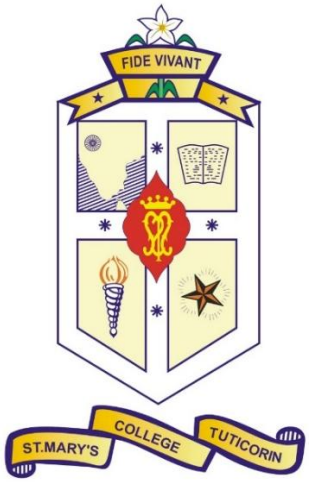
ST. MARY'S COLLEGE (AUTONOMOU

(Accredited by NAAC at A+ Grade in 4th Cycle)

Thoothukudi – 628 001.



SYLLABUS

B.Sc. COMPUTER SCIENCE

(w.e.f June 2024)

B.Sc. Computer Science

Course Structure (w.e.f. 2024)

Preamble:

B.Sc. The Computer Science program helps students master the basic skills needed to analyze a problem and design, implement, and find a solution to meet the ever-changing demands of the industry and nurture their innovation and creativity.

Vision:

Empower girls byte by byte.

Mission:

To create computer professionals of immense quality and impeccable manners who can face and survive the computing and communication revolution that lies ahead with great confidence.

PROGRAMME OUTCOMES (PO):

PO No.	**After completion of the Undergraduate programme the students of St. Mary's College will be able to**
PO 1	acquire an in-depth domain knowledge and a comprehensive knowledge of various disciplines to become skilled professionals
PO 2	enrich their communicative skills, and enhance their creative, numerical, analytical and problem-solving skills
PO 3	gain potential skills to excel in digital literacy, team management, scientific reasoning, research and self-directed life-long learning to emerge as entrepreneurs
PO 4	be aware of the environment with a social responsibility for the well-being of humanity and the planet at large
PO 5	be an empowered, economically independent woman with a global perspective to emerge holistically in the egalitarian society

PROGRAMME-SPECIFIC OUTCOMES (PSO):

PSO.No	Upon completion of B.Sc Degree programme, the graduates will be able to	PO
PSO-1	acquire in-depth knowledge in the field of Computer Science and aligned areas	1
PSO-2	Understand, formulate and develop programming models for software solutions	1,2
PSO-3	Apply problem-solving skills and programming knowledge to provide solutions for real-world problems	2,3
PSO-4	enhance the level of knowledge in recent techniques and tools to analyse, design and develop constructive computer applications	2,3
PSO-5	develop a range of generic skills helpful in employment and get adequate exposure to global and local concerns that provide a platform for further exploration into multi-dimensional aspects of Computing sciences	4,5

Semester I

Part	Components	Course Code	Course Title	Hrs/	Credits	Max. Marks

				Week		CIA	ESE	Total
I	Tamil / French	24ULTA11 24ULFA11		6	3	40	60	100
II	General English	24UGEN11		6	3	40	60	100
III	Core I	24UCSC11	Programming with C and C++	5	5	40	60	100
	Core Practical I	24UCSCR1	C and C++ Programming Lab	3	3	40	60	100
	Generic Elective I	24UCSE11	Discrete Mathematics	4	3	40	60	100
	Generic Elective Practical I	24UCSER1	Discrete Mathematics Lab	2	1	40	60	100
IV	Skill Enhancemer Course I	24UCSSE1	Office Automation Lab	2	2	20	30	50
	Ability Enhancem Course I	24UAVE11	Value Education	2	2	20	30	50
Total				**30**	**22**			

Semester II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil / French	24ULTA21 24ULFA21		6	3	40	60	100
II	General English	24UGEN21		6	3	40	60	100
III	Core II	24UCSC21	Java Programming	5	5	40	60	100
	Core Practical II	24UCSCR2	Java Programming Lab	3	3	40	60	100
	Generic Elective II	24UCSE21	Digital Logic Fundamental	4	3	40	60	100
	Generic Elective Practical II	24UCSER2	Multimedia Lab 1	2	1	40	60	100
IV	Skill Enhancement Course II	24UCSSE2	Advanced Excel Lab	2	2	20	30	50
	Ability Enhancement Course II	24UAEV21	Environmental Studies	2	2	20	30	50
Total				**30**	**22**			

Semester III

Part	Components	Course Code	Course Title	Hrs/ Week	Cred	Max.Mark		
						CIA	ES	Tota
I	Tamil / French	24ULTA31 / 24ULFA31		6	3	40	60	100
II	General English	24UGEN31		6	3	40	60	100
III	Core III	24UCSC31	Python Programming	4	4	40	60	100
	Core Practical III	24UCSCR3	Python Programming Lal	2	2	40	60	100
	Generic Elective III	24UCSE31	Data Structures and Algorithms	4	3	40	60	100
	Generic Elective Practical III	24UCSER3	Data Structures and Algorithms Lab	2	1	40	60	100
	NME I	24UCSN31	Computer Literacy	2	2	20	30	50
IV	Skill Enhancement Course III	24UCSSE3	Web Designing Lab	2	2	20	30	50
	Ability Enhancement Course III	24UAYM31	Yoga and Meditation	2	2	20	30	50
	Self Study/ MOOC / Internship (Compulsory)	24UCSSS1	Computer Architecture		+2		50	50
				30	**22+**			

Semester IV

Part	Components	Course Cod	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French	24ULTA41 / 24ULFA41		6	3	40	60	100
II	General English	24UGEN41		6	3	40	60	100
III	Core IV	24UCSC41	PHP and MySQL	4	4	40	60	100
	Core Practical IV	24UCSCR4	PHP and MySQL La	2	2	40	60	100
	Generic Elective IV	24UCSE41	Statistical Methods	4	3	40	60	100
	Generic Elective Practical I	24UCSER4	Statistical Methods L	2	1	40	60	100
	NME II	24UCSN41	Internet Literacy	2	2	20	30	50
IV	Skill Enhancement Course IV	24UCSSE4	Multimedia Lab 2	2	2	20	30	50
	Ability Enhancement Course IV (Entrepreneurial Based)	24UACS41	Graphic Design	2	2	20	30	50
V	NCC / NSS / Sports				1			
	CDP(Extension Activity)				+1			
Total				**30**	**23+1**			

Semester V

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
III	Core V	24UCSC51	.NET Programming	5	5	40	60	100
	Core VI	24UCSC52	Microprocessors	5	4	40	60	100
	Core VII	24UCSC53	Data Mining and Warehousing	5	4	40	60	100
	Core VIII	24UCSC54	Software Engineering and Testing	5	4	40	60	100
	Core Practical V	24UCSCR5	. NET Programming Lab	4	3	40	60	100
	Discipline Specific Elective I	24UCSE51/ 24UCSE52	IoT and its Applications/ Smart Devices Programming	4	4	40	60	100
IV	Skill Enhancement Course V	24UCSSE5	MATLAB	2	1	20	30	50
	Self-Study / Online Course / Internship (Optional)	24UCSSS2	Mathematical Reasoning		+2		50	50
Total				**30**	**25+2**			

Semester VI

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
III	Core IX	24UCSC61	Data Analytics using R	6	5	40	60	100
	Core X	24UCSC62	Computer Networks	5	5	40	60	100
	Core XI	24UCSC63	Operating Systems	5	5	40	60	100
	Core Practical VI	24UCSCR6	R Programming Lab	4	3	40	60	100
	Core XII (Project)	24UCSP61	Project and Viva voce	6	4	40	60	100
	Discipline Specific Elective II	24UCSE61/ 24UCSE62	Cloud Computing / Cyber Forensic	4	4	40	60	100
Total				**30**	**26**			

SEMESTER I

Core 1	Programming with C and C++		
Course Code: 24UCSC11	**Hrs/week: 5**	**Hrs / Semester: 75**	**Credits: 5**

Objectives:

- To learn fundamental concepts of C and C++
- To understand the Programming techniques using C and C++
- To acquire knowledge of object-oriented programming

CO.No.	Upon completion of this course, students will be able to	CL
CO-1	describe the structured and object-oriented paradigm concepts of programming	K1
CO-2	understand the fundamentals of programming with C and C++	K2
CO-3	demonstrate the programming techniques with various types of statements in C and use of various OOP concepts	K3
CO-4	examine the algorithms and programs to find solutions using C and C++	K4
CO-5	explain and develop programs to solve problems through looping, array concepts, object-oriented concepts of function overloading, operator overloading, and inheritance.	K5

SEMESTER I			
Core 1	**Programming with C and C++**		
Course Code: 24UCSC11	**Hrs/week: 5**	**Hrs / Semester: 75**	**Credits: 5**

Unit I:

Constants, variables, and Data Types: History of C - Character Set. - CTokens -Keywords and Identifiers - Constants -Variables -Data Types -Declaration of Variables -Declaration of Storage Class. Assigning Values to Variables - Defining Symbolic Constants -Declaring a Variable as Constant

Operators and Expressions: Introduction - Arithmetic Operators - Relational Operators - Logical Operators -Assignment Operators -Increment and Decrement Operators -Conditional Operator - Bitwise Operators - Special Operators - Arithmetic Expressions - Evaluation of Expressions -Precedence of Arithmetic Operators - Type Conversions in Expressions -Operator Precedence and Associativity -Mathematical Functions

Unit II:

Managing Input and Output Operations: Reading a Character -Writing a Character - Formatted Input - Formatted Output - Decision Making and Branching

Decision Making and Branching: Introduction -Decision Making with IF Statement -Simple IF Statement - The …IF ELSE Statement - Nesting of IF... ELSE Statements - The ELSE IF Ladder - The Switch Statement -The ?: Operator The GOTO Statement

Decision Making and Looping: Introduction -The WHILE Statement -The DO Statement. -The FOR Statement - Jumps in LOOPS - Concise Test Expressions

Unit III:

Arrays: -One-dimensional Arrays -Declaration of One-dimensional Arrays - Initialization of One-dimensional Arrays - Two-dimensional Arrays - Initializing-Two-dimensional Arrays - Multi-dimensional Arrays - Dynamic Arrays - More about Arrays

Character Arrays and Strings:- Declaring and Initializing String Variables
-Reading Strings from Terminal - Writing Strings to Screen -Arithmetic Operations on Characters -Putting Strings Together -Comparison of Two Strings - String-handling Functions
-Table of Strings - Other Features of Strings

Unit IV:

Functions:- function prototyping - call by reference -return by reference - inline functions - default arguments -function overloading

Classes and Objects: - Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Constructor and destructor with static members.

Unit V:

Operator Overloading:- Overloading unary, binary operators – Overloading Friend functions – type conversion.

Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multipath inheritance – Virtual base Classes – Abstract Classes.

Text Books:

1. E. Balagurusamy, " *Programming in ANSI C"* .India: McGraw Hill Education Private Limited, Eighth Edition 2019.
2. E. Balagurusamy, "*Object-Oriented Programming with C++*", TMH 2013, 7th Edition.

Books for Reference:

1.Byron Gottfried, "*Programming with C*". India: McGraw Hill Education Private Limited. 3rd Edition 2017.
2. Ashok N Kamthane, "*Object-Oriented Programming with ANSI and Turbo C++*", Pearson Education 2003.
3. Bjarne Stroustrup, "*The C++ Programming Language*", Fourth Edition, Pearson Education

4. Hilbert Schildt, (2009), "*C++ - The Complete Reference*", 4th Edition, Tata McGraw-Hill

Web Resources:

1.https://alison.com/course/introduction-to-c-plus-plus-programming

2. https://www.programiz.com/cpp-programming

PSO Relation Matrix (Course Code: 24UCSC11)

Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	2	2	2	1	2	2	2	2	2	2
CO-2	2	2	2	1	2	2	2	2	2	2
CO-3	2	3	3	1	2	3	3	3	3	3
CO-4	3	3	3	1	3	3	3	3	3	3
CO-5	3	3	3	1	3	3	3	3	3	3
Ave.	2.4	2.6	2.6	5	2.4	2.6	2.6	2.6	2.6	2.6

SEMESTER- I			
Core Practical 1	**C and C++ Programming Lab**		
Course Code: 24UCSCR1	**Hrs/week: 3**	**Hrs / Semester: 45**	**Credits: 3**

Objectives:

- To write programs using branching statements and array concepts in C.
- To write programs with classes and functions in C++.
- To develop programs in C++ using object-oriented concepts.

CO. No.	Upon completion of this course, students will be able to	CL
CO-1	describe the algorithms and write simple programs in C with various operators	K1
CO-2	understand the fundamental concepts of branching and develop programs to solve problems using C and C++ programming languages	K2
CO-3	apply the concepts of arrays and functions to develop programs in C and C++ programming languages	K3
CO-4	examine and develop the programs using classes and objects	K4
CO-5	explain and develop programs using object-oriented concepts of function overloading, operator overloading, and inheritance.	K5

Practical List:

1. Solve Quadratic equation-control statements.
2. The sum of Digits and reverse the number.
3. Prime number Checking.
4. Sine Series evaluation.
5. Sorting an Array of numbers
6. Linear Searching
7. Area calculation using Function overloading (Minimum three functions).
8. Implement constructor overloading
9. Implement a friend function.
10. Overload the Binary + operator which adds two complex numbers.
11. Process students' mark lists using multiple inheritances.
12. Process telephone billing using multilevel inheritance.

PSO Relation Matrix (Course Code: 24UCSCR1)

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	2	2	2	1	2	2	2	2	2	2
CO-2	2	2	2	1	2	2	2	2	2	2
CO-3	2	3	3	1	2	3	3	3	3	3
CO-4	3	3	3	1	3	3	3	3	3	3
CO-5	3	3	3	1	3	3	3	3	3	3
Ave.	2.4	2.6	2.6	1	2.4	2.6	2.6	2.6	2.6	2.6

SEMESTER I			
Generic Elective I	**Discrete Mathematics**		
Course Code: 24UCSE11	**Hrs / week: 4**	**Hrs /Semester:60**	**Credits: 3**

Objectives:

- To attain mathematical foundations this is essential for the study of computer courses.
- To make the students capable of mathematically formulating certain practical problems.
- To understand the basic concepts of graphs, directed graphs, and weighted graphs and able to present a graph by matrices

Course Outcomes:

CO.No.	Upon completing this course, students will be able to	CL
CO-1	acquire knowledge of the concepts of set theory and relations	K1
CO-2	understand and construct mathematical functions and algorithms	K2
CO-3	apply counting techniques to solve computational problems	K3
CO-4	describe and manipulate propositional calculus	K4
CO-5	evaluate the validity of logical arguments and use graphs and trees as tools to visualize and simplify situations	K5

SEMESTER I			
Generic Elective I	**Discrete Mathematics**		
Course Code: 24UCSE11	**Hrs/week: 4**	**Hrs /Semester:60**	**Credits: 3**

Unit I:

Set Theory – Introduction – sets and elements – universal set and empty set –Subsets – Venn Diagrams – set operations – Algebra of sets and duality – finite sets, counting principle – class of sets, power sets, partitions – mathematical induction.

Relations – Introduction – product sets – relations – pictorial representations of relations – composition of relations – types of relations – closure properties – equivalence relations – partial ordering relations – n-ary relations.

Unit II:

Functions and Algorithms – Introduction – functions – One – to – one – Onto and Inevitable functions – mathematical functions, exponential and logarithmic functions – sequences, indexed classes of sets – recursively defined functions – cardinality – algorithms and functions – complexity of algorithms.

Unit III:

Logic and Propositional Calculus :- propositions and compound propositions – Basic logical operations – propositions and truth tables – tautologies and contradictions – logical equivalences – algebra of propositions – conditional and biconditional statements – arguments – logical implication – prepositional functions, Quantifiers – Negation of quantified statements.

Unit IV:

Counting :-Basic counting principles – factorial Notation – Binomial coefficients – permutations – combinations – the pigeonhole principle – the inclusion–exclusion principle – ordered and unordered partitions.

Unit V:

Graph Theory:- data structures – graphs and multigraphs – subgraphs, Isomorphic and homeomorphic graphs – paths, connectivity – the bridges of Konigsberg, traversable multigraphs – labeled and weighted graphs – complete, regular, and bipartite graphs – tree graphs.

Directed Graphs: Directed Graphs- Basic Definitions- Rooted Trees.

Text Book:

1. Seymour Lipschutz, Marc Lipson "*Discrete Mathematics*" Third Edition 2010, Tata McGraw Hill.

Books for Reference:

1. B.S. Vatsa, "*Discrete Mathematics*", Wishwa Prakashan, Third Edition.

2. K.D. Joshi, "*Foundation of Discrete Mathematics*", Wiley Eastern Ltd.

PSO Relation Matrix (Course Code: 24UCSE11)

Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	3	3	2	1	2	3	3	3	1	2
CO-2	3	3	2	1	2	3	3	3	1	2
CO-3	3	3	2	1	2	3	3	3	1	2
CO-4	3	3	2	1	2	3	3	3	1	2
CO-5	3	3	2	1	2	3	3	3	1	2
Ave.	3	3	2	1	2	3	3	3	1	2

SEMESTER I			
Generic Elective Practical I	**Discrete Mathematics Lab**		
Course Code: 24UCSER1	**Hrs/week: 2**	**Hrs /Semester:30**	**Credits: 1**

Objectives:

- To write programs to understand the concepts of discrete mathematics.
- To write programs using functions.
- To develop programs to implement counting principles of mathematics.

Practical List:

1. Sum of series of squares of N numbers
2. Sum of a series of odd numbers
3. Sum of series of even numbers
4. Polynomial Evaluation using Horner's methods.
5. Greatest Common divisor using Euclidian Algorithm.
6. Evaluate the function using the Ackermann function.
7. Generate Pascal's Triangle.
8. Fibonacci series using recursive function.
9. Binomial co-efficient using recursive function.
10. Find out the frequency of numbers using a function.
11. Computing Permutation P(n,r) and Permutation with repetitions.
12. R- Combination of a string

SEMESTER I

Skill Enhancement Course I (Discipline Specific)	Office Automation		
Course Code:24UCSSE1	**Hrs / week:2**	**Hrs / Semester: 30**	**Credits :2**

Objectives:

- To familiarize various Microsoft Office components
- To apply various formatting tools
- To create effective presentations

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	CL
CO-1	acquire basic knowledge of Word and PowerPoint.	K1
CO-2	understand the formatting of texts in Word and the basics of presentation.	K2
CO-3	construct tables, organise Word documents with images, utilize animations in PowerPoint,	K3
CO-4	examine spell checker and references.	K4
CO-5	create a mail merge and Create a PowerPoint with audio and video.	K5

SEMESTER I	
Skill Enhancement Course I (Discipline Specific)	**Office Automation Lab**

Course Code:24UCSSE1	Hrs / week:2	Hrs / Semester: 30	Credits:2

Practical List:

1. Use various formatting in a Word Document. Use find and replace.
2. Prepare a Calendar in a Word Document
3. Design a wedding invitation in a Word Document
4. Use mail merge in Word document.
5. Picture Insertion and Alignment.
6. Create and Design Admission/Enquiry Forms.
7. Use smart art and create organization charts.
8. Create a PowerPoint presentation about your college.
9. Create a PowerPoint presentation about your hobbies.
10. Create a PowerPoint presentation about the sport that you like.
11. Create or edit presentation handouts.
12. Create Organization Chart and add transition effects.

SEMESTER II	
Core II	**Java Programming**

Course Code: 24UCSC21	Hrs / week: 5	Hrs / Semester: 75	Credits: 5

Objectives:

- To understand the basic concepts and fundamentals of platform-independent Object-Oriented Language.
- To demonstrate skills in writing programs with exception-handling techniques and Multithreading.
- To understand streams, efficient user interface design techniques, Applets, AWT and Database concepts.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	CL
CO-1	understand the concepts related to Java Technology.	K1
CO-2	design Packages, Manage Exceptions and Apply Threads.	K2
CO-3	apply the concepts of Multithreading and Exception handling to develop efficient and error-free codes.	K3
CO-4	create GUI screens as well as handle events.	K4
CO-5	develop databases through Java programs, using Java Database Connectivity (JDBC)	K5

SEMESTER II			
Core II	**Java Programming**		
Course Code: 24UCSC21	**Hrs / Week :5**	**Hrs / Semester: 75**	**Credits :5**

Unit I:

The History and Evolution of Java - Overview of Java - Operators – Control Statements – Introducing Classes - A Closer Look at Methods and Classes - Inheritance.

Self-Learning: Data Types, Variables and Arrays.

Unit II:

Packages and Interfaces: Packages - Access Protection – Importing Packages- Interfaces.
Exception Handling: Exception-Handling Fundamentals-Exception Types-Uncaught Exceptions-Using try and catch- Multiple catch clauses-Nested try Statements-throw-throws-finally-Java's Built-in Exceptions.
I/O Basics-Reading Console Input-Writing Console Output-The PrintWriter Class-Reading and Writing Files:

Multithreaded Programming: Java Thread Model-Main Thread-Creating a Thread-Creating Multiple Threads- Using is Alive() and join ()-Thread Priorities-Synchronization - Interthread Communication-Suspending, Resuming, and Stopping Threads.

Unit III:

The Applet Class: Applet Basics -Applet Architecture - Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - HTML APPLET tag - Passing Parameters to Applet.

Event Handling: Event Handling Mechanisms - Delegation Event Model - Event Classes(The Action Event, Item Event, Key Event , Mouse Event) - Sources of Events - Event Listener Interfaces(Action Listener ,Item Listener, Key Listener, Mouse Listener).

Unit IV:

Introducing the AWT: AWT Classes-Window fundamentals -working with Frame Windows - Working with Graphics.

Using AWT Controls: Controls Fundamentals -Labels-Using Buttons-Applying Check Boxes-Check Box Group-Choice Controls-Using a Text Field-Using a Textarea-Understanding Layout Managers-[Flow Layout Only]-Menu Bars and Menus.

Self Learning: Adapter Classes

Unit V:

JDBC: JDBC – JDBC versus ODBC – Types of JDBC drivers – Connection – Statement – PreparedStatement.- Fields of ResultSet – Methods of ResultSet – Executing a query - ResultSetMetaData – DatabaseMetaData.

Self Learning: Basic data types in JDBC

Text Books:

1. Herbert Schildt. "*The Complete Reference Java™*" . New Delhi:Tata Mc Graw Hill. 8th Edition 2011.

2. S. Horstmenn and Gary Cornell, "*Core Java2 Volume II Advanced Features".* The Sun Microsystems press Java Series. 2002.

Books for Reference:

1. Steven Holzner. "*Java 2 Programming Black Book*." New Delhi: Dream Tech Press.2005.

2.Joseph O'Neil. "*JavaBeans Programming from the GroundUp",*. New Delhi: TMGH. 1998

3. Kathy Walrath. "*The J2EE Tutorial" , New* Delhi: Pearson. Education Asia 2003.

PSO Relation Matrix (Course Code: 24UCSC21)

Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	2	2	3	1	2	2	2	3	3	3
CO-2	3	2	3	1	2	3	2	3	3	3
CO-3	3	3	3	1	2	3	3	3	3	3
CO-4	3	3	3	1	2	3	3	3	3	3
CO-5	3	3	3	1	3	3	3	3	3	3
Ave.	2.8	2.6	3	1	2.2	2.8	2.8	3	3	3

SEMESTER II			
Core Practical II	**Java Programming Lab**		
Course Code: 24UCSCR2	**Hrs/week: 3**	**Hrs / Semester: 45**	**Credits: 3**

Objectives:

- To provide fundamental knowledge of object-oriented programming.
- To enable the students to know about String Concepts and Event Handling.
- To equip the student with programming knowledge in to create GUI using AWT controls.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	CL
CO-1	write object-oriented programs in Java: Objects, Classes, constructors, Inheritance, Overloading and overriding methods, Abstract classes, and Extended classes.	K3
CO-2	develop Packages, Interfaces and Exception Handling in Java.	K5
CO-3	develop GUI applications to handle events.	K5
CO-4	develop Applet programs.	K5
CO-5	develop database through Java programs, using Java Database Connectivity (JDBC)	K5

Practical List:

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.
2. Write a Java program that displays the number of characters, lines and words in a text
3. String Manipulation using Character Array and perform the following String operations:

i. String length ii. Finding a character at a particular position iii. String Concatenation.

4. Implement Overloading Constructor and Overloading Method

5. Writing a Program to apply method Overriding concept.

6. Development of Java Packages

7. To create and implement an interface.

8. To create a thread i. Using Thread class ii. Using runnable interface

9. To create an applet with four Checkboxes with labels and a Text area object.

10. To create a window with a checkbox group with boxes for the colors, Violet, Indigo, Yellow, Orange, Red, Blue and Green. When the button is selected the background color must change accordingly.

11. To demonstrate the use of choice box.

12. Write a program to demonstrate the use of following exceptions.

i. Arithmetic Exception ii. Number Format Exception

iii. ArrayIndexOutofBoundException iv. NegativeArraySizeException

13. To illustrate mouse event handling.

14. Menu Creation.

15. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, and % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

SEMESTER II			
Generic Elective II	**Digital Logic Fundamentals**		
Course Code: 24UCSE21	**Hrs/week:4**	**Hrs / Semester: 60**	**Credits :3**

Objectives:

- To understand the basic concepts used in the design and analysis of digital systems
- To study number systems, various Boolean gates and functions
- To construct digital circuits using MSI and LSI logic circuits.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	CL
CO-1	understand various number systems, boolean functions and logic gates.	K1
CO-2	summarize various methods to simplify boolean function.	K2
CO-3	describe combinational circuits with logic gates.	K3
CO-4	construct digital circuits for boolean functions with logic gates.	K4
CO-5	analyse the operation of various flip-flops.	K5

SEMESTER II			
General Elective II	**Digital Logic Fundamentals**		
Course Code: 24UCSE21	**Hrs / week :4**	**Hrs / Semester: 60**	**Credits :3**

Unit I:

Binary Systems: Digital Computers and Digital Systems – Binary numbers – Number base conversion – Octal and Hexadecimal numbers – Complements– Binary Codes –Basic theorems and properties of boolean algebra– Boolean functions– Canonical and Standard forms .

Self Learning : Digital Logic Gates

Unit II:

Simplification of Boolean Functions: The Map method – Two and Three variable Maps – Four Variable Map– Five and Six Variable Maps – Product of Sums Simplification – NAND and NOR Implementation– Don't care conditions – The Tabulation method – Determination of Prime – Implicants – Selection of Prime – Implicants

Unit III:

Combinational Logic: Introduction– Design Procedure – Adders – Subtractors – Code Conversion– Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive-OR and Equivalence Functions.

Unit IV:

Combinational Logic with MSI and LSI: Introduction– Binary Parallel Adder – DecimalAdder– Magnitude Comparator– Decoders – Multiplexers

Unit V:

Registers and Counters: Sequential logic -Introduction – Flip-Flops -Basic Flip-Flop Circuit-Clocked RS Flip-Flop-D-Flip-Flop-JK Flip-Flop- T-Flip-Flop- Registers – Shift Registers

Text Book:

1. M. Morris Mano, "*Digital Logic and Computer Design"*, Noida: Pearson education India, First Edition, 2016.

Books for Reference:

1. Charles H.Roth, Jr. "*Fundamentals of Logic Design"*, New Delhi: Cengage Learning India Private Limited, 7th Edition, 2015
2. Donald.Givone, "*Digital Principles and Design"*, New Delhi: Tata McGraw-Hill, First Edition,2012.
3. Donald P.Leach and Albert Paul Malvino, "*Digital Principles and Applications"*, New Delhi: Tata McGraw Hill, 8th Edition, 2014.

PSO Relation Matrix (Course Code: 24UCSE21)

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	3	3	2	1	2	3	3	3	1	2
CO-2	3	3	2	1	2	3	3	3	1	2
CO-3	3	3	2	1	2	3	3	3	1	2

CO-4	3	3	2	1	2	3	3	3	1	2
CO-5	3	3	2	1	2	3	3	3	1	2
Ave.	3	3	2	1	2	3	3	3	1	2

SEMESTER II			
Generic Elective Practical II	**Multimedia Lab 1**		
Course Code: 24UCSER2	**Hrs/week: 2**	**Hrs / Semester: 30**	**Credits: 1**

Objectives:

- To understand the various tools used in image editing
- To make use of effects and filters in image editing
- To create logos and advertisements

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	CL
CO-1	understand the fundamentals of Photoshop and how to navigate the interface.	K1
CO-2	develop proficiency in using basic and advanced tools and features to manipulate images and graphics.	K2
CO-3	learn how to work with layers, selections, and masks to create complex designs and artwork.	K3
CO-4	gain expertise in color correction, photo retouching, and compositing.	K4
CO-5	apply design principles and best practices to create professional-quality graphics, logos, and advertisements.	K5

Practical List:

1. Design a sport poster design using layer mask.

2. Design image with double exposure effect.

3. Design creative fish tank.

4. Design window shadow with light effect.

5. Design a company advertisement using text behind an object.

6. Design a photo frame using a dripping photo effect.

7. Remove tooth braces, pimples from cheeks, dark circles and change the color of the teeth.

8. Design image with bubble effect.

9. Design a image with glowing effect.

10. Design a image with typography effect.

11. Use Filters.

12. Create frame animation.

SEMESTER II			
Skill Enhancement Course II (Discipline Specific) **Advanced Excel Lab**			
Course Code: 24UCSSE2	**Hrs/week: 2**	**Hrs /Semester:30**	**Credits: 2**

Objectives:

- To help the students learn the advanced features of Excel, to summarise, analyse, explore, and present visualisations of data in the form of charts, graphs.
- To make the students Create financial models, and budgeting using advanced Excel functions.
- To analyse Data Using PivotTables and Pivot Charts

CO No.	Upon completion of this course, students will be able to	CL
CO-1	learn how to use various functions and effectively manage large amounts of data.	K1
CO-2	aggregates numeric data, and summarise it into categories and subcategories.	K2
CO-3	apply Filtering, sorting, and grouping data or subsets of data	K3
CO-4	create Simple and classic Pivot Tables, Grouping based on numbers and Dates	K5
CO-5	create dynamic and interactive charts and integrate many charts into one	K5

Practical List:

1. Fing the following: i. VLOOKUP with MATCH Function in Excel

ii. Pulling Out Data Based on Partial Match with VLOOKUP

iii. How to use the HLOOKUP Function in Excel?

iv. How to use the LOOKUP Function in Excel?

2. **Troubleshoot VLOOKUP Function.**

In this exercise, you'll find five VLOOKUP related errors. Your task is to fix those errors. You shouldn't use IFERROR, IFNA, or similar functions. The five errors are:

i. **VALUE! error**

Formula on the cell: =VLOOKUP (C10,A1:D11,0,true)

ii. **N/A error**

Formula on the cell: =VLOOKUP (B11,$B$1:$D$6,3,0)

ii. **REF error**

Formula used: =VLOOKUP(B2,B2:C7,4,0)

iii. **Wrong Output error**

Formula used: =VLOOKUP

iv. **NAME error**

Formula used: = VLOOKUP(B15,A2:D11,3,fa)

3. **Date Calculations and Conditional Formatting:**

i. Calculate your Age from Date of Birth

ii. Apply formats to students over 19 years

4. **Pivot Table:**

i. Create a pivot table

ii. How can you modify the Pivot Tables in Excel.

5. A worksheet contains the following data:

	NAME	GENDER	CLASS	CATEGORY	FEES
1	Joe	M	SY	Open	5000
2	Deep	M	FY	Open	3000
3	Jayesh	M	SY	Reserved	1000
4	Yash	M	TY	Reserved	1000
5	Sara	F	FY	Reserved	500
6	Gita	F	FY	Open	3000
7	Jinal	F	TY	Open	5000
8	Kavita	F	SY	Open	4000
9	Minal	F	SY	Reserved	1000
10	Karan	M	TY	Reserved	1000
11	Abhay	M	TY	Open	5000
12	Bina	F	FY	Open	3000
13	Seema	F	FY	Reserved	2500
14	Naresh	M	FY	Reserved	1500
15	Rima	F	TY	Open	5000
16	Gajendra	M	SY	Open	4000

Filter the worksheet to show

a) Female students from the Reserved category

b) Male students from TY

c) Open category students paying fees > 3000

6. Data Cleaning and Processing

The Olympic committee has data on the athletes “Athletes.xlsx” (attached) and is found to be dirty for any analysis. To be ready for analyzing and obtaining the answers for various questions:

a. Clean up the file

b. Freeze the 1st row and the 1st column

c. Make the 1st row filterable

d. Make the names of the athletes in the proper case

e. Highlight Gold Medalist with Red text, Bold and Green background. Also, highlight the athlete with a Cost per head below 80 units.

f. Vegetarians are marked with 0 and non-vegetarians with 1. Change this marking and denote all vegetarians as Yes and non-vegetarians as No. The Married column has also coded 0 for Unmarried and 1 for Married. Change this coding and mark Unmarried to No and Married to Yes

g. The committee wants to mention the religion of the athletes as "Christian, Muslim, Hindu, Others" in this dataset. Create a column "Religion" and make the necessary validation so that the columns do NOT take values other than "Christian, Muslim, Others"

h. Arrange the data in Alphabetical order of the column "Nationality", Name" and "Discipline" and provide serial values in the first column, "Sl. No

7. Use Database Functions in Excel.

8. Sorting and Filtering.

9. A worksheet containing Roll Number and marks in 5 subjects for 10 students in a class, Calculate the Result and Grade using the following:

i. A student is declared PASS if he gets 40 or more in all subjects, Otherwise FAIL.

ii. A student fails if they score below 40 in any subject.

iii. For PASSED students Grades will be obtained as follows:

AVERAGE	**GRADE**
>=60	I
<60 but >=50	II
<50 but >=40	III

10. For the following worksheet containing the amount spent for various items during the year, prepare scenarios were

a) Machinery increases to 80,000, carriage increases to 9000 & Postage increases to 8000

b) Carriage increases to 10,000 Office equipment increases to 7000 and postage increases to 9000

S.No.	Items	Items
1	Machinery	60000
2	Carriage	8000
3	Transport	30000
4	Office equipment	6000
5	Postage	7000
6	Miscellaneous	3000

7	Generator	5000
8	Total	119000

11. Mr. Raj is a cricketer and has a target of getting at least 50 runs in the tournament. Out of 8, he played 7 matches and already scored 326 runs. So, In the tournament's final match, he wants to know what the targeted score (goal) will be.

The below table shows the runs scored by Mr. Raj.

Particulars	Values
Match 1	87
Match 2	39
Match 3	40
Match 4	50
Match 5	43
Match 6	37
Match 7	30
Match 8	

12**.** A worksheet contains names and marks in 3 subjects. Calculate Total Marks

(include Name for all)

a) Construct a 3D Pie Chart for Total marks
b) Construct a 2D Line Chart for Subject 1 and Subject 3
c) Construct 2D Column Chart for Sub1, Sub2, Sub3
d) Construct Stacked Column Chart for Sub1, Sub2, Sub3

	A	**B**	**C**	**D**	**E**
1	**NAME**	**SUB 1**	**SUB 2**	**SUB 3**	**TOTAL MARKS**
2	Deep	50	45	65	
3	Jayesh	60	56	85	
4	Yash	70	76	67	
5	Sara	78	83	50	
6	Gita	79	64	43	
7	Jinal	80	51	35	
8	Kavita	82	46	40	
9	Minal	66	79	40	
10	Naresh	60	30	70	

11	Rima	67	44	46	

13. a. Extract names and company details from email addresses
    b. Text to Columns using Flash Fill
    c. Concatenation of cells and text strings
    d. Reformat the Numbers
    e. Extract letters from text strings.

14 i. Find the value of X and Y in the following arithmetic equation with the help of the solver tool.

$$56=2X-5+Y^2$$

ii. Given Data Set. Get the maximum profit.

A	B	C	D
Product	Quantity	Profit per Product	Overall profit
Speaker	100	10	1000
Keyboard	20	16	320
Pendrive	230	33	7590
	350		8910

Constraints: Here are a couple of constraints that you need to consider while trying to maximize the profit.

- At least 100 Quantities of Widget A should be made.
- At least 20 Quantities of Widget B should be made.
- At least 50 Quantities of Widget C should be made.
- A total of 350 widgets should be made.

15. How to Create a Pivot Table Slicer in Excel?

Date	**Sales Person**	**Region**	**Sales**
1/28/2019	Jack	South	1,946
2/28/2019	Liam	North	1,234
2/28/2019	Mark	Central	1,012
4/30/2019	Jack	West	926
5/31/2019	Mark	East	1,715
6/30/2019	Jimmy	South	1,346
7/31/2019	Rinku	North	1,062
8/31/2019	Mac	Central	1,779
9/30/2019	Mark	West	1,230
10/31/2019	Jack	East	1,621

16. Create employees' salary sheets.

1. Type the following worksheet

Emp. No	Name	Basic Salary	House Rent	Conv. Allowance	Medical Allowance	Gross	Tax	Net
1	ABC	8000						
2	XYZ	3500						
3	KLM	8900						
4	WXY	4500						
5	MNO	6500						
6	PQR	4000						
7	STU	7800						
Total Salary								

2. In the “Basic Salary” column values greater than 10,000 are not allowed
3. Calculate House Rent (if Basic Salary is greater than 5000 then 45% otherwise 30%)
4. Calculate Conv. Allowance (if Basic Salary is greater than 5000 then 30% otherwise 20%)
5. Calculate Medical Allowance (if Basic Salary is greater than 5000 then 60% otherwise 45%)
6. Calculate Gross Pay
7. Calculate Tax (if Gross is greater than 15000 then 10% otherwise 0)
8. Calculate Net Pay
9. Calculate the total salary of those employees whose salary is less than 5000
10. Count number of employees who are not giving tax