

**CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-
BASED CURRICULUM FRAMEWORK**

B.Sc Computer Science

Those who have joined in the Academic year 2023-24 onwards

Programme Outcomes (PO) of B.Sc. degree programme in Computer Science

- Scientific aptitude will be developed in Students
- Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
- Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship.
- Students will possess basic subject knowledge required for higher studies, professional and applied courses.
- Students will be aware of and able to develop solution oriented approach towards various Social and Environmental issues.
- Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
- The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems.
- Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- To recognize patterns and to identify essential and relevant aspects of problems.
- Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
- Mould the students into responsible citizens in a rapidly changing interdependent society.

The above expectations generally can be pooled into 6 broad categories and can be modified according to institutional requirements:

PO1: Knowledge

PO2: Problem Analysis

PO3: Design / Development of Solutions

PO4: Conduct investigations of complex problems

PO5: Modern tool usage

PO6: Applying to society

3. Programme Specific Outcomes of B.Sc. Degree Programme in Computer Science

PSO1: Think in a critical and logical based manner

PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and realtime application related sciences.

PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4: Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PO6: Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PO7: Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.

PO8: Develop a range of generic skills helpful in employment, internships& societal activities.

PO9: Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of Computing sciences.

**CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-
BASED CURRICULUM FRAMEWORK**

B.Sc Computer Science

Part	Courses	Subject	Code	Cr.	Hrs
SEMESTER - I					
I	Lang. – I	பொதுத் தமிழ் - I	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 1	Python Programming	232503101	4	4
	CC – 2	Python Programming Lab	232503102	4	6
	EC – I	Numerical Methods	232003122	3	4
IV	SEC –I (NME)	Office Automation	234603125	2	2
IV	FC	Problem Solving Techniques	234403125	2	2
	AECC – 1	Soft Skill - I	236003101	2	2
	Total			23	30
SEMESTER II					
I	Lang. -I	பொதுத் தமிழ் - II	230103201	3	6
II	Lang. -II	General English	231003201	3	4
III	CC – 3	Data Structure and Algorithms	232503201	4	4
	CC - 4	Data Structure and Algorithms Lab	232503202	4	6
	EC – II	Graph Theory and its applications	232003222	3	4
IV	SEC –II (NME)	Quantitative Aptitude	234603225	2	2
	SEC - III	Advanced Excel	234403225	2	2
	AECC –II	Soft Skill - II	236003201	2	2
				23	30
SEMESTER III					
I	Lang. -I	பொதுத் தமிழ் - III	230103301	3	6
II	Lang. -II	General English	231003301	3	4
III	CC – 5	Object Oriented Programming with C++	232503301	4	4
	CC - 6	Object Oriented Programming with C++ Lab	232503302	4	6
	EC –3	Discrete Mathematical Structures	232003322	3	4
IV	SEC –IV	Web Application and Development Lab	234403325	1	1
	SEC – V	Cloud Computing	238203325	2	2
	AECC – III	Soft Skill - 3	236003301	2	2
	EVS	Environmental Studies	234103301	1	1
				23	30

Part	Courses		Code	Cr.	Hrs
SEMESTER IV					
I	Lang. – I	பொதுத் தமிழ் - IV	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 7	Java Programming	232503401	4	4
	CC - 8	Java Programming Lab	232503402	4	5
	EC – IV	Industrial Statistics	232003422	3	4
IV	SEC –VI	PHP Programming	234403425	2	2
IV	SEC –VII	PHP Programming Lab	238203425	2	2
	AECC- IV	Soft Skill - IV	236003301	2	2
	EVS	Environmental Studies	234103401	1	1
	Total			24	30
SEMESTER V					
III	CC – 9	Software Engineering	232503501	4	5
	CC - 10	Database Management System	232503502	4	5
	CC - 11	Database Management System Lab	232503503	4	5
	Core 12	Project with Viva voce	232503504	4	4
	EC – V	Operating Systems	232503505	3	5
		Elective - V	232503506		
	EC – VI	Data Mining and Warehousing	232503507	3	5
Elective - VI		232503508			
IV		Value Education	234303501	1	1
		Internship/Industrial Training(carried out in II year summer vacation)30 hrs	232503509	2	
				25	30
SEMESTER VI					
III	CC – 13	Computer Networks	232503601	4	5
	CC – 14	.NET Programming	232503602	4	5
	CC – 15	.NET Programming Lab	232503603	4	5
	EC –7	Introduction to Data Science	232503604	3	5
		Elective - VII	232503605		
	EC - 8	Cyber Security	232503606	3	5
		232503607			
IV	Proessional competency skill enhancement course		232503608	2	4
		Value Education	234303601	1	1
V		Extension Activity (outside college hrs)	232503609	1	
				22	30

Title of the Course		OBJECT ORIENTED PROGRAMMING WITH C++						
Part		III						
Category	Core –5	Year	II	Credits	4	Course Code	232503301	
		Semester	III					
Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total	
	4	-	--	4	25	75	100	
Learning Objectives								
<p>☞ To engender an appreciation for the need and characteristics of Object-orientation.</p> <p>☞ To impart knowledge of the C++ language grammar in order to design and implement programming solutions to simple problems by applying Object-oriented thinking.</p>								
UNIT	Details							No. of Periods for the Unit
I	<p>Object Oriented Programming Concepts: Complexity in software - The need for object-orientation – Abstraction – Encapsulation – Modularity – Hierarchy.</p> <p>Basic Elements of C++: Classes – Objects – Data members and member functions – <i>private</i> and <i>public</i> access specifiers - Static members - Constructors – Singleton class - Destructors - Friend Functions and Friend Classes - Array of objects – Pointer to objects - <i>this</i> pointer – References – Dynamic memory allocation - Namespaces.</p>							12
II	<p>Function Overloading: Overloading a function - Default arguments – Overloading Constructors.</p> <p>Operator Overloading: Overloading an operator as a member function – Overloading an operator as a friend function – Overloading the operators [], (), -> and comma operators – Conversion Functions.</p>							12
III	<p>Inheritance: Types of inheritance – <i>protected</i> access specifier – Virtual Base Class – Base class and derived class constructors. Run-time Polymorphism: Virtual Functions – Function overriding - Pure virtual function – Abstract base class.</p>							12
IV	<p>Templates: Function templates – Overloading a function template – Class templates.</p> <p>Standard Template Library (STL): Containers: vector, list – Iterators: forward, backward – Algorithms: removing and replacing elements, sorting, counting, reversing a sequence.</p> <p>Exception Handling: Exceptions – <i>try</i>, <i>catch</i>, <i>throw</i> – Rethrowing an exception – Restricting exceptions - Handling exceptions in derived classes - <i>terminate()</i>, <i>abort()</i>, <i>unexpected()</i>, <i>set_terminate()</i>.</p>							12
V	<p>I/O Streams: Formatted I/O with <i>ios</i> class functions - Manipulators – Creating own manipulator – Overloading << and >> operators.</p> <p>File I/O: <i>fstream</i> class – Opening and closing a file – Reading from and writing to a text file - Unformatted and Binary I/O – Random access I/O.</p>							12

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Explain the various basic concepts of Object-orientation.
CO2	Write programs to implement static binding
CO3	Write programs to implement inheritance and dynamic binding
CO4	Write programs to implement templates and exception handling and learn how to use STL class library.
CO5	Write programs implementing File and Stream I/O.

Text Books (Latest Editions)	
1.	Herbert Schildt, <i>C++ - The Complete Reference</i> , Third Edition, TMH, 1999.
2.	Grady Booch, <i>Object Oriented Analysis and Design</i> , Pearson Education, 2008. (For Unit I)

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Bjarne Stroustrup, <i>The C++ Programming Language</i> , Addison Wesley, 2000.
2.	J. P. Cohoon and J. W. Davidson, <i>C++ Program Design – An Introduction to Programming and Object-Oriented Design</i> , Second Edition, McGraw Hill, 1999.
3.	C. J. Lippman, <i>C++ Primer</i> , Third Edition, Addison Wesley, 2000.
Web Resources	
1.	https://www.geeksforgeeks.org/c-plus-plus/
2.	https://www.programiz.com/cpp-programming
3.	https://www.w3schools.com/cpp/
4.	https://www.codecademy.com/learn/learn-c-plus-plus

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO1	3	3	3	3	3	2	3	3	2
CO2	3	3	3	3	2	3	3	2	3
CO3	3	2	3	2	3	3	2	3	3
CO4	2	3	3	2	3	3	3	3	2
CO5	1	3	3	3	2	3	2	3	3

S – Strong, M – Medium , L - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3	3	3	3	3

Title of the Course		OBJECT ORIENTED PROGRAMMING WITH C++ LAB					
Part		III					
Category	Core 6	Year	II	Credits	4	Course Code	232503302
		Semester	IV				
Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
	-	1	5	6	25	75	100

Learning Objectives:

- ✍ Design classes for the given problems.
- ✍ Write programs in C++.
- ✍ Code, debug and execute a C++ program to solve the given problems using an IDE.

List of Exercises:

1. Write a class to represent a complex number which has member functions to do the following
 - a. Set and show the value of the complex number
 - b. Add, subtract and multiply two complex numbers
 - c. Multiplying the complex number with a scalar value
2. Write a Point class that represents a 2-d point in a plane. Write member functions to
 - a. Set and show the value of a point
 - b. Find the distance between two points
 - c. Check whether two points are equal or not
3. Design and implement a class that represents a Harmonic Progression (HP). Implement functions to do the following:
 - a. Generate the HP up to a specified number of terms
 - b. Calculate the sum of the HP to n terms and to infinity
 - c. Generate the nth term of the HP
 - d. Generate the corresponding Arithmetic Progression. (Design and implement a class that encapsulates an AP, and allow the HP class to use its facilities by implementing friend functions.)
4. Design and implement a class to represent a Solid object.
 - a. Apart from data members to represent dimensions, use a data member to specify the type of solid.
 - b. Use functions to calculate volume and surface area for different solids.
5. Design a class representing time in hh:mm:ss. Write functions to
 - a. Set and show the time
 - b. Find the difference between two time objects
 - c. Adding a given duration to a time
 - d. Conversion of the time object to seconds
6. Design a 3x3 matrix class and demonstrate the following:
 - a. Addition and multiplication of two matrices using operator overloading
 - b. Maintaining a count of the number of matrix object created
7. Design a class called cString to represent a string data type. Create a data member in the class to represent a string using an array of size 100. Write the following functionality as member functions:
 - a. Copy Constructor
 - b. Concatenate two strings
 - c. Find the length of the string
 - d. Reversing a string
 - e. Comparing two strings
8. Design a class called cString to represent a string data type. Create a data member in the class to represent a string whose size is dynamically allocated. Write the following as member functions:
 - a. Copy Constructor

- b. Destructor
 - c. Concatenate two strings
 - d. Find the length of the string
 - e. Reversing a string
 - f. Comparing two strings
9. Create a class to represent a 2-d shape and derive classes to represent a triangle, rectangle and circle. Write a program using run-time polymorphism to compute the area of the figures.
 10. Define a class template representing a single-dimensional array. Implement a function to sort the array elements. Include a mechanism to detect and throw an exception for array-bound violations.
 11. Demonstrate the use of the vector STL container.
 12. Implement a telephone directory using files

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Design and create classes. Implement Stream I/O as appropriate.
CO2	Design appropriate data members and member functions.
CO3	Implement functions, friend functions, static members, constructors and compile-time polymorphism.
CO4	Implement inheritance, run-time polymorphism and destructors.
CO5	Implement templates and exceptions. Use STL class library. Implement File I/O.

Text Books (Latest Editions)	
1.	Herbert Schildt, <i>C++ - The Complete Reference</i> , Third Edition, TMH, 1999.
2.	Grady Booch, <i>Object Oriented Analysis and Design</i> , Pearson Education, 2008. (For Unit I)

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1.	Bjarne Stroustrup, <i>The C++ Programming Language</i> , Addison Wesley, 2000.
2.	J. P. Cohoon and J. W. Davidson, <i>C++ Program Design – An Introduction to Programming and Object-Oriented Design</i> , Second Edition, McGraw Hill, 1999.
3.	C. J. Lippman, <i>C++ Primer</i> , Third Edition, Addison Wesley, 2000.

Web Resources	
1.	https://www.geeksforgeeks.org/c-plus-plus/
2.	https://www.programiz.com/cpp-programming
3.	https://www.w3schools.com/cpp/
4.	https://www.codecademy.com/learn/learn-c-plus-plus

Title of the Course		WEB APPLICATION AND DEVELOPMENT LAB						
Part		III						
Category	SEC - IV	Year	II	Credits	1	Course Code	234403325	
		Semester	III					
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
		-	-	1	1	25	75	100
Learning Objectives:								
<ul style="list-style-type: none"> ✍ To develop an ability to design and implement static and dynamic website ✍ Choose best technologies for solving web client/server problems 								
List of Experiments								
<ol style="list-style-type: none"> 1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient. 2. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format. 3. Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt. 4. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems: a. Parameter: A string b. Output: The position in the string of the left-most vowel c. Parameter: A number d. Output: The number with its digits in the reverse order 5. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. 6. Change a Content of webpage using AJAX. Perform Different Operations using JQUERY Selectors. 7. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name. 								
Course Outcomes								
Course Outcomes		On completion of this course, students will;						
CO1		Study and Implement Web pages using Basic and Advanced HTML						
CO2		Differentiate between functionalities of Basic CSS and Advanced CSS						
CO3		Implement basic JavaScript						
CO4		Program basic functions in JavaScript and XHTML						
CO5								
Text Books (Latest Editions)								
1	Pankaj Sharma, “ <i>Web Technology</i> ”, Sk Kataria & Sons Bangalore, 2011.(UNIT I, II, III & IV).							
2	Achyut S Godbole & Atul Kahate, “ <i>Web Technologies</i> ”, 2002, 2 nd Edition. (UNIT V: AJAX)							
References Books (Latest editions, and the style as given below must be strictly adhered to)								
1	Laura Lemay, Rafe Colburn , Jennifer Kyrnin, “ <i>Mastering HTML, CSS & Javascript Web Publishing</i> ”, 2016.							
2	DT Editorial Services (Author), “ <i>HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)</i> ”, Paperback 2016, 2 nd Edition.							
Title of the Course		CLOUD COMPUTING						

Part		IV													
Category	SEC 5	Year	II	Credits	2	Course Code		238203325							
		Semester	III			CIA	External								
Instructional Hours per week		Lecture	2	Tutorial	-	Lab Practice	--	Total	2	CIA	25	External	75	Total	100
		Learning Objectives													
<ul style="list-style-type: none"> ✍ To impart fundamental concepts of Cloud Computing. ✍ To impart a working knowledge of the various cloud service types and their uses and pitfalls. ✍ To enable the students to know the common features and differences in the service offerings of the three major Cloud Computing service providers, namely Amazon, Microsoft and Google. ✍ To provide know-how of the various aspects of application design, benchmarking and security on the Cloud. 															
UNIT	Details													No. of Periods for the Unit	
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.													6	
II	Cloud Concepts and Technologies: Virtualization – Loadbalancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network FunctionVirtualization – MapReduce – Identity and Access Management – Service LevelAgreements – Billing.														
III	<p>Cloud Services</p> <p>Compute Services: Amazon Elastic Computer Cloud - Google ComputeEngine - Windows Azure Virtual Machines. Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage</p> <p>Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service</p> <p>Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services</p> <p>Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon ElasticMapReduce - Google MapReduce Service - Google BigQuery - Windows Azure HDInsight</p> <p>Deployment and Management Services: Amazon ElasticBeanstack - Amazon CloudFormation</p> <p>Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory</p> <p>Open Source Private Cloud Software:CloudStack – Eucalyptus - OpenStack</p>													6	
IV	Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: RelationalApproach (SQL), Non-RelationalApproach (NoSQL).													6	

v	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.</p> <p>Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.</p>	6
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Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	To understand the Introduction to Cloud Computing
CO2	To understand the concepts and technologies involved in Cloud Computing.
CO3	To understand the concepts of various cloud services and their implementation in the Amazon, Microsoft and Google cloud computing platforms.
CO4	To understand the aspects of application design for the Cloud.
CO5	To understand the concepts involved in benchmarking and security on the Cloud.

Text Books (Latest Editions)	
1.	Arshdeep Bahga, Vijay Madisetti, <i>Cloud Computing – A Hands On Approach</i> , Universities Press (India) Pvt. Ltd., 2018.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Anthony T Velte, Toby J Velte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i> , Tata McGraw-Hill, 2013.
2.	David Crookes, <i>Cloud Computing in Easy Steps</i> , Tata McGraw Hill, 2012.
3.	Dr. Kumar Saurabh, <i>Cloud Computing</i> , Wiley India, Second Edition 2012
Web Resources	
1.	https://nptel.ac.in/courses/106/105/106105167/
2.	https://www.coursera.org/specializations/cloud-computing
3.	https://www.coursera.org/learn/introduction-to-cloud

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO1	3	3	3	3	3	2	3	3	2
CO2	3	3	3	3	2	3	3	2	3
CO3	3	2	3	2	3	3	2	3	3
CO4	2	3	3	2	3	3	3	3	2
CO5	1	3	3	3	2	3	2	3	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3	3	3	3	3

Title of the Course		JAVA PROGRAMMING						
Part		III						
Category	Core 7	Year	II	Credits	4	Course Code	232503401	
		Semester	IV					
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
		4	-	--	4	25	75	100
Learning Objectives								
☞ To provide fundamental knowledge of object-oriented programming.								
☞ To equip the student with programming knowledge in Core Java from the basics up.								
☞ To enable the students to use AWT controls, Event Handling and Swing for GUI.								
UNIT	Details							No. of Periods for the Unit
I	Introduction: Review of Object Oriented concepts - History of Java - Java buzzwords - JVM architecture - Data types - Variables - Scope and life time of variables - arrays - operators - control statements - simple java program - constructors - methods - Static block - Static Data - Static Method String and String Buffer Classes							12
II	Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition - Access Protection - Importing Packages. Interfaces: Definition – Implementation – Extending Interfaces. Exception Handling: <i>try – catch - throw - throws – finally</i> – Built-in exceptions - Creating own Exception classes							12
III	Multithreaded Programming: Thread Class - Runnable interface – Synchronization – Using synchronized methods – Using <i>synchronized</i> statement - Interthread Communication – Deadlock. I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.							12
IV	AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events.							12
V	Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel, JTextField – JTextArea.							12

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.
CO3	Implement multi-threading and I/O Streams of Core Java
CO4	Implement AWT and Event handling.
CO5	Use swing to create GUI.

Text Books (Latest Editions)	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2017.
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.

References Books	
(Latest editions, and the style as given below must be strictly adhered to)	
1	Head First Java, O’Rielly Publications,
2	Y. Daniel Liang, <i>Introduction to Java Programming</i> , 7th Edition, Pearson Education India, 2010.
Web Resources	
1	Web resources from NDL Library, E-content from open-source libraries
2	https://www.w3schools.com/java/
3	https://www.javatpoint.com/java-tutorial
4	https://www.programiz.com/java-programming

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	3	2	2	2	2	2
CO2	3	3	2	2	2	2
CO3	2	2	2	3	2	3
CO4	2	2	2	3	3	3
CO5	2	2	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	3	2	3
CO3	3	3	2	2	3
CO4	3	3	3	3	2
CO5	3	3	3	2	3

Title of the Course		JAVA PROGRAMMING LAB					
Part		III					
Category	Core 8	Year	II	Credits	4	Course Code	232503402
		Semester	IV				
Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
	--	1	4	5	25	75	100
Learning Objectives							
<ul style="list-style-type: none"> ✍ To gain practical expertise in coding Core Java programs ✍ To become proficient in the use of AWT, Event Handling and Swing. 							
List of Exercises:							
<ol style="list-style-type: none"> 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 to multiply two given matrices. 3. Write a Java program that displays the number of characters, lines and words in a text? 4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated. 5. Write a program to do String Manipulation using Character Array and perform the following string operations: <ol style="list-style-type: none"> a. String length b. Finding a character at a particular position c. Concatenating two strings 6. Write a program to perform the following string operations using String class: <ol style="list-style-type: none"> a. String Concatenation b. Search a substring c. To extract substring from given string 7. Write a program to perform string operations using String Buffer class: <ol style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 8. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. 9. Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 90 to 100 using Thread2. 10. Write a program to demonstrate the use of following exceptions. <ol style="list-style-type: none"> a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception 11. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes? 12. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls. 13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes). 14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero. 15. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown. 							

Learning Resources:

• **Recommended Texts**

1. Herbert Schildt, *The Complete Reference*, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2. Gary Cornell, *Core Java 2 Volume I – Fundamentals*, Addison Wesley, 1999.

• **Reference Books**

1. Head First Java, O’Rielly Publications,
2. Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.

Web resources: Web resources from NDL Library, E-content from open-source libraries

<https://www.programiz.com/java-programming/examples>

<https://www.geeksforgeeks.org/java/>

Title of the Course		PHP PROGRAMMING						
		IV						
Category	SEC - VI	Year	II	Credits	2	Course Code	234403425	
		Semester	IV					
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
		2	-	--	2	25	75	100
Learning Objectives								
☞ The objective of this course is to teach the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.								
UNIT	Details							No. of Periods for the Unit
I	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation- PHP Programming Basics -Syntax of PHP - Embedding PHP in HTML -Embedding HTML in PHP .							6
II	Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement -Switch() Statements -Using the while() Loop - Using the for() Loop							6
III	Introduction to Array- Types of Array - storing data in arrays - Assigning arrays values- Modifying array values - Retriving array values-Nesting array values -processing array with loops and iteration-working with date and times							6
IV	PHP Functions and classes- creating user defined class- creating and invoking functions -using arguments and return values- setting default Aruguments values-using dynamic Arugument values -understanding variable scope- Recursive function							6
V	PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File -Managing Sessions and Using Session Variables - Destroying a Session							6

Course Outcomes	
Course Outcomes	On completion of this course, students will be able;
CO1	Analyze the behaviour of basic quantum algorithms
CO2	Implement simple quantum algorithms and information channels in the quantum circuit model
CO3	Simulate a simple quantum error-correcting code
CO4	Prove basic facts about quantum information channels
CO5	Evaluate the client-side or front end of a website with the server-side or backend

Text Books (Latest Editions)	
1	Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes
Web Resources	
1	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO1	3	3	3	3	3	2	3	3	2
CO2	3	3	3	3	2	3	3	2	3
CO3	3	2	3	2	3	3	2	3	3
CO4	2	3	3	2	3	3	3	3	2
CO5	1	3	3	3	2	3	2	3	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3	3	3	3	3

Title of the Course		PHP PROGRAMMING LAB						
Part		IV						
Category	SEC – 7	Year	II	Credits	2	Course Code	238203425	
		Semester	IV					
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
		--	--	2	5	25	75	100
Learning Objectives								
<ul style="list-style-type: none"> ✍ To become proficient in the use of Control Structures. ✍ To gain practical expertise in OOPs Concepts. ✍ To enable the students to design a web page. 								
List of Exercises:								
<ol style="list-style-type: none"> 1. Simple PHP programs using expressions and operators. 2. Programs to demonstrate the usage of control structures. 3. Programs using looping structures. 4. Programs using arrays. 5. Programs using string functions. 6. Simple and parameterized functions. 7. Programs using OOPS concepts. 8. Program to design a web page using various form controls. 9. Data Validation in web pages. 10. Using cookies and session variables. 								
Text Books (Latest Editions)								
Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.								
References Books								
(Latest editions, and the style as given below must be strictly adhered to)								
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