester Examination	**2**	**60**	**24**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**2**	**30**	**12**

Course Objectives

1. Students will possess a solid understanding of the core concepts of PHP, including its history, syntax, data types, variables, expressions, operators, and flow-control statements.
2. Students will be proficient in utilizing PHP functions, strings, and arrays to manipulate data and develop dynamic web applications.
3. Students will have a comprehensive understanding of object-oriented programming (OOP) principles in PHP, including object creation, class declaration, and accessing properties and methods.
4. Students will be proficient in utilizing PHP for handling dates and times effectively and implementing web techniques such as HTTP basics, form processing, and SSL.
5. Students will have a comprehensive understanding of using PHP to interact with databases, including relational databases, SQL, and database interfaces such as MySQLi and SQLite and Students will be proficient in utilizing PHP for graphics manipulation, XML processing, and implementing security measures and web services.

Module	Name	Lectures
I	**Introduction to PHP & Functions, Strings**	**9**
II	**Arrays**	**9**

III	**Objects & Dates and Times**	**9**
IV	**Web Techniques & Databases**	**9**
V	**Graphics, XML& Security, Web Services**	**9**
	Total	**45**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**A)Introduction to PHP:** What Does PHP Do, A Brief History of PHP, Lexical Structure, Data Types, Variables, Expressions and Operators, Flow-Control Statements, **B)Functions, Strings:** Calling a Function, Defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions, Quoting String Constants, Printing Strings, Accessing Individual Characters, Cleaning Strings, Encoding and Escaping, Comparing Strings, Manipulating and Searching Strings, Regular Expressions	**A) U, A** **B) U, A , AN**
II	**A) Arrays:** Indexed Versus Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, Extracting Multiple Values, Converting Between Arrays and Variables, Traversing Arrays, Sorting, Acting on Entire Arrays, Using Arrays to Implement Data Types	**A) U, A**
III	**A)Objects:** Terminology, Creating an Object, Accessing Properties and Methods, Declaring a Class, Anonymous Classes **B)Dates and Times:**	**A) U, A, AN** **B) U, A, AN**
IV	**A)Web Techniques:** HTTP Basics, Variables, Server Information, Processing Forms, Setting Response Headers, Maintaining State, SSL **B)Databases:** Using PHP to Access a Database, Relational Databases and SQL, MySQLi Object Interface, SQLite	**A) U, A, EV** **B) U, A, EV**
V	**A)Graphics, XML:** Embedding an Image in a Page, Basic Graphics Concepts, Creating and Drawing Images, Images with Text, Dynamically Generated Buttons, Scaling Images, Color Handling, Lightning Guide to XML, Generating XML, Parsing XML, Parsing XML with the DOM, Parsing XML with SimpleXML, Transforming XML with XSLT **B)Security, Web Services:** Safeguards, Security Vulnerabilities, REST Clients, XML-RPC	**A) U, A, AN** **B)U, A**

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	Create a simple HTML form and accept the user name and display the name through PHP echostatement	A
2.	Write a program to check whether the given number is prime or not. Write a program to check given number is odd or even. Write a program to find the greatest number in three given numbers.	A, AN
3.	-Print the numbers 1 - 10 in reverse order. -Create a script that displays 1-2-3-4-5-6-7-8-9-10 on one line. There will be no hyphen(-)at starting and ending position -Write a PHP program to generate and display the first n lines of a Floyd triangle. Sample output for n = 5 : 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	A, EV
4.	Accept any number from 1 - 10 and print the numbers from 1 - 10 other than the user given number. (using 'continue') Write a program to fetch the two values and perform the arithmetic action based on user selection (define arithmetic actions in combo/select box).	A, AN
5.	Write a program to print the multiplication table of the number entered by the user. Write a program to check whether the given number is Armstrong or not.	A, AN
6.	Write a Program to display fruit names & that values within a table	A, EV

	Write a program to find out the sum of the array.	
7.	Write a program to multiply a user given number with the given matrix.16. Write a program to check whether the given string is a palindrome or not.(Eg: Malayalam)	A, EV
8.	Write a program to multiply a user given number with the given matrix.16. Write a program to check whether the given string is a palindrome or not. (Eg: Malayalam)	A
9.	Write the program to get the registration page information in html and show that information using PHP.	A
10.	Write a program to get the username & password from user. If the given username is “admin” and password is “godsgift” show the welcome message otherwise show the error and redirect to login page	A

Learning Outcome:

1. Students will demonstrate an understanding of PHP's lexical structure, data types, variables, expressions, and flow-control statements.
2. Students will analyze and evaluate various techniques for working with strings and arrays in PHP, including manipulation, searching, sorting, and implementing data structures.
3. Students will demonstrate an understanding of creating objects, declaring classes, and working with properties and methods in PHP.
4. Students will analyze and evaluate various web techniques in PHP, including HTTP basics, form processing, and SSL, to develop secure and efficient web applications.
5. Students will recall and explain the concepts of relational databases and SQL and Students will apply their knowledge of PHP to manipulate graphics, including embedding images, drawing images, and generating dynamically generated buttons.

Books and References:

1. Tatroe, K., & MacIntyre, P. (2014). Programming PHP: Creating Dynamic Web Pages (4th ed.). SHROFF PUBLISHERS & DISTRIBUTORS PVT. LTD.
2. Schlossnagle, G. (2004). Advanced PHP Programming (1st ed.). Sams Publishing.
3. Reiersol, D., Shiflett, C., & Baker, M. (2007). PHP in Action: Objects, Design, Agility (1st ed.). Manning Publications.
4. Crockford, D. (2008). JavaScript: The Good Parts (1st ed.). O'Reilly Media.
5. Herman, D. (2012). Effective JavaScript: 68 Specific Ways to Harness the Power of JavaScript (1st ed.). Addison-Wesley.
6. Stewart, A. (2020). Python Programming: A Beginner's Guide to Learn Python in 7 Days. Independently published.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	**20**	**20**	**20**	**10**	**10**	**20**	**100%**

MCCSCT222 Software Testing Tools

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: Software Testing Tools		**Course Code: MCCSCT222**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**03**		
Practical per week (1 Period is 60 minutes)		**02**		
Credits		**04**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**40**	**16**
	End Semester Examination	**2**	**60**	**24**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**2**	**30**	**12**

Objectives of the Course:

1. Understand the fundamentals of software testing, including manual and automated testing, frameworks, and evaluation processes.
2. Gain practical experience in web and manual testing using industry-standard tools for test management and bug tracking.
3. Learn Agile testing methodologies, including SCRUM, Test-Driven Development (TDD), and Behavior-Driven Development (BDD) using Cucumber and Cypress.
4. Explore Agile development with open-source automation frameworks such as JUnit, NUnit, and TestNG.
5. Develop expertise in performance and SOA testing using JMeter and SOAPUI, ensuring software reliability and efficiency.

Module	Name	Lectures
I	**Foundations of Software Testing**	**09**
II	**Comprehensive Web and Manual Testing: Tools, Techniques, and Management**	**09**
III	**Agile and Behavior-Driven Development: Methodologies and Tools**	**09**

IV	**Agile Development and Open-Source Automation Frameworks: TDD and TestNG**	**09**
V	**Performance and SOA Testing - Approaches, Tools, and Best Practices**	**09**
	Total	**45**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR – Create

Module /Unit	Syllabus As per SSC framework of NEP	Level of Knowledge Applicable as per Blooms Taxonomy
I	**Foundations of Software Testing:** **A) Fundamentals of Testing:** Introduction on testing, what is manual testing, what is Automation, Benefits of Automation, Automation Frameworks and types of frameworks, Steps followed for framework selection, Test artifacts, Evaluation Process.	**A) U, EV, AN, CR, A**
II	**Comprehensive Web and Manual Testing: Tools, Techniques, and Management:** **A) Web Testing using Selenium IDE Tool:** Selenium IDE, Selenium RC Tools, Creating JUnit test using the Eclipse, Web Testing using WebDriver tool, Automation using Auto IT Tool. **B) Manual Testing, Test Management & Bug Tracking:** Manual Testing Concepts: Introduction, Objective & Tasks, Testing Strategy, Environment Requirement, Test Schedule, control procedure, features to be and not to be tested, role & Responsibilities, significantly impacted Department (SIDs), Assumptions, Tools, Approvals, bug tracking using Bugzilla tools and TestRail.	**A) U, AN, CR, A** **B) U, AN, A, EV**
III	**Agile and Behavior-Driven Development: Methodologies and Tools:** **A) Agile Testing:** What is Agile, what is SCRUM, characteristics of SCRUM project, SCRUM Role, Sprint, Extreme Programming (XP), Test Driven Development (TDD), TDD Sages, Pairwise Testing. **B) Behavior Driven Development (BDD) Tools:** Introduction of BDD, what is Cucumber, BDD using cucumber tool, Cypress tool.	**A) U, A, AN** **B) U, A, AN**
IV	**Agile Development and Open-Source Automation Frameworks: TDD and TestNG:** **A) Agile Development:** Test-driven Development using JUnit: What is JUNIT, creating Junit TestSuite, Test-	**A) U, A, EV**

	driver Development using NUnit: TDD Benefits, introducing XUnit, what is NUnit. **B) Open-Source Automation Framework:** TestNG Automation Framework: What is TestNG, TestNG Features.	**B) U, A**
V	**<u>Performance and SOA Testing - Approaches, Tools, and Best Practices:</u>** **A) Performance Testing Approach:** Why performance Testing Needed, performance issues before rolling out to production, Types of performance Testing, Performance Testing using JMeter tool **B) SOA Testing:** Evolution of Software Architecture, what is SOA, Benefits SOA, SOA Components, SOA Testing Life Cycle, SOA Testing using SOAPUI tool	**A) U, AN, A** **B) U, EV, A, AN**

Software Testing Tools - Practical		
List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	**Selenium IDE:** a. Install Selenium IDE in your browser of choice. b. Record a simple test scenario such as logging into the web application. c. Add assertions to verify elements on the page. d. Export the test case to a programming language of your choice (e.g., Java).	**A, AN**
2.	**Selenium RC Tools:** a. Install Selenium RC and set up a test environment. b. Write a test script using Selenium RC to automate a registration form on the web application. c. Execute the test script and verify the results.	**A, EV**
3.	**Creating JUnit Tests using Eclipse:** a. Set up a Java project in Eclipse for automation testing. b. Write a JUnit test case to verify the search functionality of the web application. c. Run the JUnit test case and analyze the test results.	**A, EV**
4.	**Web Testing using WebDriver Tool:** a. Set up WebDriver in your preferred programming language (e.g., Java). b. Write a WebDriver test script to automate the checkout process of the web application. c. Implement synchronization techniques to handle dynamic elements on the page.	**A, EV**

	d. Execute the WebDriver test script and capture screenshots for each step.	
5.	**Automation using AutoIT Tool:** a. Install AutoIT and familiarize yourself with its scripting language. b. Write an AutoIT script to automate a file upload process on the web application. c. Integrate the AutoIT script with your Selenium WebDriver test script. d. Execute the combined test script and verify the file upload functionality.	**A, EV**
6.	**Setting Up TestNG Testing Framework:** Set up a TestNG testing framework in your preferred IDE (e.g., IntelliJ IDEA, Eclipse). Create a test class with multiple test methods to validate different functionalities of a sample web application. Utilize TestNG annotations such as @Test, @BeforeMethod, @AfterMethod, etc., to organize and execute your test cases effectively.	**A**
7.	**Unit Testing with Junit** Develop a Java class representing a simple calculator with methods for addition, subtraction, multiplication, and division. Write Junit test cases to verify the correctness of each operation. Utilize Junit assertions to validate expected outcomes and ensure that the calculator functions as expected under various scenarios.	**A**
8.	**Unit Testing with Nunit and Load Testing with Jmeter:**	
a.	Implement a .NET class representing a user authentication system with methods for login and logout. Create Nunit test cases to validate the authentication functionality, including positive and negative test scenarios. Use Nunit's Assert methods to verify the behavior of the authentication system under different conditions.	**A**
b.	Set up a load testing environment using Apache Jmeter to assess the performance of a web application under heavy user load. Create Jmeter test plans to simulate concurrent user traffic accessing different pages of the application. Analyze Jmeter test results to identify performance bottlenecks and optimize system performance.	**A, AN**
9.	**Behavior-Driven Development (BDD) with Cucumber/Cypress:** Implement behavior-driven development (BDD) practices using Cucumber to define and execute acceptance tests for a web application. Write feature files in Gherkin syntax to describe various application features and scenarios. Develop step	**A**

	definitions in your preferred programming language to automate the execution of Cucumber scenarios.	
10.	**API Testing with SoapUI/POSTMAN:** Use SoapUI to perform functional and performance testing of a RESTful web service. Create SoapUI test suites to validate different API endpoints and verify the correctness of request and response payloads. Configure SoapUI load tests to simulate concurrent user interactions and measure the service's scalability and responsiveness.	**A, AN**

Learning Outcomes: After completion of Course, the learners will be able to:

1. Apply fundamental software testing concepts, including manual and automated testing, to ensure software quality.
2. Conduct web and manual testing using tools like Selenium, AutoIT, Bugzilla, and TestRail for effective test management.
3. Implement Agile testing methodologies such as SCRUM, TDD, and BDD using frameworks like Cucumber and Cypress.
4. Utilize open-source automation frameworks, including JUnit, NUnit, and TestNG, to enhance test automation efficiency.
5. Perform performance and SOA testing using JMeter and SOAPUI to assess system performance and service-oriented applications.

Books and References:

1. Shende, R. (2012). Testing in 30+ Open-Source Tools (2nd ed.). SHROFF PUBLISHERS & DISTRIBUTORS PVT. LTD.
2. Tripathy, P., & Naik, K. (2007). Software Testing and Quality Assurance: Theory and Practice. Wiley India.
3. Osherove, R. (2013). The Art of Unit Testing (2nd ed.). Manning Publications.
4. Jorgensen, P. C. (2017). Software Testing: A Craftsman's Approach (4th ed.). Shroff Publishers & Distributors Pvt. Ltd.
5. Ammann, P., & Offutt, J. (2016). Introduction to Software Testing (2nd ed.). Cambridge University Press.
6. Black, R., van Veenendaal, E., & Graham, D. (2012). Foundations of Software Testing: ISTQB Certification (3rd ed.). Cengage Learning.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	**20**	**30**	**10**	**20**	**10**	**10**	**100%**

MCCSCT218 TCP/IP Protocol & Vulnerabilities

B.Sc. (Computer Applications)		**Semester – IV**		
Course Name: TCP/IP Protocol & Vulnerabilities		**Course Code: MCCSCT218**		
Vertical:		**Minor**		
Periods per week (1 Period is 60 minutes)		**03**		
Practical per week (1 Period is 60 minutes)		**02**		
Credits		**04**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**40**	**16**
	End Semester Examination	**2**	**60**	**24**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**2**	**30**	**12**

Course Objectives:

1. Understand the fundamental concepts of networking, including the OSI model and the TCP/IP protocol suite, enabling learners to describe the protocol layers, differentiate between the OSI model and TCP/IP, and explain addressing schemes used in networking.
2. Develop proficiency in IPv4 addressing, including classful and classless addressing, special addresses, and Network Address Translation (NAT), allowing learners to analyze IPv4 addressing schemes, configure networks, and troubleshoot addressing-related issues effectively.
3. Understand UDP fundamentals: Introduction, services, applications, and package structure.
4. Grasp TCP essentials: Services, features, connection setup, segment structure, and control mechanisms.
5. Understand TCP/IP vulnerabilities: Identify vulnerabilities, explore security measures, and grasp IP Security Architecture (IPSec) fundamentals and Develop proficiency in addressing network threats: Recognize various attack methods such as spoofing, session hijacking, and denial-of-service attacks, and learn effective prevention and mitigation strategies.

Module	Name	Lectures
I	**Fundamentals of Networking**	**9**
II	**IPv6 Addressing and Protocol: Concepts, Configuration, and Transition from IPv4**	**9**
III	**Understanding UDP and TCP: Protocols, Services, and Features**	**9**
IV	**Securing TCP/IP Networks: Vulnerabilities, Spoofing**	**9**
V	**Session Hijacking and Denial-of-Service Attacks: Techniques, Prevention, and Mitigation**	**9**

	Total	**45**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Details	Level of Knowledge Applicable as per Blooms Taxonomy
I	**<u>Fundamentals of Networking</u>** **A) The OSI Model and the TCP/IP Protocol Suite:** Protocol Layers, The OSI Model, TCP/IP Protocol Suite , Addressing **B) IPv4 Addresses:** Introduction, Classful Addressing, Classless Addressing, Special Addresses, NAT **C) Internet Protocol Version 4 (IPv4):** Introduction, Datagrams, Fragmentation, Options, Checksum , IP Over ATM, Security, IP Package	**A) U, R, A** **B) U, R, A** **C) U,R, A, AN**
II	**<u>IPv6 Addressing and Protocol: Concepts, Configuration, and Transition from IPv4</u>** **A) IPv6 Addressing:** Introduction, Address Space allocation, Global Unicast Addresses, Autoconfiguration, Renumbering **B) IPv6 Protocol:** Introduction, Packet Format, Transition from IPv4 to IPv6	**A) U, R** **B) U, R**
III	**<u>Understanding UDP and TCP: Protocols, Services, and Features</u>** **A) User Datagram Protocol (UDP):** Introduction, User Datagram, UDP Services, UDP Applications, UDP Package **B) Transmission Control Protocol (TCP):** TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Windows In TCP, Flow Control, Error Control, Congestion Control, TCP Timers , Options, TCP Package	**A) U,R** **B) U, R A**
IV	**<u>Securing TCP/IP Networks: Vulnerabilities, Spoofing</u>** **A) Scanning Tools:** Introduction, Evolution of Scanners, How Scanner works, Types of Scanning, Review of Scanner Technology **B) TCP/IP Vulnerabilities:** Introduction to TCP/IP Vulnerabilities, Vulnerabilities in TCP/ IP, Securing TCP/IP, IP Security Architecture (IPSec) **C) Spoofing:** The process of an IP Spoofing Attack, Costs Spoofing, Types of Spoofing, Spoofing Tools, Prevention and Mitigation	**A) U, R, A, AN** **B) U, R** **C) U, R**
V	**<u>Session Hijacking and Denial-of-Service Attacks: Techniques, Prevention, and Mitigation</u>**	**A) U, R** **B) U, R**

	A) Session Hijacking: TCP Session Hijacking, Session Hijacking Tools, UDP Hijacking, Prevention and Mitigation **B) Denial-of-Service Attacks:** Causes of DoS Attacks, Types of DoS Attacks, Known DoS Attacks, Known DDoS Attacks, Prevention and Mitigation of DoS and DDoS Attacks	

TCP/IP Protocol & Vulnerabilities – Practical		
Sr. No	**Syllabus**	**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	Configure a small network environment using routers, switches, and computers, and demonstrate the transmission of data packets across different OSI layers.	U,R,A,CR,AN,EV
2.	Set up a network addressing scheme using IPv4 addressing, including both classful and classless addressing, and verify connectivity between devices.	U,R,A,CR,AN,EV
3.	Implement Network Address Translation (NAT) to allow multiple devices in a private network to share a single public IP address. Test the NAT configuration by accessing external resources from internal devices.	U,R,A,CR,AN,EV
4.	Capture and analyze IPv4 datagrams transmitted across a network using packet capture tools. Identify the source and destination addresses, as well as any IP options present in the packets.	U,R,A,CR,AN,EV
5.	Configure and test fragmentation by adjusting packet size and observing how routers handle fragmented packets. Determine the impact of fragmentation on network performance.	U,R,A,CR,AN,EV
6.	Analyze a network for potential vulnerabilities and propose security measures to mitigate risks, such as implementing IPsec or using intrusion detection systems (IDS).	U,R,A,CR,AN,EV
7.	Simulate an IP Spoofing attack and demonstrate its impact on network security. Develop countermeasures to prevent and mitigate IP Spoofing attacks.	U,R,A,CR,AN,EV
8.	Create a scenario involving a TCP session hijacking attempt and demonstrate how to detect and prevent such attacks using appropriate security measures.	U,R,A,CR,AN,EV
9.	Create a scenario for UDP hijacking within a simulated network environment.	U,R,A,CR,AN,EV
10.	Design and execute a Denial-of-Service (DoS) attack simulation against a target server or network within a controlled environment.	U,R,A,CR,AN,EV

Learning Outcome: After completion of Course, the learners will be able to:

1. Identify the layers of the OSI model and components of the TCP/IP protocol suite.
2. Recall the different types of IPv4 addresses and their characteristics.
3. Explain the purpose and services provided by the User Datagram Protocol (UDP).
4. Understand the features and functions of the Transmission Control Protocol (TCP)
5. Develop strategies to prevent and mitigate spoofing, session hijacking, and denial-of-service attacks.

Books and References:

1. Forouzan, B. A. (2017). TCP/IP Protocol Suite (4th ed.). McGraw Hill.
2. Basta, A., Basta, N., Brown, M., & Kumar, R. (2018). Cyber Security and Cyber Laws. Cengage.
3. Forouzan, B. A. (2021). Data Communications and Networking with TCP/IP Protocol Suite (6th ed.). McGraw Hill.
4. Kurose, J. F., & Ross, K. W. (2017). Computer Networking: A Top-Down Approach (7th ed.). Pearson.
5. Tanenbaum, A. S., & Wetherall, D. J. (2011). Computer Networks (5th ed.). Prentice Hall.
6. Forouzan, B. A. (2006). Data Communications and Networking (4th ed.). McGraw Hill.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	40	40	10	10	--	--	100%

MCCSB114 E-COMMERCE & DIGITAL MARKETING

B.Sc. (Computer Applications)	**Semester – IV**
Course Name: E-Commerce & Digital Marketing	**Course Code: MCCSB114**

Vertical:	**General / Open Elective**		
Periods per week (1 Period is 60 minutes)	**02**		
Practical per week (1 period is 60 minutes)	**-**		
Credits	**02**		
Evaluation System	**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Continuous Internal Assessment	**-**	**50**	**20**

Objectives of the course:

1. The course combines essential knowledge of e-commerce principles and digital marketing strategies to empower learners in the digital business landscape.
2. This course will help learners to identify the different types of e-commerce models and the concepts of electronic payment systems.
3. Learner will be able to create and manage social media marketing campaigns on platforms like Facebook, LinkedIn, Twitter, and YouTube.
4. Learner will understand the fundamentals of SEO, SEM & Google Analytics including its purpose and functionality.
5. These concepts will empower learners with the essential skills to leverage online platforms, drive business growth, and effectively reach target audiences in the digital era.

Module	Name	Lectures
I	Introduction to E-Commerce	06
II	Electronic Payment systems & Security in E-Commerce	06
III	Introduction to Digital Marketing	06
IV	Social Media Marketing & Google Analytics	06
V	Search Engine Optimization & Search Engine Marketing	06
	Total	**30**

R- Remember, U- Understand, A – Apply, AN- Analyse , EV- Evaluate, CR – Create

Module / Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**Introduction to E-Commerce** **A) Introduction to E-Commerce and E- Business:** Definition and competing in the digital economy, Impact of E-Commerce on Business Models, Factors Driving e-commerce and e-Business	A) R, U, A, AN

	Models, Economics and social impact of e-Business, opportunities and Challenges, e-Commerce vs m-Commerce, Different E-Commerce Models (B2B, B2C, C2B, C2C, B2E), e-Commerce Applications: e-Trading, e-Learning, e-Shopping, Virtual Reality & Consumer Experience, Legal and Ethical issues in e-Commerce.	
II	**Electronic Payment systems & Security in E-Commerce** **A) Overview of Electronic Payment systems:** Types of Electronic payment schemes (Credit cards, Debit cards, Smartcards, Internet banking), E-checks, E-Cash Concepts and applications of EDI and Limitation. **B) Security in E Commerce:** Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.	A) R, U B) R, U
III	**Introduction to Digital Marketing** **A) Introduction of Digital Marketing:** Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages. **B) Mobile Marketing & Content Marketing**: Introduction, Mobile Marketing Types, Mobile Marketing Features, Mobile Advertising Analytics, Types of Content, Types of Blog posts, Content Creation, Content optimization, Content creation tools and apps.	A) R, U B) R, U, AN, EV
IV	**Social Media Marketing & Google Analytics** **A) Social Media Marketing:** Meaning, Purpose, types of social media websites, Social Media Engagement, Target audience, Facebook Marketing, LinkedIn Marketing, Twitter Marketing, YouTube Marketing. **B) Google Analytics:** Basics of Google Analytics, Installing Google Analytics in website, Parameters of Google Analytics, Reporting and Analysis.	A) R, U, AN, EV, CR B) U, A, AN, EV, CR
V	**Search Engine Optimization & Search Engine Marketing** **A) Search Engine Optimization & Search Engine Marketing**: Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website, On-page and off-page optimization, Introduction to SEM, Introduction to Ad Words - Google Ad Words, Ad Ranks, Creating Ad Campaigns, Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Acquisition (CPA).	A) R, U, AN

Learning Outcomes: After completion of Course, the learners will be able to:

1. Recognize and apply various e-commerce models and their respective applications.
2. Gain a comprehensive understanding of electronic payment systems, including their concepts and various types.
3. Develop and oversee social media marketing campaigns across various popular platforms, effectively managing their online presence and engagement with the target audience.

4. Gain the ability to assess and enhance content for both mobile marketing strategies and search engine optimization.
5. Develop proficiency in generating reports and performing analysis using Google Analytics.

6. Develop proficiency in generating reports and performing analysis using Google Analytics.

Books & References:

1. Whiteley, D. (2017). *E-Commerce Strategy, Technologies and Applications* (2nd ed.)., Tata McGraw Hill
2. Gupta, S. (2017). *Digital Marketing* (2nd ed.)., McGraw Hill Education
3. Pankaj, S. (2005). *E-Commerce* (1st ed.)., A.P.H. Publication
4. Bhatia, P. (2017). *Fundamentals of Digital Marketing* (2nd ed.)., Pearson
5. Ryan, D., & Jone, C. (2008). *Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation* (4th ed.)., Kogan Page
6. Chaffey, D. (2022). *Digital Marketing: Strategy, Implementation and Practice* (8th ed.)., Pearson
7. Laudon, K. C., & Traver, C. G. (2021). *E-Commerce 2021: Business, Technology, Society* (16th ed.)., Pearson
8. Kotler, P., Kartajaya, H., & Setiawan, I. (2021). *Marketing 5.0: Technology for Humanity* (1st ed.)., Wiley
9. Kingsnorth, S. (2019). *Digital Marketing Strategy: An Integrated Approach to Online Marketing* (2nd ed.)., Kogan Page
10. Strauss, J., & Frost, R. (2016). *E-Marketing* (7th ed.)., Pearson

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyse	Evaluate	Create	
% in Question Paper	30	30	10	10	10	10	100%

MCCSCT219 Management Information Systems

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: Management Information Systems		**Course Code: MCCSCT219**		
Vertical:		**General Elective / Open Elective**		
Periods per week (1 Period is 60 minutes)		**02**		
Credits		**02**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**50**	**20**

Course Objectives:

1. To understand how information systems and innovation contribute to the strategic objectives of modern organizations.

2. To explore how management information systems and IT strategies support business competitiveness and operational efficiency.
3. To examine the governance structures, ethical considerations, and managerial responsibilities in overseeing IT within organizations.
4. To gain knowledge of information systems security and the methodologies involved in system development and project management.
5. To analyze how enterprise systems and decision support tools integrate business processes and enhance organizational decision-making.

Module	Name	Lectures
1	**The Strategic Role of Information Systems and Innovation in Modern Organizations**	**6**
2	**Leveraging Management Information Systems and IT Strategy for Competitive Advantage**	**6**
3	**Governance, Ethics, and the Evolving Role of IT Management in Organizations**	**6**
4	**Securing and Developing Information Systems: From Risk Management to Project Execution**	**6**
5	**Enterprise Integration and Intelligent Decision Support in the Digital Era**	**6**
	Total	**30**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**<u>The Strategic Role of Information Systems and Innovation in Modern Organizations</u>** **A) Organizations and Information Systems** Modern Organization, Information Systems in Organizations, Brief History of Computing, The Role of the Internet, Managing in the Internet Era, Managing Information Systems in Organizations, Challenges for the Manager, **B) IT and Innovation** Innovation Theory, Innovation Impact, Types of Business Innovations with IT, Management Issues: Challenges for Managers.	**A) R,U,AN** **B) R,U,AN**

II	**<u>Leveraging Management Information Systems and IT Strategy for Competitive Advantage</u>** **A) Concepts of Management Information Systems** Data and Information, Information as a Resource, Information in Organizational Functions, Types of Information Technology, Types of Information Systems, Decision Making with MIS, Communication in Organizations. **B) IT Strategy and Digital Goods** The Competitive Environment of Business, Using IT for Competing, Information Goods, Information Systems and Competitive Strategy,	**A) R,U,AN** **B) R,U,AN**
III	**<u>Governance, Ethics, and the Evolving Role of IT Management in Organizations</u>** **A) Managing Information Systems** Challenges of Managing the IT Function, Vendor Management, The Role of the CIO, IT Governance. **B) Ethical and Social Issues** Ethical Issues, Social Issues, Dark Side of IT	**A) R,U,AN** **B) R,U,AN**
IV	**<u>Securing and Developing Information Systems: From Risk Management to Project Execution</u>** **A) Information Systems Security and Control** Threats to the Organization, Technologies for Handling Security, Managing Security. **B) Information Systems Development and Project Management** Analysis of Business Processes, Life Cycle Models, Software Project Management	**A) R, U, AN** **B) R, U, AN**
V	**<u>Enterprise Integration and Intelligent Decision Support in the Digital Era</u>** **A) Business Process Integration and Enterprise Systems** Business Process Integration, Motivation for Enterprise Systems, Enterprise Resource Planning Systems, Supply Chain Management Systems, Customer Relationship Management Systems, Challenges of Enterprise Systems Implementations, International Information Systems. **B) Decision Support Systems** Decision Support Systems, Components of a DSS, Analytics and Business Intelligence, Knowledge Management.	**A) R, U, AN** **B) R, U, AN**

Learning Outcome: After completion of Course, the learners will be able to:

1. analyze the strategic role of information systems and innovation in modern organizations, understanding their impact on business operations and management challenges.

2. understand the core concepts of management information systems and their role in supporting decision-making, business functions, and competitive strategy.
3. analyze the governance, ethical, and social issues related to managing IT within organizations, including vendor management and the role of the CIO.
4. understand the importance of information systems security and apply techniques for managing system risks and overseeing software project development.
5. analyze how business process integration and decision support systems contribute to effective organizational decision-making and operational efficiency.

Books and References:

1. De, R. (2018). Managing Information Systems in Business, Government, and Society (2nd ed.). Wiley.
2. Murthy, C. S. V. (2019). Management Information Systems (3rd ed.). Himalaya Publishing House.
3. Bagchi, N. (2010). Management Information Systems (1st ed.). Vikas Publishing.
4. Joshi, G. (2011). Management Information Systems (1st ed.). Oxford University Press.
5. Issa, T., & Issa, T. (2023). Management Information Systems (1st ed.). SAGE Publications Ltd.
6. Kelkar, S. A. (2018). Management Information Systems: A Concise Study (2nd ed.). PHI Learning.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	35	35	-	30	-	-	100%

MCCBAF221 IT RETURN FILING

B. Sc (Computer Applications)	**Semester – IV**		
Course Name: IT Return Filing	**Course Code: MCCBAF221**		
Vertical:	**General Elective / Open Elective**		
Periods per week (1 Period is 60 minutes)	**02**		
Credits	**02**		
Evaluation System	**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Continuous Internal Assessment	**-**	**50**	**20**

Course Objectives:

1. Develop a comprehensive understanding of the fundamental concepts of income tax, including the Indian Income Tax Act, various sources of income, tax slabs, deductions, rebates, and relief provisions, enabling learners to accurately assess and compute tax liabilities for individuals and entities.
2. Equip learners with the knowledge and skills necessary for effective tax planning, including the importance of tax planning, investment options for tax savings, strategies for optimizing tax liabilities for salary and business income, and practical guidance on filing income tax returns, ensuring compliance with legal requirements while maximizing tax benefits.
3. Equip learners with a thorough understanding of taxation procedures, including scrutiny assessment, summary assessment, appeals, and revision processes under the Income Tax Act, as well as the concept, applicability, and compliance requirements of Tax Deducted at

Source (TDS), enabling them to navigate tax-related procedures effectively and ensure compliance with legal obligations.

4. Provide learners with basic knowledge of taxation principles applicable to various entities such as individuals, Hindu Undivided Families (HUFs), firms, companies, Limited Liability Partnerships (LLPs), non-residents, foreign companies, trusts, and charitable institutions, enabling them to analyze and apply taxation rules accurately in diverse scenarios and contexts.

Module	Name	Lectures
I	**Accounting in Action**	**06**
II	**The Recording Process of Accounting Transactions**	**06**
III	**Preparation of Trial Balance with Financials**	**06**
IV	**Maintenance of Records for Inventory for Merchandising Operations**	**06**
V	**Accounting Information Systems**	**06**
	Total	**30**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR – Create

Unit/Module	Syllabus As per SSC framework of NEP	Level of Knowledge Applicable as per Blooms Taxonomy
I	**Accounting in Action:** Overview of the Indian Income Tax Act, Concepts of Income, Assessee, and Assessment Year	**R, U, A**
II	**The Recording Process of Accounting Transactions:** Conditions for Resident and Non Resident Status and Determination of Taxability of Income as per the residential Status.	**R, U, AN, A,**
III	**Preparation of Trial Balance with Financials:** Basic Concepts Heads of income – Salary and House Property with Deduction U/S 80C to 80U and Practical problem solving for the same	**R, U, A, AN, EV**

IV	**Maintenance of Records for Inventory for Merchandising Operations:** Basic Concept of Business & Profession, Capital Gain and Income from other sources with Deduction U/S 80C & 80U and Practical Problem Solving for the same and Concept and Applicability of TDS, TDS Rates and Procedures, TDS Return Filing and Compliance	**R, U, A, AN, EV**
V	**Accounting Information Systems:** a) Scrutiny Assessment, Summary Assessment, Appeals and Revision under the Income Tax Act, Tax Evasion vs. Tax Avoidance, Tax Compliance: b) Importance and Consequences of Non-Compliance, Ethical Considerations in Tax Planning and Filing, Overview of Recent Amendments to the Income Tax Act, Case Studies and Practical Applications, Emerging Trends in Income Taxation C) Taxation of Individuals, HUFs, Firms, Companies, LLPs, Taxation of Non-residents and Foreign Companies, Taxation of Trusts and Charitable Institutions	**a) R, U** **b) R, U** **c) R, U, A**

<u>Learning Outcomes:</u> After completion of Course, the learners will be able to:

1. Demonstrate understanding of the fundamental concepts of income tax, including the Indian Income Tax Act, Concepts of Resident and Non-Resident, various sources of income, income tax slabs and rates, deductions, rebates, and relief provisions.
2. Understand and apply the basic concepts of tax planning, including its importance, investment options for tax saving, types of income tax returns, and taxation of different income sources such as capital gains, income from house property, and business/professional income Salary and Other Sources.
3. Understand basic knowledge of taxation procedures in scrutiny assessment, summary assessment, appeals, revision processes, and compliance with Tax Deducted at Source (TDS) regulations.
4. Analyse and evaluate basic taxation concepts applicable to Tax Payer along with ethical considerations in tax planning and filing, recent amendments to the Income Tax Act, and emerging trends in income taxation.
5. Compute taxable income and determine the final tax payable under the heads of Income from Salary, House Property, Business & Profession, Capital Gains, and Other Sources.

Books & References:

1. Singhania, V. K., & Singhania, M. (2024). Students' Guide to Income Tax (71st ed.). Taxmann Publications Private Limited.

2. Ahuja, G., & Gupta, R. (2023). Taxmann's Income Tax Law & Practice (27th ed.). Taxmann Publications Private Limited.
3. Ahuja, G., & Gupta, R. (2023). Systematic Approach to Income Tax (44th ed.). Wolters Kluwer India Pvt. Ltd.
4. Jain, R. K. (2023). Income Tax Made Easy (1st ed.). Centax Publications Pvt. Ltd.
5. Ahuja, G., & Gupta, R. (2023). Practical Approach to Direct Tax Laws (26th ed.). Wolters Kluwer India Pvt. Ltd.
6. Singhania, V. K. (2023). Direct Taxes Ready Reckoner (47th ed.). Taxmann Publications Private Limited.
7. Manoharan, T. N. (2023). Direct Tax Laws & International Taxation (17th ed.). Snow White Publications Pvt. Ltd.
8. Dubey, A. (2023). Beginners' Guide to Income Tax (5th ed.). Taxmann Publications Private Limited.
9. Taxmann Publications. (2023). Income Tax Act (Bare Act) (2023 ed.). Taxmann Publications Private Limited.
10. Gour, M., & Rathi, R. (2023). Simplified Approach to Income Tax (12th ed.). Bharat Law House Pvt. Ltd.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	**25**	**25**	**20**	**20**	**10**	**--**	**100%**

MCCSCT225 Fullstack Vue

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: Fullstack Vue		**Course Code: MCCSCT225**		
Vertical:		**Skill Enhancement Course**		
Periods per week (1 Period is 60 minutes)		**02**		
Credits		**02**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**--**	**30**	**12**

Course Objectives:

1. Students will gain hands-on experience creating Vue components that display dynamic content, handle user interactions, and utilize various functionalities like routing and state management.
2. Students will learn how to fetch data from APIs, manage application state with Vuex, and integrate data into Vue components for display and manipulation.
3. Students will explore different ways to capture user interactions in Vue components, handle events effectively, and use them to trigger actions and update the UI.
4. Students will understand the importance of testing in Vue development and be able to write unit tests for components and end-to-end tests for user interactions using tools like Jest and Vue Test Utils.

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Practical		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	Create a Vue.js component that displays a message based on the value of a boolean variable **isRaining**. If **isRaining** is true, display the message "Remember to bring an umbrella!". Otherwise, display the message "Enjoy the sunny weather!".	R, U, A,CR

2.	Create a button that triggers an event when clicked, and then displays a message in the console.	R, U, A,CR
3.	Sort an array of numbers in ascending order and display the sorted array in a Vue component.	R, U, A,AN,CR
4.	Write a Vue component that renders a list of items fetched from an array in the component's data.	U, A,CR
5.	Implement a form in the component that allows users to add new items to the list dynamically. And then also perform delete and update operation.	R, U, A, CR
6.	Implement event handlers for various user interactions such as clicking on an item to view details or hovering over an item to display additional information.	R, U, A, CR
7.	Create two separate lists and implement functionality to move items between them (e.g., dragging an item from one list and dropping it into another).	R, U, A, AN, CR
8.	Enhance the calendar app with drag-and-drop functionality for moving events between different dates or time slots.	R, U, A, CR
9.	Break down the calendar app into components such as **Calendar**, **MonthView**, **WeekView**, **DayView**, **Event**, etc., outlining the responsibilities of each component.	R, U, A, CR
10.	Write unit tests and end-to-end tests for the calendar app to ensure its functionality works as expected. Use tools like Jest and Vue Test Utils for testing Vue components.	R, U, A, CR
11.	Write a JavaScript function that dispatches a custom event named "customEvent" and logs a message when it's fired.	R, U, A, AN, CR
12.	Demonstrate the use of event modifiers in Vue.js by creating a button that prevents the default form submission behavior when clicked.	R, U, A, CR
13.	Implement a simple event bus using Vue.js to emit and listen for custom events between two components in a Vue application. Use **alert()** to display messages when events are emitted and received.	R, U, A, CR
14.	Set up a basic Vuex store with a state containing a counter variable, mutations to increment and decrement the counter, and actions to asynchronously update the counter.	R, U, A, E, CR
15.	Write a mutation in Vuex to add a new item to the state's list of items.	R, U, A, CR
16.	Create a form in a Vue component to update an existing item's properties in the Vuex store's state by dispatching an action.	R, U, A, AN, CR
17.	Enhance the server API integration to handle errors gracefully in a Vue component, displaying error messages to the user when requests fail.	R, U, A, CR
18.	Implement client-side validation in a Vue component to validate form data before sending it to the server, displaying error messages for invalid inputs.	R, U, A, CR
19.	Implement pagination functionality in a Vue component to fetch and display data from a server API in smaller, paginated chunks.	R, U, A, CR
20.	Add basic validation to the text input component to ensure that it only accepts alphanumeric characters.	R, U, A, E, CR
21.	Create a Vue form component that includes multiple text input fields and a submit button.	R, U, A, CR

22.	Implement functionality to reset all form fields to their initial state when a "Reset" button is clicked, using Vuex actions to update field values.	R, U, A, CR
23.	Set up Vue Router to define routes for different pages in a Vue.js application, such as a home page, about page, and contact page.	R, U, A,CR
24.	Set up a catch-all route in Vue Router to handle 404 errors and display a custom error page when a route is not found.	R, U, A,CR
25.	Implement nested routes in Vue Router to create a parent-child relationship between routes, such as a parent route for a blog post and child routes for viewing, editing, and deleting posts.	R, U, A,CR
26.	Define dynamic route parameters in Vue Router to create routes that accept dynamic values, such as user IDs.	R, U, A,CR
27.	Write unit tests for Vue components, including testing component rendering, behavior, and interaction using Vue Test Utils.	R, U, A,CR
28.	Write end-to-end tests to simulate user interactions with the weather app, such as searching for a location, viewing weather details, and navigating between pages.	R, U, A,CR
29.	Write tests for asynchronous operations in Vuex actions, such as testing API calls for fetching weather data and handling loading states.	R, U, A,CR
30.	Create a basic Vue component to display the current price of a cryptocurrency, fetching data from an API and rendering it in the component's template.	R, U, A,CR
31.	Set up a Vue.js project structure for SimpleCoinCap, including installing necessary dependencies like Vue Router and Vuex.	R, U, A,CR
32.	Write a unit test for a Vuex mutation, testing that it correctly updates the state of the Vuex store.	R, U, A,CR
33.	Write a unit test for a Vue component's emitted events, testing that the correct events are emitted in response to user interactions.	R, U, A,CR

Learning Outcome: After completion of Course, the learners will be able to:

1. Explain the concepts of Vue components, dynamic content rendering, and user interaction handling in Vue.js applications.
2. Assess the suitability of different data integration techniques within Vue components for display and manipulation based on specific scenarios
3. Develop Vue components that effectively handle user events, trigger actions based on those events, and update the UI accordingly.
4. Design and implement unit tests for Vue components using tools like Jest and Vue Test Utils, as well as assess the effectiveness of their tests for ensuring component functionality.

Books & References:

1. Djirdeh, H., Murray, N., & Lerner, A. (2018). Fullstack Vue: The Complete Guide to Vue.js. Fullstack.io.
2. Halliday, P. (2017). Vue.js 2 Design Patterns and Best Practices. Packt Publishing.
3. Macrae, C. (2018). Vue.js Up and Running. O'Reilly Media.
4. Ivanova, E. (2018). Mastering Vue.js. Packt Publishing.
5. Rashid, K. M. (2020). Fullstack React with TypeScript. Packt Publishing. Filipova, O. (2017). Learning Vue.js 2. Packt Publishing.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	10	10	20	10	10	40	100

MCCSCT224 NODE with Express JS

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: NODE with Express JS		**Course Code: MCCSCT224**		
Vertical:		**Skill Enhancement Course**		
Periods per week (1 Period is 60 minutes)		**02**		
Credits		**02**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Practical	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**--**	**30**	**12**

Course Objectives:

1. Students will gain the ability to build web servers, handle user requests, work with files and data, and create custom functionalities using Node.js.
2. Students will learn how to pass data between components, potentially building complex and interactive user interfaces using the React.js library.
3. Students will be able to create applications that interact with data, including user input, files, and APIs, and respond to user actions effectively using Node.js.
4. Students will acquire skills in building web applications with Express, a popular Node.js framework, including handling different HTTP methods (GET, POST, PATCH, DELETE), routing, and error handling.

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	Write a program to print user input data using NODE JS	R, U, A, CR
2.	Programs on Reading and Writing files using NODE JS (File System)	R, U, A, CR

3.	Creating simple web server by using NODE JS	R, U, A, CR
4.	Creating Routes in NODE JS	R, U, A, CR
5.	Creating Custom Module by using NODE JS	R, U, A, CR
6.	Program on working with JSON data using NODE JS	R, U, A, CR
7.	Programs on Events: emitting & handling custom events	R, U, A, CR
8.	Program on Parsing Query String from URL	R, U, A, AN, CR
9.	Programs on Streams using NODE JS	R, U, A, CR
10.	Passing Data from one component to other component in ReactJS	R, U, A, CR
11.	Create Calculator using Node.js	R, U, A, EV, CR
12.	Create a basic Express application that listens on a specified port and responds with "Hello, World!" to incoming requests.	R, U, A, CR
13.	Programs on Express GET Method	R, U, A, AN, CR
14.	Programs on Express POST Method	R, U, A, AN, CR
15.	Programs on Routes in Express	R, U, A, AN, CR
		R, U, A, AN, CR
16.	Programs on Express PATCH request	R, U, A, AN, CR
		R, U, A, AN, CR
17.	Programs on Express Delete request	R, U, A, AN, CR
18.	Program on creating Custom middleware	R, U, A, EV, CR
19.	Create user form with validation	R, U, A, CR
20.	Implement error handling middleware to catch and handle errors that occur during request processing.	R, U, A, CR

Learning Outcome: After completion of Course, the learners will be able to:

1. Students will be able to recall fundamental Node.js functionalities like user input handling, file system interaction, and web server creation.
2. Students will be able to explain the purpose and usage of key Node.js concepts such as modules, events, streams, and routing mechanisms.
3. Students will be able to implement programs that work with data structures like JSON and handle user input data using Node.js.
4. Students will be able to develop React components that can effectively pass data between each other, potentially leading to the creation of more complex and interactive user interfaces

Books & References:

1. Ethan Brown, Node.js Design Patterns, Packt Publishing, Second edition, 2019.
2. David Mark Clements, Mastering Node.js, Packt Publishing, Second edition, 2019.
3. Azat Mardan, Node.js for Front-End Developers, O'Reilly Media, First edition, 2014.
4. Valeri Karpov, Practical Node.js: Building Real-World Scalable Web Apps, O'Reilly Media, First edition, 2017.
5. Liran Tal, Learning React: Functional Web Development with React and Redux, O'Reilly Media, Second edition, 2018.
6. Brad Traversy, Node.js, Express, MongoDB & More: The Complete Bootcamp, Udemy (Course), 2021.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	10	10	20	10	10	40	100

MCCLANG206 Vyavaharik Hindi Lekhan, Batcheet aur Prastuti

B. Sc. (Computer Applications)		Semester – IV		
Course Name: Vyavaharik Hindi Lekhan, Batcheet aur Prastuti		Course Code: MCCLANG206		
Vertical:		Ability Enhancement Course		
Periods per week (1 Period is 60 minutes)		02		
Credits		02		
Evaluation System		Duration (in Hours)	Total Marks	Minimum Passing Marks
Theory	Continuous Internal Assessment	--	50	20

Course Objectives:

1. व्यावहारिक हिंदी लेखन शैलियों की पहचान करना
2. व्यावहारिक हिंदी लेखन शैलियों की पहचान करना
3. संचार और प्रस्तुति कौशल में सुधार करना

Module	Name	Lectures
1	व्यावहारिक और अनुप्रयुक्त लेखन शैली	15
2	बातचीत और प्रस्तुति के प्रकार	15
	Total	30

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**<u>व्यावहारिक और अनुप्रयुक्त लेखन शैली:</u>** अर्ज लेखन, निर्देश पत्र लेखन, भित्तिपत्र, व्यावसायिक लेखन, ई-मेल लेखन, ब्लॉग, शब्दांकन, अनुवाद, यूनिकोड टंकन	R, U, CR
II	**<u>बातचीत और प्रस्तुति के प्रकार:</u>** साक्षात्कार, संचार कौशल, चर्चा सत्र, मंच संचालन, समाचार वक्तव्य, प्रस्तुति	U, A, CR, EV, AN

Learning Outcome: After completion of Course, the learners will be able to:

१. विद्यार्थी में भाषाई और व्यावहारिक लेखन कौशल विकसित होगा
२. विद्यार्थी दैनिक जीवन में हिंदी भाषा का व्यवहारिक एवं उपयोगी प्रयोग कर सकेंगे
३. विद्यार्थी हिंदी वार्तालाप और प्रस्तुति कर सकते हैं

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	व्यावहारिक एवं प्रशासनिक हिंदी	कमलेश बजाज	डायमंड बुक्स		
2.	व्यावहारिक हिंदी	डॉ. प्रकाश चंद्र सेन			

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper							100%

MCCLANG205 Vyavaharik va Upayojik Marathi Lekhan, Sambhashan va Sadarikaran

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: Vyavaharik va Upayojik Marathi Lekhan, Sambhashan va Sadarikaran		**Course Code: MCCLANG205**		
Vertical:		**Ability Enhancement Course**		
Periods per week (1 Period is 60 minutes)		**02**		
Credits		**02**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**50**	**20**

Course Objectives:

1. व्यवहारिक मराठी लेखन प्रकारांची ओळख करणे
2. दैनंदिन जीवनात मराठी भाषेचा वापर करणे
3. संभाषण व सादरीकरण करण्याची क्षमता वाढविणे

Module	Name	Lectures
1	व्यावहारिक व उपयोजिक लेखन प्रकार	**15**
2	संभाषणाचे व सादरीकरणाचे प्रकार	**15**
	Total	**30**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**<u>व्यावहारिक व उपयोजिक लेखन प्रकार</u>** अर्ज लेखन, सूचना पत्रक लेखन, भित्तीफलक, व्यावसायिक लेखन, इ-मेल लेखन, ब्लोग, शब्दांकन, भाषांतर, युनिकोड टंकन	R, U, CR
II	**<u>संभाषणाचे व सादरीकरणाचे प्रकार</u>** मुलाखत, संवद कौशल्य, चर्चा सत्र, सूत्र संचालन, वृत्त निवेदन, सादरीकरण	U, A, CR, EV, AN

Learning Outcome: After completion of Course, the learners will be able to:

१. विद्यार्थ्यांचे भाषिक आणि व्यावहारिक लेखन कौशल्य विकसित होईल
२. विद्यार्थ्यांना दैनंदिन जीवनात व्यावहारिक व उपयोजिक मराठी भाषेचा वापर करता येईल
३. विद्यार्थ्यांना मराठी संभाषण व सादरीकरण करता येईल

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	व्यावहारिक मराठी	ल.रा. नसिराबादकर	फडके प्रकाशन, कोल्हापूर		
2.	आशय लेखन	रसिका सावंत	सेठ प्रकाशन, मुंबई		

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper							100%

MCCSCT207 Sanskrit Proficiency Course

B. Sc. (Computer Applications)		**Semester – IV**		
Course Name: Sanskrit Proficiency Course		**Course Code: MCCLANG207**		
Vertical:		**Ability Enhancement Course**		
Periods per week (1 Period is 60 minutes)		**02**		
Credits		**02**		
Evaluation System		**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Theory	**Continuous Internal Assessment**	**--**	**50**	**20**

Course Objectives:

1. Enhance students' understanding and application of advanced Sanskrit grammar and vocabulary.
2. Develop the ability to create and present written and oral assignments in Sanskrit, including recipe books, stories, and worksheets.
3. Foster cultural awareness and historical knowledge through the exploration of ancient texts, festivals, and scientific traditions in Sanskrit.

Module	Name	Lectures
1	व्यावहारिक संस्कृत ज्ञानम् (Practical Sanskrit Knowledge)	**15**
2	संस्कृत सृजनशीलता तथा समीक्षा (Sanskrit Creativity and Review)	**15**
	Total	**30**

R- Remember, U- Understand, A – Apply, AN- Analyze, EV- Evaluate, CR - Create

Unit	Syllabus	Level of Knowledge

		Applicable as per Blooms Taxonomy
I	**<u>व्यावहारिक संस्कृत ज्ञानम् (Practical Sanskrit Knowledge)</u>** 1. षष्ठी विभक्ति परिचयः (Vibhakti Parichaya 6) 2. पाकशाला उपकरणानि तथा पाकशाला पुस्तकम् (Kitchen Equipments and Recipe Book) 3. दिशाः, मासाः, दिवसाः, ऋतवः नामानि (Sanskrit Names of Directions, Months, Days, and Seasons) 4. घटी तथा विभक्ति पुनरावलोकनम् (Clock and Vibhakti Revision and Practice) 5. कथा लेखनम् (Story Writing) कार्यपत्रिका प्रस्तुति (Assignment Presentation in Sanskritam)	U, A, R, CR
II	**<u>संस्कृत सृजनशीलता तथा समीक्षा (Sanskrit Creativity and Review)</u>** 1. कार्यपत्रिका निर्माणम् (Worksheet Preparation) 2. भूतसङ्ख्या (Bhootasankhya) 3. अमरकोशः (सिंहादिवर्गः) (Amarkosha - Simhaadivargah) 4. अमरकोशः + आरम्भात पुनरावलोकनम् (Amarkosha + Revision from the beginning) पुनरावलोकनम् तथा अभ्यासः (Revision and Practice)	U, A, R, CR, AN

Learning Outcome: After completion of Course, the learners will be able to:

1. Students will be able to understand and apply advanced Sanskrit grammar and vocabulary in practical contexts.
2. Students will develop the ability to create and present written and oral assignments in Sanskrit, enhancing their communication skills.
3. Students will gain cultural awareness and historical knowledge through the exploration of ancient texts, festivals, and scientific traditions in Sanskrit.

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Vibhaktivallarī (विभक्तिवल्लरी)		Samskrita Bharati		
2.	Supada (Level 4)		Samskrita Bharati		

3.	abhyāsapustakam	Dr. H.R. Vishwas, Samskrita Bharati	Samskrita Bharati, Aksharam, India		

Evaluation Scheme

The Exam for the students in this programme will be held under four heads

- Continuous Internal Assessment
- End Semester Examination
- Practical Continuous Internal Examination
- Practical End Semester Examination

1. Internal Evaluation (40 Marks).

i. Test: 1 and Test 2: Class test of 20 marks. (Can be taken online)

Q	**Attempt *any four* of the following:**	**20**
a.		
b.		
c.		
d.		
e.		
f.		

2. End Semester Examination: (60 marks)

	All questions are compulsory	
Q1	**(Based on Unit 1) Attempt *any two* of the following:**	**12**
a.		
b.		
c.		
d.		
Q2	**(Based on Unit 2) Attempt *any two* of the following:**	**12**
Q3	**(Based on Unit 3) Attempt *any two* of the following:**	**12**
Q4	**(Based on Unit 4) Attempt *any two* of the following:**	**12**
Q5	**(Based on Unit 5) Attempt *any two* of the following:**	**12**

3. End Semester Examination: (30 marks)

	All questions are compulsory	
Q1	**(Based on Unit 1) Attempt *any one* of the following:**	**6**
a.		
b.		
Q2	**(Based on Unit 2) Attempt *any one* of the following:**	**6**
Q3	**(Based on Unit 3) Attempt *any one* of the following:**	**6**
Q4	**(Based on Unit 4) Attempt *any one* of the following:**	**6**
Q5	**(Based on Unit 5) Attempt *any one* of the following:**	**6**

4. Practical End Semester Examination

Note: Certified Copy of Journal is mandatory for appearing for the practical exam.

1.	**Practical Question 1**	**15**
2.	**Practical Question 2**	**15**

OR

1.	**Practical Question**	**30**

For Tutorial Exam, a paper of 30 marks to be solved.

General Elective / Open Elective will have continuous internal assessment of 50 marks. The assessment shall be based on Assignments / Tests / Presentations/ Role plays and similar activities.