Academic Council 10/04/2024
Item No: 5.18

Parle Tilak Vidyalaya Association's

MULUND COLLEGE OF COMMERCE (AUTONOMOUS)

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Syllabus for F.Y. B.Sc.(CA)

Programme: Bachelor of Science (Computer Applications)

Code:

BASED ON LEARNING OUTCOME CURRICULUM FRAMEWORK (LOCF) and NEP

Semester I & II

with effect from the academic year

2025 – 2026

AC:**10/04/2024**
Item No: **5.18**

Parle Tilak Vidyalaya Association's
MULUND COLLEGE OF COMMERCE (AUTONOMOUS)

Sr. No.	Heading	Particulars
1.	Title of the Course	**Bachelor of Science (Computer Applications)**
2.	Eligibility for Admission	Any student who has completed HSC or equivalent in Arts / Science / Commerce / MCVC with Mathematics or Statistics as one of the subjects. Any student who has completed Diploma in IT / CS/ Electrical / Electronics / Mechanical / Civil / Electronics and Telecommunication / Instrumentation and allied branches from MSBTE or equivalent board. Any student who has completed HSC or equivalent in Arts / Science / Commerce / MCVC without Mathematics or Statistics will have to undergo a bridge course of 30 hours on Mathematics and Statistics.
3.	Passing Marks	40%
4.	Ordinances / Regulations (if, any)	As applicable for all B.Sc. Courses
5.	Number of years / Semesters	Three years – Six Semesters / Four years – Eight Semesters
6.	Level	~~P.G.~~ / U.G. /~~Diploma / Certificate~~
7.	Pattern	Semester, Choice Based Credit system under NEP
8.	Status	New / ~~Revised~~
9.	To be implemented from Academic year	From the Academic Year **2025 – 2026**

Date: 10-04-2024 **Signature:**_____

Name of the BoS Chairperson **Dr. Hiren Dand**
hiren.dand@mccmulund.ac.in

F. Y. B.Sc. C.A. Syllabus 2025 – 2026

Semester – II			
Course Code	**Course Type**	**Course Title**	**Credits**
MCCSCT104	Major	Object Oriented Programming with C++	4
MCCSCT109	Major	Database Management Systems	4
MCCSCT112	Major	Computer Graphics	4
MCCMATH103	Minor	Calculus	2
MCCAF107	GE/OE- I (Choose any one)	Principles of Accounting	2
MCCECO111		Economics	
MCCAF108	GE/OE - II (Choose any one)	Practical Accounting	2
MCCECO110		Economic Modelling	
MCCENG110	AEC	English Technical Writing Skills	2
MCCIKS101	IKS	Fundamentals of Indian Knowledge System	2
		Total Credits	**22**

GE / OE: General Elective / Open Elective

AEC: Ability Enhancement Course

VEC: Value Education Course

IKS: Indian Knowledge System

Contents

Preamble

The B.Sc. Computer Applications programme focuses on computer fundamentals, programming in languages such as C, C++, Python and Java, database management, internet technologies, operating system concepts, and more.
The curriculum offers a balanced approach to software development, and the courses cover a wide range of topics ranging from design principles to software security. Throughout the programme, students develop practical skills and apply their knowledge in hands-on projects.
This programme enables students to create a strong foundation of computing concepts and gets them ready to develop computer applications and website for organisations.

Objectives:

- Provide strong foundations in fundamentals of Computer Science and applications, inter disciplinary courses and electives for widening the domain expertise.
- Design and develop software based solutions for real world problems, serving effectively to the requirements of computer field and Society
- Attain sufficient knowledge related to computer domains, possesses technical, soft and hard skills and apply them effectively in team work
- Empower the students with competencies in creative thinking and problem solving, inter-personal communication and managerial skills

Programme Specific Outcomes:

PSO1: Understanding of the key concepts and principles of programming languages.

PSO2: Capacity to analyze a problem, identify the computing requirements and using Procedures find a solution.

PSO3: Development of practical skills to solve problems and provide solutions using current trends in the discipline of Computer Applications.

PSO4: Ability to apply the algorithmic principles, mathematical foundations and computer science theory for designing computer-based systems

SEMESTER II

MCCSCT104 Object Oriented Programming with C++

B.Sc (Computer Applications)		**Semester – II**		
Course Name: Object Oriented Programming with C++		**Course Code: MCCSCT104**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**3**		
Practical per week (1 Period is 60 minutes)		**2**		
Credits		**4**		
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. The course is designed for providing knowledge of OOPs concepts using C++.

2. The objective of the course is to understand the fundamental concepts of OOPs, such as classes, objects, encapsulation, Abstraction and interface, inheritance and polymorphism.
3. This course will help learner to understand the concept of classes and relationships using UML.
4. Learn mechanism for handling errors and exceptional conditions that can occur during program execution.
5. Design functions and classes that can be used to manage file streams and their associated file buffers.

Module	Name	Lectures
1	Beginning with C++	**9**
2	OOP with C++	**9**
3	UML & Inheritance	**9**
4	Polymorphism & Pointer	**9**
5	Advanced C++	**9**
	Total	**45**

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

Module / Unit	Syllabus	Level of Knowledge Applicable as per Blooms Taxonomy
I	**<u>Beginning with C++</u>** **A) Introduction to Programming Concepts:** Object oriented programming paradigm, basic concepts, benefits of object oriented programming, object oriented languages, Tokens-keywords, identifiers, constants-integer, real, character and string constants, backslash constants, features of C++ and its basic structure, simple C++ program without class, compiling and running C++program. **B) Data Types, Data Input Output and Operators:** Basic data types, variables, rules for naming variables, programming constants, the type cast operator, implicit and explicit type casting, cout and cin statements, operators, precedence of operators. **C) Decision Making, Loops, Arrays and Strings:** Conditional statements-if, if...else, switch loops- while, do...while, for, types of arrays and string and string manipulations.	A) R, U, A B) R, U, A, AN C) R, U, A

II	**OOP with C++** **A) Classes, Encapsulation, Abstraction & Interface:** Classes and objects, Dot Operator, data members, member functions, passing data to functions, scope and visibility of variables in function. Introduction to Abstract class and interface. **B) Constructors and Destructors:** Default constructor, parameterized constructor, copy constructor, private constructor, destructors. **C) Working with objects:** Accessor - mutator methods, static data and static function, access specifiers, array of objects.	A) R, U, A, AN, E, CR B) R, U, A, AN C) R, U, A
III	**UML & Inheritance** **A) Unified Modeling Language (UML) & Modelling Relationships in Class Diagrams:** Introduction to UML & class diagrams. Association, Aggregation-Composition and examples covering these principles. **B) Inheritance:** Defining base class and its derived class, access specifiers, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance, friend function and friend class, constructors in derived classes. Modelling Relationships: Generalization-Specialization and examples covering these principles.	A) R, U, A, AN, CR B) R, U, A, AN

IV	**Polymorohism & pointer** **A) Compile time Polymorphism:** Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators. **B) Runtime Polymorphism:** Dynamic Binding, Function overriding, virtual function, pure virtual function, virtual base class, abstract class. **C) Pointers:** Introduction to pointers, * and & operators, assigning addresses to pointer variables, accessing values using pointers, pointers to objects & this pointer, pointers to derived classes.	A) R, U, A, AN, CR B) R, U, A, AN, E, CR C) R, U, A, AN, CR
V	**Advanced C++** **A) File Handling:** File Stream classes, opening and closing file-file opening modes, text file handling, binary file handling. **B) Exception Handling:** Exceptions, exception hierarchy, throwing and catching exceptions, built-in exceptions, creating own exceptions. **C) Applying OOP to solve real life applications:** To cover case studies like library management, order management etc. to design classes covering all relationships.	A) R, U, A, AN, E, CR B) R, U, A, AN, E, CR C) A, AN, E, CR

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	**Classes and methods**	**U, A**
a.	Design an employee class for reading and displaying the employee information, the getInfo() and displayInfo() methods will be used repectively. Where getInfo() will be private method	
b.	Design the class student containing getData() an displayData() as two of its methods which will be used for reading and displaying the student information respectively.Where getData() will be private method.	
c.	Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number,	

	isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not.Where readNo() will be private method.	
d.	Write a program to demonstrate function definition outside class and accessing class members in function definition.	
2.	**Using friend functions.**	**U, A**
a.	Write a friend function for adding the two complex numbers, using a single class	
b.	Write a friend function for adding the two different distances and display its sum using two classes.	
	Write a friend function for adding the two matrix from two different classes and display its sum.	
3.	**Constructors and method overloading.**	**U, A**
a.	Design a class Complex for adding the two complex numbers and also show the use of constructor.	
b.	Design a class Geometry containing the methods area() and volume() and also overload the area() function .	
c.	Design a class Static Demo to show the implementation of static variable and static function.	
4.	**Operator Overloading**	**U, A, AN**
a.	Overload the operator unary(-) for demonstrating operator overloading.	
b.	Overload the operator + for adding the timings of two clocks, And also pass objects as an argument	
c.	Overload the + for concatenating the two strings. For e.g “Py” + “thon” = Python	
5.	**Exception handling**	**U, A, AN**
a.	Programs on Exception handling.	
6.	**Inheritance-I**	**U, A, AN**
a.	Design a class for single level inheritance	
b.	Design a class for multiple inheritance.	
c.	Design a class for multilevel inheritance	
7.	**Inheritance-II**	**U, CR**
a.	Implement the hierarchical inheritance	
b.	Implement the Hybrid inheritance.	
c.	Program on inheritance using public, private and protected type derivation.	
8.	**Virtual functions and abstract classes**	**U, CR**
a.	Implement the concept of method overriding.	
b.	Show the use of virtual function	
c.	Show the implementation of abstract class.	

9.	**Templates**	**U, CR**
a.	Programs on Function Templates.	
b.	Programs on Class Templates	
10.	**File handling**	**U, CR**
a.	Design a class FileDemo open a file in read mode and display the total number of words and lines in the file.	
b.	Design a class to read and write a file.	
c.	Design a class to handle multiple files and file operations	

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

1. Understand object-oriented programming concepts and basic C++ features to write, compile, and execute simple programs.
2. Design and implement object-oriented programs in C++ using classes, encapsulation, abstraction, constructors, destructors, and object manipulation techniques.
3. Utilize UML for modelling class relationships and implement various types of inheritance in C++ to achieve code reusability and hierarchy management.
4. Implement polymorphism and pointers in C++ to enhance code flexibility, achieve dynamic behaviour, and manage memory efficiently.
5. Manage files, handle exceptions, and develop real-life applications using object-oriented programming in C++.

Books and References:

1. Balagurusamy, E. (2020). Object oriented programming with C++ (8th ed.). McGraw Hill Education India.
2. Lee, R. C., & Tepfenhart, W. M. (2015). UML & C++: A practical guide to object-oriented development (2nd ed.). Pearson Education.
3. Venugopal. (2017). Mastering C++ (2nd ed.). McGraw-Hill Education.
4. Kanetkar, Y. (2020). Let us C++ (3rd ed.). BPB Publications.
5. Timothy, B. (2008). Object oriented analysis and design (3rd ed.). Tata McGraw Hill.
6. Stroustrup, B. (2013). The C++ programming language (4th ed.). Addison-Wesley.
7. Deitel, P., & Deitel, H. (2016). C++ how to program (10th ed.). Pearson.
8. Schildt, H. (2014). C++: The complete reference (4th ed.). McGraw-Hill.
9. Booch, G., Rumbaugh, J., & Jacobson, I. (2005). The unified modeling language user guide (2nd ed.). Addison-Wesley.
10. Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1994). Design patterns: Elements of reusable object-oriented software (1st ed.). Addison-Wesley.

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCSCT109 Database Management Systems

Bachelor of Computer Applications		**Semester – II**		
Course Name: Database Management Systems		**Course Code: MCCSCT109**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**3**		
Practical per week (1 Period is 60 minutes)		**2**		
Credits		**4**		
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. The objectives of a course are to provide learners with strong understanding of databases, their design, implementation, and management.
2. Introduce learners to various DBMS architectures and their functionalities.
3. Design a relational database, understand the process of identifying entities, attributes, and relationships between entities.
4. Learn mechanism to draw Entity-Relationship (ER) diagrams to represent the logical structure of a database and its relationships.
5. Understand the importance of normalization to reduce data redundancy and improve data integrity.
6. Introduce learners to the concept of transactions, their properties (ACID), and how to manage them effectively to maintain data consistency and integrity.

Module	**Name**	**Lectures**
1	**Database Systems & Data Models**	**9**
2	**Relational Model & ER Modeling**	**9**
3	**Advanced Data Modeling Techniques**	**9**

4	**Database Normalization & Design**	**9**
5	**Transaction Management & Concurrency Control**	**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	**Database Systems & Data Models:-** A) **Database Systems:** Why Databases?, Data versus Information, Introducing the Database, Why Database Design Is Important, Evolution of File System Data Processing, Problems with File System Data Processing, Database Systems, Preparing for Your Database Professional Career. B) **Data Models:** Data Modeling and Data Models, Importance of Data Models, Data Model Basic Building Blocks, Business Rules, the Evolution of Data Models, Degrees of Data Abstraction.	**A) U, R, AN, EV** **B) U, R, AN, CR, EV**
II	**Relational Model & ER Modeling:-** **A) The Relational Database Model:** A Logical View of Data, Keys, Integrity Rules, Relational Algebra, The Data Dictionary and the System Catalog, Relationships within the Relational Database, Data Redundancy Revisited, Indexes, Codd's Relational Database Rules. **B) Entity Relationship (ER) Modeling:** The Entity Relationship Model, Developing an ER Diagram, Database Design Challenges: Conflicting Goals.	**A) U,R,AN,CR,EV** **B) U,R,AN,EV**
III	**Advanced Data Modeling Techniques:-** A) **Advanced Data Modeling:** The Extended Entity Relationship Model: Entity Supertypes and Subtypes, Specialization Hierarchy, Inheritance, Subtype Discriminator, Disjoint and Overlapping Constraints, Completeness Constraint, Specialization and Generalization. B) **Entity Clustering:** Entity Integrity: Selecting Primary Keys, Design Cases: Learning Flexible Database Design.	**A) U,R,AN,CR,EV** **B) U,R,AN,EV**
IV	**Database Normalization & Design:-** **A) Normalization of Database Tables:** Database Tables and Normalization, The Need for	

	Normalization, The Normalization Process, Improving the Design, Higher-Level Normal Forms, Denormalization. **B) Database Design:** The Information System, The Systems Development Life Cycle, The Database Life Cycle, Conceptual Design, DBMS Software Selection, Logical Design, Physical Design, Database Design Strategies, Centralized versus Decentralized Design.	**A) U,R,AN,CR,EV** **B) U,R,AN,A**
V	**<u>Transaction Management & Concurrency Control:-</u>** **A) Transaction Management:-**What Is a Transaction? ACID properties of transaction, States of transaction, Read and write operations of transaction, management of transactions, benefits and challenges for managing transaction. **B) Concurrency Control: -** Concurrent executions of transactions and its benefits, need for concurrency control, problems without concurrency control mechanisms, Concurrency control with Locking Methods, Concurrency Control with two-phase locking (2PL) protocol, Concurrency Control with Time Stamping Methods, and Concurrency Control with validation-based protocols.	**A) U,R,AN,CR,EV** **B) U,R,AN,EV**

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1.	Writing **Basic SQL SELECT** Statements.	U,R,CR,EV
2.	Restricting and Sorting Data:-	
a.	Single-Row Functions:-	
	i)Numeric Functions(abs, ceil, floor, trunc, round)	
	ii)Character Functions(lower, upper, initcap, ltrim, rtrim, trim, substr, length, lpad)	
3	Displaying Data from Multiple Tables:	U,R,CR,EV,A
a.	**Joins: Its Types**: Inner Join, **Outer Join:** Left Outer Join, Right Outer Join & Full Outer Join, Equi Join, Self-Join & Cross Join.	
4	Aggregating Data Using **Group Functions**: Min, Max, Count, Sum, Avg, total.	
5.	**Sub queries** and its types.	U,R,CR,EV,A
6.	**Manipulating Data:**	
a.	Using INSERT statement	

b.	Using DELETE statement	
c.	Using UPDATE statement	
7.	**Creating and Managing Tables**	U,R,CR,EV
a.	Creating and Managing Tables including **Constraints.**	
8.	**Creating and Managing other database objects**	U,R,CR,EV
a.	Creating **Views** and **Its Types:** Horizontal View, Vertical View, Joined View, Row/Column Subset View, Grouped View, Joined View.	
9.	**Controlling User Access/Permissions:**	U,R,CR,EV
a.	Creating User	
b.	Grant	
c.	Revoke	
10.	**Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced Subqueries**	U,R,CR,EV,AN
a.	Using SET Operators	
b.	Date and time Functions	
c.	Enhancements to the GROUP BY Clause	

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

1. Understand data modelling concepts to design efficient and structured database systems.
2. Apply relational database principles and ER modelling techniques to design structured, efficient, and scalable databases.
3. Analyze advanced modelling concepts to design efficient, structured, and integrity-driven databases.
4. Remember normalization techniques and database design strategies to develop well-structured and efficient databases.
5. Evaluate ACID properties and concurrency control mechanisms to manage transactions efficiently in a multi-user database environment.

Books and References:

1. Coronel, C., & Morris, S. (2019). Database systems: Design, implementation, and management (13th ed.). Cengage Learning.
2. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). Database system concepts (7th ed.). McGraw Hill.
3. Ramakrishnan, R., & Bayross, I. (2014). Database management systems (3rd ed.). McGraw Hill.
4. Joel, M. (2019). Murach's MySQL (3rd ed.). Mike Murach & Associates.
5. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2013). Database system concepts (6th ed.). McGraw Hill.
6. Elmasri, R., Navathe, S. B., & Shamkant, B. N. (2017). Fundamentals of database systems (7th ed.). Pearson.
7. Sheldon, T., & Mo, B. (2005). Beginning MySQL (1st ed.). Wrox Press.

8. Vikram, V. (2017). MySQL: The complete reference (1st ed.). McGraw Hill.

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	Understand	Apply	Analyze	Evaluate	Create	
% in Question Paper	**20**	**20**	**20**	**15**	**15**	**10**	**100%**

MCCSCT112 Computer Graphics

B.Sc (Computer Applications)		**Semester – II**		
Course Name: Computer Graphics		**Course Code: MCCSCT112**		
Vertical:		**Major**		
Periods per week (1 Period is 60 minutes)		**3**		
Practical per week (1 Period is 60 minutes)		**2**		
Credits		**4**		
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. To provide students with a comprehensive understanding of computer graphics principles, including display technologies, input devices, scan conversion techniques, and clipping algorithms, enabling them to develop foundational skills for graphical representation and visualization.
2. To equip students with a fundamental understanding of two-dimensional transformations and their matrix representations, enabling them to apply geometric transformations for graphical object manipulation.

3. To introduce students to three-dimensional transformations and projection techniques, enabling them to understand and apply 3D geometric transformations for realistic graphical representations.
4. To provide students with an understanding of 3D viewing techniques, light modeling, and color representation, enabling them to apply these concepts for realistic rendering in computer graphics.
5. To familiarize students with visible-surface determination techniques and curve/surface representation methods, enabling them to develop efficient rendering algorithms for 3D graphics.

Module	Name	Lectures
1	**Fundamentals of Computer Graphics and Scan Conversion**	**9**
2	**Two-Dimensional Transformations**	**9**
3	**Three-Dimensional Transformations and Projections**	**9**
4	**3D Viewing, Lighting, and Color**	**9**
5	**Visible-Surface Determination and Curve Representation**	**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 Computer Graphics and Scan Conversion:-</u>** A) **Introduction to Computer Graphics:** Overview of Computer Graphics, Application and Software, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Random-Scan Display Processor, LCD displays. B) **Scan Conversion:-** Scan-conversion of line, Digital Differential Analyzer (DDA) algorithm, Bresenhams' Line drawing algorithm, Scan Converting Circles, Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, 2D clipping, Line clipping algorithms:- Cohen-Sutherland, Liang-Barsky, Cyrus-beck, Clipping types:- point, line, text clipping, polygons clipping:-	**A) U,R,AN** **B) U,R,EV,CR**

	Sutherland-Hodgeman polygon clipping, problems of Aliasing.	
II	**Two-Dimensional Transformations :-** **A) Two-Dimensional Transformations:** Transformations and Matrices, 2D Transformations types:- Identity transformation, Two-Dimensional scaling, Two-Dimensional rotation, Two-Dimensional translation, Two-Dimensional shearing, Combined Transformation, Need for Homogeneous Coordinates and Matrix Representation of 2D Transformations, Homogeneous Coordinates for Scaling, Rotation, Translation, Transformation of points, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, The Window-to- Viewport Transformations.	**A) U,R,EV,CR**
III	**Three-Dimensional Transformations and Projections :-** **A) Three-Dimensional Transformations:** Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.	**A)U,R,A,AN,CR**
IV	**3D Viewing, Lighting, and Color :-** **A) Viewing in 3D:** Stages in 3D viewing, Canonical View Volume (CVV), specifying an arbitrary 3D View, Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid. **B) Light:** Radiometry, Transport, Equation, Photometry **C) Color:** Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance.	**A)U,R,A, CR** **B)U,R** **C)U,R**
V	**Visible-Surface Determination and Curve Representation :-** A) **Visible-Surface Determination:**-Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The Z-buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing. B) **Plane Curves and Surfaces:-** Curve Representation, Nonparametric Curves, Parametric Curves, Parametric Representation of a Circle, Parametric Representation of an Ellipse, Parametric Representation of a Parabola, Parametric Representation of a Hyperbola, Bezier Curves, B-spline Curves, Bezier surfaces, B-spline surfaces.	**A) U,R,AN** **B) U,R,EV**

List of Practical:		Level of Knowledge Applicable as per Blooms Taxonomy
1.	**Solve the following:**	**U,R,CR,A**
a.	Study and enlist the basic functions used for graphics in C / C++ / Python language. Give an example for each of them.	
b.	Draw a co-ordinate axis at the center of the screen.	
2.	**Solve the following:**	**U,R,CR,A**
a.	Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.	
b.	Draw a simple hut on the screen.	
3.	**Draw the following basic shapes in the center of the screen :**	**CR**
a.	i. Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line	
b.	Draw polynomial polygon.	
4.	**Solve the following:**	**CR**
a.	Develop the program for DDA Line drawing algorithm	
b.	Develop the program for Bresenham's Line drawing algorithm	
5.	**Solve the following:**	**CR,EV**
a.	Develop the program for the mid-point circle drawing algorithm	
b.	Develop the program for the mid-point ellipse drawing algorithm.	
6.	**Solve the following:**	**CR,R**
a.	Write a program to implement 2D scaling.	
b.	Write a program to perform 2D translation.	
7.	**Solve the following:**	**CR**
a.	Perform 2D Rotation on a given object.	
b.	Program to create a house like figure and perform the following operations. i. Scaling about the origin followed by translation. ii. Scaling with reference to an arbitrary point. iii. Reflect about the line y = mx + c.	
c.	Perform rotation of a circle about an arbitrary point.	

8.	**Solve the following:**	**CR**
a.	Write a program to implement Cohen-Sutherland clipping.	
b.	Write a program to implement Liang - Barsky Line Clipping Algorithm.	
9.	**Solve the following:**	**CR,EV**
a.	Write a program to fill a circle using Flood Fill Algorithm.	
b.	Write a program to fill a circle using Boundary Fill Algorithm.	
10.	**Solve the following:**	**U,CR**
a.	Develop a simple text screen saver using graphics functions.	
b.	Perform smiling face animation using graphic functions.	
c.	Draw the moving car on the screen.	

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

1. Recall scan conversion and clipping algorithms to generate and manipulate graphical objects. (Remember).
2. Apply 2D transformations using matrix representations and homogeneous coordinates for graphical transformations. (Apply).
3. Analyze 3D transformations and projection methods to manipulate three-dimensional objects. (Analyze).
4. Evaluate 3D viewing transformations, lighting principles, and color models for visual realism. (Evaluate).
5. Create graphical models using visible-surface determination algorithms and parametric curve representations. (Create)

Books and References:

1. Hearn, D., & Baker, M. P. Computer graphics. Pearson. (Edition and year not provided—please specify for complete citation)
2. Marschner, S., & Shirley, P. (2016). Fundamentals of computer graphics (4th ed.). CRC Press.
3. Foley, J. D., Van Dam, A., Feiner, S. K., & Hughes, J. F. Computer graphics: Principles and practice (2nd ed.). Pearson. (Year not provided—please specify)
4. Newman, W. M., & Sproull, R. F. Principles of interactive computer graphics (2nd ed.). Tata McGraw-Hill. (Year not provided—please specify)
5. Rogers, D. F., & Adams, J. A. Mathematical elements for computer graphics (2nd ed.). Tata McGraw-Hill. (Year not provided—please specify)

6. Added Book: Angel, E., & Shreiner, D. (2014). Interactive computer graphics: A top-down approach with WebGL (7th ed.). Pearson.

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCMATH103 Calculus

B.Sc (Computer Applications)		**Semester – II**		
Course Name: Calculus		**Course Code: MCCMATH103**		
Vertical:		**Minor**		
Periods per week (1 Period is 60 minutes)		**2**		
Practical per week (1 Period is 60 minutes)		**--**		
Credits		**2**		
		Duration (in Hours)	**Total Marks**	**Minimum Passing Marks**
Evaluation System	**Continuous Internal Assessment**	**--**	**20**	**8**
	End Semester Examination	**1**	**30**	**12**

Objectives of the Course:

1. Understand the concept of limits at infinity and continuity, and apply the derivative as a function to describe rates of change in various contexts.
2. Apply differentiation rules such as the product, quotient, and chain rules to compute derivatives of polynomials, exponential, and logarithmic functions.
3. Use derivatives to find maximum and minimum values of functions, analyze the shape of graphs, and solve problems involving indeterminate forms and L'Hopital's Rule.
4. Apply integration techniques, including the Fundamental Theorem of Calculus, substitution, and integration by parts, to compute areas, distances, and solve real-world problems.
5. Use integration to solve real-world problems, including finding areas between curves, calculating work, and determining the average value of a function.

Module	**Name**	**Lectures**
I	**Continuity and Derivatives**	**6**

II	**Differentiation rules**	**6**
III	**Applications of differentiation**	**6**
IV	**Integrals**	**6**
V	**Applications of Integration**	**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	**Continuity and Derivatives:** Limits at Infinity; Continuity, Properties of Continuous functions, Derivatives and Rates of Change, The Derivative as a Function.	**R, U, A,EV**
II	**Differentiation rules:** Derivatives of Polynomials and Exponential Functions, The Product and Quotient Rules, The Chain Rule, Implicit Differentiation, Derivatives of Logarithmic Functions, Rates of Change in the Natural and Social Sciences, Exponential Growth and Decay, Related Rates, Linear Approximations and Differentials, Hyperbolic Functions.	**R, U, A**
III	**Applications of differentiation:** Maximum and Minimum Values, Derivatives and Shape of a Graph, Indeterminate Forms and L'Hospital's Rule.	**R,U, A, AN**
IV	**Integrals:** Areas and distances, The Definite Integral, The Fundamental Theorem of Calculus, Indefinite Integrals and the Net Change Theorem, The Substitution Rule, Integration by Parts, Trigonometric Integrals, Trigonometric Substitution, Integration of Rational Functions by Partial Fractions, Strategy for Integration, Integration Using Tables and Computer Algebra Systems, Approximate Integration, Improper Integrals.	**R,U, A, AN**
V	**Applications of Integration:** Areas between Curves, Work, Average Value of a Function, Arc Length.	**R,U,A,CR,EV**

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

1. Explain the concept of continuity and limits at infinity, and describe how derivatives represent rates of change in various contexts.
2. Apply differentiation rules such as the product, quotient, and chain rules to find derivatives of various types of functions.
3. Analyze the behavior of a function's graph by using its derivative to determine maximum and minimum values and identify points of inflection.

4. Apply integration techniques like substitution and integration by parts to compute areas, distances, and solve related problems.
5. Create models to solve real-world problems involving the area between curves, work, and arc length using integration techniques.

Books and References:

1. Stewart, J. (2008). Calculus: Early transcendentals (6th ed.). Thomson.
2. Thomas, G. B., Finney, R. L., & Weir, M. D. (1998). Calculus and analytical geometry. Addison Wesley Publishing Company.
3. Mendelson, E. (1988). Schaum's 3000 solved problems in calculus. Tata McGraw Hill.
4. Staff of Research & Education Association. (2007). The advanced calculus problem solver. Research & Education Association.
5. Thompson, S. P., & Gardner, M. (1998). Calculus made easy. Palgrave.

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCAF107 Principles of Accounting

B. Sc (Computer Applications)	**Semester – II**
Course Name: Principles of Accounting	**Course Code: MCCAF107**
Vertical:	**General / Open Elective**
Periods per week (1 Period is 60 minutes)	**2**
Practical per week (1 Period is 60 minutes)	**--**
Credits	**2**

Evaluation System	Duration (in Hours)	Total Marks	Minimum Passing Marks
Continuous Internal Assessment	**--**	**50**	**20**

Objectives of the Course:

1. To define and understand the Fundamentals of Accounting and its significance in business.
2. To identify and Classify Different Types of Accounts and the Application of the Golden Rules of Accounting for each type.
3. To learn to Record Financial Transactions.
4. To prepare and Maintain Ledger Accounts and Basic Financial Statements.
5. To understand and Prepare Trial Balance.
6. Prepare Basic Financial Statements.

Unit/ Module	Name	Lectures
I	Accounting in Action	06
II	The Recording Process – journal Entries and Ledger Posting and Balancing	06
III	Preparation of Trial Balance with all final Adjustments and Profit & Loss and Balance sheet of the business organization	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:** Identify the activities and users associated with accounting**,** Explain the building blocks of accounting: ethics, principles, and assumptions, State the accounting equation, and define its components, Analyze the effects of business transactions on the	R, U, A, AN, EV

	accounting equation, Describe the four financial statements and how they are prepared and Leaning of Golden Rules with application of the same while doing Accounting with practical problem solving	
II	**The Recording Process – journal Entries and Ledger Posting and Balancing:** Describe how accounts, debits, and credits are used to record business transactions, indicate how a journal is used in the recording process, explain how a ledger and posting help in the recording process with practical problem solving.	R, U, A, AN, EV
III	**Preparation of Trial Balance with all final Adjustments and Profit & Loss and Balance sheet of the business organization** Explain the accrual basis of accounting and the reasons for adjusting entries, Prepare adjusting entries for deferrals, Prepare adjusting entries for accruals, Describe the nature and purpose of an adjusted trial balance Explain the steps in the accounting cycle and how to prepare correcting entries, Identify the sections of a classified balance sheet	R, U, A, AN, EV
IV	**Maintenance of Records for Inventory for Merchandising Operations:** Describe merchandising operations and inventory systems, Record purchases under a perpetual inventory system, Record sales under a perpetual inventory system, Apply the steps in the accounting cycle to a merchandising company, how to classify and determine inventory, Apply inventory cost flow methods	R, U, A, AN, EV
V	**Accounting Information Systems:** Explain the basic concepts of an accounting information system, Describe the nature and purpose of a subsidiary ledger, Record transactions in special journals**.**	R, U, A, AN, EV

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

1. Understand the key functions of accounting in business operations.
2. Identify internal users and external users.

3. Explain fundamental accounting principles such as Accrual Principle, Matching Principle, and Revenue Recognition. Recognize accounting assumptions like Going Concern, Consistency, and Monetary Unit Assumption.
4. Analyse the Effects of Business Transactions on the Accounting Equation and apply the Golden Rules of Accounting with Practical Problem-Solving.
5. Apply the basic concepts of accounting for passing journal entries, preparing different types of ledgers with posting from journal entries and balancing the ledgers accounts
6. Prepare Trial Balance with all necessary adjustments and preparation of Profit & Loss and Balance sheet for Organisation.
7. Maintain Records for Inventory for Merchandising Operations, describe merchandising operations and inventory systems, Record purchases under a perpetual inventory system, Record sales under a perpetual inventory system, Apply the steps in the accounting cycle to a merchandising company, how to classify and determine inventory, Apply inventory valuation methods and understand net realizable value like FIFO, LIFO and Weightage Average Cost Value method of stock valuation.
8. Identify the role of AIS in financial decision-making and reporting. Recognize the benefits of automation in accounting processes. Need for subsidiary ledgers in managing detailed financial records. Understand how subsidiary ledgers link to the general ledger for efficient financial management.

Books and References:

1. Maheshwari, S. N., & Maheshwari, S. K. (n.d.). Fundamentals of accounting. (Publisher not provided).
2. Grewal, T. S. (n.d.). Introduction to accountancy. (Publisher not provided).
3. Grewal, T. S. (n.d.). Double entry book keeping. (Publisher not provided).
4. Mukherjee, A., & Hanif, M. (n.d.). Corporate accounting. (Publisher not provided).
5. Gupta, R. L., & Radhaswamy, M. (n.d.). A textbook of accountancy. (Publisher not provided).
6. Tulsian, P. C. (n.d.). Financial accounting. (Publisher not provided).
7. Monga, J. R. (n.d.). Book keeping & accountancy. (Publisher not provided).
8. Maheshwari, S. N. (n.d.). Accounting for management. (Publisher not provided).
9. Sofat, R., & Hiro, P. (2016). Basic accounting (3rd ed.). PHI Learning.
10. Narayanaswamy, R. (n.d.). Financial accounting: A managerial perspective. (Publisher not provided).

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCECO111 Economics

B. Sc (Computer Applications)		**Semester – II**		
Course Name: Economics		**Course Code: MCCECO111**		
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 the basic concepts of economics, including scarcity, choice, opportunity cost, and the application of economic models in decision-making.
2. To apply the concept of the production possibility frontier in analyzing trade-offs, opportunity costs, and the impact of economic growth on production efficiency.
3. To analyze the role of supply and demand in product and resource markets, and understand the effects of shifts in demand and supply on market equilibrium.
4. To examine the business cycle, macroeconomic policies, and the impact of aggregate demand and supply shifts on economic equilibrium.
5. To understand the measurement of unemployment, inflation, and GDP, and analyze the relationship between these indicators and the broader economy.

Unit/ Module	Name	Lectures
I	**First Principles**	**06**
II	**Economic Models**	**06**
III	**Supply and Demand: Product and Resource Markets**	**06**
IV	**Macroeconomics**	**06**
V	**Economic Indicators: Unemployment, Inflation, and Gross Domestic Product**	**06**
	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	**First Principles:** What is the difference between macro and micro economics? The central choices of economic decision making: what, how and for whom to produce? The participants in the market economy Key concepts used in economic analysis: Scarcity, choice, opportunity cost Marginal analysis and choice Ceteris Paribus or 'everything else held constant.' Positive and normative economics and using theories and models to measure economic events Various Economic tools	R, U, A
II	**Economic Models:** Trade-offs and Trade: Defining the resources used in the production of goods and services The production possibility frontier applied to the concept of opportunity cost/tradeoffs and to marginal costs and benefits; increasing marginal opportunity costs. Productive efficiency; inefficient choices and unattainable choices, Using the frontier to illustrate economic growth, attainment of new resources, technological change, and more efficient production. The circular flow of income, product and services in the economy	R, U, A
III	**Supply and Demand: Product and Resource Markets** – Role of households (consumers) and firms What is a market? Consumer demand and the "Law of Demand" Law of Demand: the inverse relationship between price and quantity demanded Change in quantity demanded vs. shift in demand: the concept of "ceteris paribus" Causes of a shift in demand: changes in income, expectations, number of consumers, tastes and preferences; Normal and inferior goods Law of Supply: The positive relationship between price and quantity supplied. Change in quantity supplied vs. a shift in supply Causes of a shift in Supply: changes in cost of resources, prices of related goods, technology, expectations of producers, number of producers Applications (examples) of Demand and Supply graphs; Market demand, market supply and market equilibrium Government price controls: price ceilings, price floors	R, U, A
IV	**Macroeconomics:** Theory and Policy: The Business Cycle in Market Economies; short-term vs. long-term growth trend Expansion, peak, decline, trough Emergence of	R, U, A, E

	modern-day macroeconomic policy to moderate effects of recessions: Components of aggregate demand and aggregate supply Shifts in the AD and AS curves: What do they show? The roots of macroeconomics: John Maynard Keynes and the Great Depression Classical vs. Keynesian economics; the short-run vs. long run model of macroeconomic equilibrium The Keynesian short-run model and the classical economists' long-run model Keynes' challenge to Say's Law: the Demand Driven Economy Wage and Price inflexibility; The role of Government Concerns of Inflation (boom times) and deflation (severe economic downturns) The impact of recession on trade imbalances	
V	**<u>Economic Indicators: Unemployment, Inflation, and Gross Domestic Product</u>** **A) Unemployment and Inflation:** How is the labor force defined? Who is in the labor force? Measuring employment and unemployment. Types of unemployment; cyclical unemployment and the business cycle. Types of Inflation, Effects & Measures to reduce Inflation The labor force participation rate Unemployment and the changes in the global economy **B) Gross Domestic Product:** Measuring the economy's output of goods and services; Two Sector, three sector & Four sector model The three markets: goods and service, labor market, money market Nominal and real GDP; Various concepts of National Income	A) R, U, A, AN, E B) R, U, A, AN, E

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

1. R**ecognize** and **explain** the basic concepts of economics, including scarcity, choice, opportunity cost, and marginal analysis.
2. A**pply** the production possibility frontier to analyze opportunity cost, trade-offs, and economic growth.
3. A**nalyze** shifts in demand and supply and how they impact market equilibrium, price, and quantity.
4. E**valuate** the business cycle and understand its effects on the economy, including recessions, inflation, and government interventions.
5. A**pply** knowledge of unemployment, inflation, and GDP to assess economic conditions and interpret national income data.

Books and References:

1. Krugman, P., & Wells, R. (2012). Macroeconomics (3rd ed.). Worth Publishers.
2. Leeds, M. A., von Allmen, P., & Schiming, R. C. (2006). Macroeconomics (1st ed.). Pearson Education.

3. Sargent, T. J., & Stachurski, J. (2019). Lectures in quantitative economics with Python. (Publisher not provided—consider updating).

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCAF108 Practical Accounting

B. Sc (Computer Applications)	**Semester – II**		
Course Name: Practical Accounting	**Course Code: MCCAF108**		
Vertical:	**General / Open Elective**		
Periods per week (1 Period is 60 minutes)	**2**		
Practical per week (1 Period is 60 minutes)	**--**		
Credits	**2**		
Evaluation System	**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Continuous Internal Assessment	**--**	**50**	**20**

Objectives of the Course:

1. Gain a solid understanding of fundamental accounting principles and practices.
2. Learn essential inventory management techniques to effectively track and manage stock.
3. Understand basic taxation concepts, including GST and TDS, and how they impact company finances.
4. Develop proficiency in simplifying and maintaining company books of accounts using TallyPrime software.
5. Acquire practical skills to perform basic to intermediate accounting tasks with confidence.
6. Explore the latest features and updates in TallyPrime software to stay current with industry standards.
7. Apply learned concepts through hands-on exercises and real-world scenarios for practical skill development.
8. Enhance decision-making abilities by analysing financial data accurately and efficiently.

9. Improve efficiency in managing company accounts, inventory, and taxation processes.
10. Prepare for further advancement in accounting and finance-related roles with a solid foundation in TallyPrime Essentials.

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

Sr. No	Proposed Syllabus As per SSC framework of NEP	Level of Knowledge Applicable as per Blooms Taxonomy
1.	**Fundamentals of Accounting** A. Identify and classify different accounting terms and concepts in TallyPrime. B. Explain and apply the Golden Rules of Accounting to various transactions. C. Record and verify transactions using the Double Entry System.	R, U, A, AN
2.	**Introduction to Tally Prime** A. Download, install, and configure TallyPrime software. B. Create a new company with appropriate features and configurations. C. Explore and analyze different company features and settings.	R, U, A, AN, CR, EV
3.	**Maintaining Chart of Accounts** A. Create and modify ledger accounts in the Chart of Accounts. B. Define and assign ledgers to appropriate accounting groups. C. Configure stock items and units of measure in TallyPrime.	U, A, CR
4.	**Recording and Maintaining Accounting Transactions** A. Record and verify different types of accounting vouchers in TallyPrime. B. Analyze and apply accounting adjustments using journal vouchers. C. Modify and correct existing voucher entries in the system.	A, AN, CR, EV
5.	**Introduction to GST and Configuration in TallyPrime**	R, U, A, AN, CR, EV

	A. Enable and configure GST settings for a company in TallyPrime. B. Define GST tax rates and apply them to different ledger accounts. C. Verify GST registration details and update tax information in company settings.	
6.	**Recording GST Transactions and Compliance** A. Record GST-compliant sales and purchase transactions in TallyPrime. B. Apply and adjust Input Tax Credit (ITC) against GST liability. C. Generate GST returns and analyze tax payment details.	R, A, CR, AN, EV
7.	**Banking** A. Perform bank reconciliation for a given bank statement. B. Configure cheque printing settings and generate a cheque printout. C. Generate payment advice for vendor transactions.	A, AN, CR
8.	**Generating Financial Statements and MIS Reports** A. Generate and analyze the Profit & Loss statement. B. Evaluate financial ratios using Ratio Analysis reports. C. Prepare a cash flow statement and interpret financial health.	AN, EV, CR
9.	**Data Security** A. Configure security controls and create user roles in TallyPrime. B. Set access restrictions and evaluate user permissions. C. Modify and update user access rights based on organizational needs.	A, AN, CR
10.	**Company Data Management** A. Perform a secure backup of company data and validate its integrity. B. Restore company data without data loss and analyze accuracy. C. Transfer company data securely between different systems.	A, AN, CR, EV

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

1. Learners will gain proficiency in fundamental accounting principles and practices, including the double-entry system and chart of accounts management.
2. Learners will develop skills in using Tally Prime software to efficiently manage company data, including creating and configuring company profiles and security controls.
3. Learners will be able to record and maintain various accounting transactions such as receipts, payments, purchases, and sales accurately using Tally Prime.

4. Learners will understand the basics of taxation, including Goods and Services Tax (GST), and be able to record GST-compliant transactions and generate GST reports in Tally Prime.
5. Learners will acquire knowledge and skills in generating essential financial statements and management information system (MIS) reports, such as balance sheets, profit and loss accounts, and cash flow statements, using Tally Prime.

Books & References:

1. Asok K. Nadhani (April 2022) Mastering Tally PRIME - BPB Publications
2. Tally Education Private Limited (August 2021) Official Guide to Financial Accounting using TallyPrime: Managing Your Business Just Got Simpler - BPB Publications

Percentage of 6 categories of Blooms Taxonomy in question paper]

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

MCCECO110 Economic Modelling

B. Sc (Computer Applications)	**Semester – II**		
Course Name: Economic Modelling	**Course Code: MCCECO110**		
Vertical:	**Generic / Open Elective**		
Periods per week (1 Period is 60 minutes)	**2**		
Practical per week (1 Period is 60 minutes)	**--**		
Credits	**2**		
Evaluation System	**Duration (in Hours)**	**Total Marks**	**Minimum Passing Marks**
Continuous Internal Assessment	**--**	**50**	**20**

Course Objectives:

1. Students will be proficient in using R, Python, Scilab, or MATLAB to build and analyze various economic models.
2. Students will develop strong data analysis and programming skills using R, Python, Scilab, or MATLAB to solve complex economic problems.
3. Students will gain hands-on experience in using computational tools to analyze economic dynamics, predict outcomes, and explore policy implications.
4. The course will equip students with the tools and knowledge to become effective economic policy analysts and contribute to evidence-based policy making.

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

List of Practical:		**Level of Knowledge Applicable as per Blooms Taxonomy**
1	Application to Asset Pricing using Geometric series for elementary economics in **R/python/scilab/matlab.**	U
2	Cass-Koopmans Optimal Growth Model using R**/python/scilab/matlab.**	A
3	a. Job Search and Separation using R**/python/scilab/matlab.**	AN,A
	b. Modeling Career Choice using R**/python/scilab/matlab.**	
4	Consumption and Tax Smoothing with Complete and Incomplete Markets using R**/python/scilab/matlab.**	U,A
5	A Lake Model of Employment and Unemployment using R**/python/scilab/matlab.**	U,A
6	Cattle Cycles model using R**/python/scilab/matlab.**	U,A
7	Von Neumann Growth Model using R**/python/scilab/matlab.**	AN, A
8	The Lucas Asset Pricing Model using R**/python/scilab/matlab.**	A
9	Implement the optimal government plan model using R**/python/scilab/matlab.**	U,A
10	Credible Government Policies in Chang Model R**/python/scilab/matlab.**	A,AN

Learning Outcomes:

1. Students will be able to critically evaluate asset pricing models using geometric series in R, Python, Scilab, or MATLAB. (Evaluate)
2. Through the use of R, Python, Scilab, or MATLAB, students will create job search and separation models to analyze labor market dynamics. (Create)
3. Students will apply the model to evaluate different development strategies and identify pathways to maximize economic welfare and stability.(Apply)
4. Using R, Python, Scilab, or MATLAB, students will analyze the impact of credible government policies on economic stability and growth in the Chang Model. (Analyze)

Books And References:

1. **Evans, R. W. (2023).** *Computational Methods for Economists using Python***.**
2. **Fackler, P. L., & Miranda, M. J. (2002).** *Applied Computational Economics and Finance***. The MIT Press.**
3. **Kendrick, D. A., Mercado, P. R., & Amman, H. M. (2006).** *Computational Economics***. Princeton University Press.**
4. **Oosterlee, C. W., & Grzelak, L. A. (2019).** *Mathematical Modeling and Computation in Finance: With Exercises and Python and MATLAB Computer Codes***. World Scientific Publishing Co.**
5. **Afonso, O., & Vasconcelos, P. B. (2016).** *Computational Economics: A Concise Introduction***. Routledge.**

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCENG110 English Technical Writing Skills

B.Sc. (Computer Applications)	**Semester – II**		
Course Name: English Technical Writing Skills	**Course Code: MCCENG110**		
Vertical:	**Ability Enhancement Course**		
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 purpose of the course is to provide learners with a comprehensive understanding of communication fundamentals, business communication, and employment-oriented communication skills.
2. This course will enhance learners' ability to communicate effectively in various professional contexts, including workplace communication, resume building, job applications, and professional writing.
3. The course will explore and apply key concepts such as business correspondence, report writing, creating abstracts and summaries, and developing user manuals, equipping learners with essential skills for professional communication.
4. These skills will be crucial for learners' career readiness, enabling them to write technical documents effectively and communicate clearly in professional environments.

Module	Name	Lectures
I	Fundamentals of Communication	**6**
II	Business Communication at Workplace	**6**
III	Employment-Oriented Communication	**6**
IV	Principles and Practices of Report Writing	**6**
V	Abstracts, Summaries, and User Manuals	**6**
	Total	**30**

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	**Fundamentals of Communication** A) Basics of Communication: Introduction, Process, Components, Factors, Significance, Need for Intercultural Communication, Communication in a Digital World. B) Verbal & Non-Verbal Communication: Introduction, Nature, Modes, Significance. C) Barriers to Communication	A) A B) U C) AN
II	**Business Communication at Workplace** A) Letter Components & Layout B) Planning a letter C) Process of letter writing D) Email Communication	A) A B) A C) A D) A E) A

	E) Memo	
III	**Employment-Oriented Communication** A) Resume & CV- Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter. B) Notice, Agenda & Minutes of Meeting. C) Brochures	A) CR B) A C) CR
IV	**Principles and Practices of Report Writing** A) Effective Writing – Diction, Effective sentences, effective reports. B) Business Report – Features, Process, Importance, Types. C) Structure of Reports.	A) A B) U C) AN
V	**Abstracts, Summaries, and User Manuals** A) Writing Abstracts and summaries – Brief, Synopsis, Abridgement, Abstract, Summary, Suggestions and procedure for writing abstracts, Forms of Abstracts, Difference between Abstract & Summary B) User Instruction Manual – Introduction, Title, Discussion Steps, Writing Style, Target Audience, Conclusion for instructions.	A) U, AN, CR B) U, AN, CR

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

1. Interpret the principles, types, and barriers of effective communication.
2. Construct professional workplace communication using standard formats and strategies.
3. Create impactful employment documents and formal meeting content.
4. Write, structure, and analyze professional reports effectively.
5. Develop concise technical documents including summaries and user guides.

Books & References:

1. Koneru, A. *Professional Communication*. Tata McGraw Hill.
2. Rao, M. S. (2016). *Strategies for Improving Your Business Communication*. Shroff Publishers and Distributors.
3. Rishipal, & Sheoran, J. (2014). *Business Communication*. SPD.
4. Raman, M., & Singh, P. (Eds.). (n.d.). *Business Communication* (2nd ed.). Oxford University Press.
5. Raman, M., & Sharma, S. (2015). *Technical Communication: Principles and Practice* (3rd ed.). Oxford University Press.
6. Kalia, S., & Agrawal, S. (2015). *Business Communication: A Practice-Oriented Approach* (1st ed.). Wiley India.
7. Kaul, A. (2015). *Business Communication* (2nd ed.). PHI Learning.

8. Lesikar, R. V., Flatley, M. E., & Rentz, K. (2010). *Business Communication: Making Connections in a Digital World* (12th ed.). McGraw-Hill Education.
9. Meenakshi, R. (2012). *Business Communication* (1st ed.). Oxford University Press.
10. Bovee, C. L., & Thill, J. V. (2017). *Business Communication Today* (14th ed.). Pearson.

Percentage of 6 categories of Blooms Taxonomy in question paper

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

MCCIKS101 Fundamentals of Indian Knowledge System

B.Sc. Computer Applications	**Semester – II**		
Course Name: Fundamentals of Indian Knowledge System	**Course Code: MCCIKS101**		
Vertical:	**Indian Knowledge System**		
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. To give a comprehensive overview of Indian knowledge system to the students
2. To help students understand and appreciate Indian literary heritage and traditions
3. To help students understand and appreciate Indian cultural heritage and traditions

4. To enable the students to recognize and value their Indianness in a global setting

Module	Name	Lectures
I	Ancient Indian literary heritage and traditions	15
II	Ancient Indian cultural heritage and traditions	15
	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	**Ancient Indian literary heritage and traditions** A) Introduction- Why IKS?; Overview of Indian Knowledge System, scope, Ancient Indian Universities, importance and significance of IKS B) Vedas and other Vedic texts, Upanishads Vedas and other Vedic texts, Upanishads C) Ancient Indian Mathematics, Astronomy, Astrology, and Medicine D) Advances in engineering and technology in Ancient India E) Gurukul System in India, Evolution of Sanskrit and other Indian languages, Ancient Indian Scripts	R,U,AN
II	**Ancient Indian cultural heritage and traditions** A) Agriculture in Ancient India B) Ancient Indian crafts and industries C) Trade and Commerce in Ancient India D) Ancient Indian Architecture: Religious and Secular E) Yoga and Arts in Ancient India	R,U,AN

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

1. Develop an understanding of Indian knowledge system.
2. Understand and appreciate Indian literary heritage and traditions.
3. Understand and appreciate Indian cultural heritage and traditions.
4. Be able to recognize and value their Indianness in a global setting.

Books & References:

1. A. P. J. Abdul Kalam, Sujatha Ramdorai, and Leena Chandran-Wadia, A History of Indian Science, Technology, and Culture, 1st edition, PHISPC, 2017

2. Altekar, A.S., Education in Ancient India, 1944
3. Anjan Chakraverty, Indian Miniature Paintings", 1st edition. Roli Books, 2015
4. Bose, D. N., Science and Technology in India: A Historical Perspective, 1st edition, PHISPC, 1987
5. Chakraborti, Haripada Trade and commerce of ancient India (c. 200 B.C.-c. 650 A.D.), Academic Publishers, Calcutta, 1966
6. Chandra, Moti, Trade and Trade Routes in Ancient India, February 2011
7. E. B. Havell, "The Story of Indian Art", revised edition. Low Price Publications, 2016
8. Emmie Te Nijenhuis, "Indian Music: History and Structure", 1st edition. Rill Academic Publishers, 1974
9. Kosambi D.D., Indian Numismatics, Oriental Black Swan, 1981
10. Leela Venkataraman, Indian Classical Dance: The Renaissance and Beyond, 2nd edition. Wisdom Tree, 2007)
11. Mitra, A., The Story of Indian Science: A Journey into the Unknown. CRC Press, 2005
12. Mujumdar, R.C., The Vedic Age: The History and Culture of the Indian People (Vol.1), Bharatiya Vidya Bhavan, Mumbai
13. Narlikar, J. V., The Scientific Edge: The Indian Scientist from Vedic to Modern Times 1st edition, Penguin Books, 2016
14. Pandalai, S. G. (Ed.)., Advances in Science, Technology & Innovation: Fostering Science and Technology in India, 1st edition Springer, 2017
15. Pillai, Jagdeesh Indian Handicrafts: A Cultural Exploration of the Crafts and Textile Traditions of India, Notion Press, 2023
16. Ratan Parimoo, Indian Art: Forms, Concerns, and Development in Historical Perspective, 1st edition. Abhinav Publications, 2004
17. Singh, Sahana, Revisiting the Educational Heritage of Ancient India, 2021
18. Singhania Nitin, Indian Art and Culture", 3rd edition. McGraw-Hill Education, 2020
19. Srivasta Prashant, Aspects of Ancient Indian Numismatics, Agam Kala Prakashan, Delhi, 2022
20. T S Bhanu Murthy, A Modern Introduction to Ancient Indian Mathematics, New Age International Publishers, 2008
21. Thapar, Romila, Indian Cultures as Heritage: Contemporary Pasts, Aleph, 2018
22. Vidya Dehejia, Indian Art, 1st edition. Phaidon Press,1997
23. Wheeler, Mortimer, The Paintings of India, Asia Publishing House, 1967

Percentage of 6 categories of Blooms Taxonomy in question paper

	Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**	
% in Question Paper	50	50	-	-	-	-	100%

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 2) 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.

5. 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.