SHIVAJI UNIVERSITY, KOLHAPUR.

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CHOICE BASED CREDIT SYSTEM

Syllabus For

B. Sc. Part – II

Computer Science (Optional)

SEMESTER – III AND IV

(Syllabus to be implemented from June, 2019 onwards.)

B.Sc. Computer Science (Optional) Semester-III& IV
CBCS Syllabus to be implemented from June 2019 Onwards.

1. **TITLE:** ComputerScience
2. **YEAROFIMPLEMENTATION**:RevisedSyllabuswillbeimplementedfromJune2019 onwards.
3. **DURATION:** B.Sc. in Computer Science Part- II The duration of course shall be one yearand two semesters.
4. **PATTERN:**Patternofexaminationwill be semester.
5. **STRUCTURE OFCOURSE:**

STRUCTURE OF COURSE

Sr. No.	Paper	Name of Paper	Marks
		Computer Science (Semester III)	
1	DSC-11C	PHP and MySQL	50 (Theory)
2	DSC-12C	Object Oriented Programming Using C++	50 (Theory)
		Computer Science (Semester IV)	
3	DSC-11D	Cyber Security Essentials-I	50 (Theory)
4	DSC-12D	Data Structure Using C++	50 (Theory)
		Practical (Annual)	
5	Practical Paper-II	Computer Science Practical Paper Based on DSC-11C	50 (Practical)
6	Practical Paper-III	Computer Science Practical Paper Based on DSC-12CandDSC-12D	50 (Practical)

6. **EQUIVALENCEINACCORDANCEWITHTITLESANDCONTENTSOFPAPERS**

(FOR REVISED SYLLABUS)

Sr.No.	Title of old paper	Sr.No.	Title of New paper
	SEMESTER III		
1	Fundamentals of Software Engineering	1	PHP and MySQL
2	Object Oriented Programming Using C++	2	Object Oriented Programming Using C++
SEMESTER – IV			
3	Relational Database Management System	3	Cyber Security Essentials-I
4	Advanced Object Oriented Programming Using C++	4	Data Structure Using C++
PRACTICAL (ANNUAL PATTERN)			

5	Computer Science Practical Paper-II	6	Computer Science Practical Paper-III

Credits: 02   **Total Marks: 50**

Course Outcomes:
Students will be able
1. To understand basic concept of PHP.
2. To Learn how to developing applications in PHP using MySQL.
3. To learn and develop various PHP technology applications that definitely meets the currentindustry needs.

Unit – I: Introduction to PHP Scripting   18 Hrs.

- **Introduction**: Evaluation, Features, PHP Script(PHP tags <?php... ?>, SGML-style tags<?...?>,ASP style <% ... %>, HTML Script Tag), Comment(single and multiline), echo command, PHP script execution on terminal and web browser.
- **Variables**: Basics, Data types(Boolean, Integers, Floating points Doubles, Strings, NULL, Arrays, Resources), Variable naming rules, scope(Local, Global, static, function parameter), unset variable, Functions(gettype(), isset(), is_array(), is_bool(), is_float(), is_int(), is_null(), is_string(), is_resource())
- **Constant**: define() function to define constant, constant() to retrieve value of constant, difference between constant and variable, PHP predefined constants
- **Operators**: Arithmetic, Comparison, Relational, Assignment, Increment-Decrement, Ternary, Bitwise, Casting, Other operators(., $, @, {}, ``, =>),Operator Precedence
- **Strings**: Single Quoted and Double Quoted, escape sequences, Multiline String, Concatenation operator(.), string functions(chr(), strlen(), ltrim(), rtrim(), trim(), strtoupper(), strtolower(), strcmp(), substr(), strrev(), echo(), print(), printf())
- **Decision Making Statements**: if, if... else, if ... elseif...else, switch statement
- **Iterative Statements**: for, while, do... while, foreach, break and continue statement
- **Exit statements**: exit, die
- **User Defined Functions**: Declaring functions, function arguments(byval, byref, default arguments, variable number of arguments),return statement(by val, by ref), recursion, global scope, static variables, Dynamic Function call
- **Arrays**: Concept, Types(Numerical/List, Associative/Maps, MultiDimentional), empty array, Initialisation of arrays([] operator, array() function, range() function), inserting element in array, Display entire array(print_r(), var_dump()), Sorting functions(sort(), rsort(), asort(), arsort(), ksort(), krsort(), natsort(), natcasesort(), array_multisort(), usort()), is_array() function, merge

arrays(array_merge()) and using + operator, array as stack(array_push(), array_pop(),array_shift(), array_unshift()), reverse array(array_reverse()), array_keys() and array_value(), key().

Unit – II: HTML, HTML forms and MySql connectivity   **18 Hrs.**
- **Introduction**: HTML, necessary tags to design form layout.
- **Forms**: HTML forms, action and get & post methods. PHP super global variables ($_PHP_SELF, $_GET, $_POST, $_SERVER, $_COOKIES, $_REQUEST)
- **MySql Database(Old or Improved)**: Connect(mysql_connect()/mysqli_connect()), Close(mysql_close()/mysqli_close()), Select a database(mysql_select_db()/mysqli_select_db()), execute mysql query and create cursor(mysql_query()/mysqli_query()), Fetch rows from tables as row(mysql_fetch_row()/ mysqli_fetch_row()) as numeric as well as associative array using cursor(mysql_fetch_array()/ mysqli_fetch_array(), mysql_fetch_assoc()/mysqli_fetch_assoc()),release memory of cursor(mysql_free_result()/ mysqli_free_result()).

Reference Books –

1. PHP and MySQL By Dreamtech Publications
2. PHP Concepts Unleashed For Novice – Vol I - By Poornima Naik, Kavita Oza, Evincepub Publishing
3. PHP A Beginner's Guide – Vikram Vaswami
4. PHP 5.1 for Beginners – By Ivan Bayross and Sharanam Shah(Shroff Publishers &Distributors)
5. Beginning PHP 6, Apache, MySQL Web Development- By Timothy Boronczyk, ElizabethNaramore, Jason Gerner, Yann Le Scouarnec, Zeremy Stolz, Michael K. Glass
6. PHP and MySQL by Rajendra Salokhe(Aruta Publications)
7. Learning PHP 7 by Antonio Lopez
8. Beginning PHP 5.3 by Matt Doyle
9. PHP-MySQL-Dummies-3rd-edition by Janet Valade

Practical Based on DSC-11C

Take input either from keyboard, command line or using PHP form. And use either terminal or web page to demonstrate following examples,

Sr. No	Content
1	**Linear Problem**: i) Arithmetic Operations on 2 numbers(real) ii) Percentage of Student in 5 Subjects iii) Convert Degree Celsius To Degree Fahrenheit using $F = \frac{9}{5}C + 32$ iv) Calculate Simple Interest. v) Display type of given value.(gettype())
2	**Decision Making - I**: i) Check Integer is even or odd ii) Maximum Between 3 numbers iii) Leap Year or Not iv) Grade of a student from Percentage
3	**Decision Making - II**: Check whether given variable stores an integer, float, Boolean, null, array, string, resource.
4	**Iterative - I**: i) Factorial of natural number ii) Number of digits, sum of digits, reverse number and palindrome or not iii) Prime number (using break) iv) Permutation of 1,2,3(using continue) v) Patterns: Triangles, Pyramids
5	**Iterative - II**: i) Sequences: Natural Numbers, Odd Natural Numbers, Even Natural Numbers, Square Natural Numbers, Fibonacci Sequence ii) Series: Sum of First n natural numbers, sum of first n odd natural numbers, sum of first n even natural numbers, sum of first n reciprocals of factorial numbers
6	**Array - I**: Create an array and display array and Smallest, Largest, Sum, Average of integer numeric array
7	**Array – II:** i) Create two arrays and merge them. ii) Create array and reverse it. iii) Create associative array and fetch value array and key array from it.
8	**Array – III:** sort associative array using sort(), rsort(), asort(), arsort(), ksort(), krsort()
9	**Array – IV:** i) Create an array and treat it as stack from begin ii) Create an array and treat it as stack from end
10	**String –I** : i) Reverse string ii) String is Palindrome or not

	iii) Covert to Lower or Upper Case iv) Compare two strings
11	**Function - I**: i) Prime Function ii) Armstrong Function iii) Factorial Function(Recursive) iv) Swap Functions(Call By Reference)
12	**Function - II**: i) Input Variable number of integers to function and display their sum. ii) Demonstrate working of static variable and display number function call to given function
13	**MySQL – I Initial:** Connect to mysql database, create own database, choose database, create a table using PHP
14	**MySQL – II Manipulation:** To manipulate data in a table using PHP i) insert record in a table ii) update record in a table iii) delete record from a table
15	**MySQL – III Selection:** To display contents of table using PHP i) All records ii) First 10 records iii) Using criteria iv) Using order by particular column
16	**MySQL – IV Grouping:** To display sum, avg, count group by particular column using PHP

Credits: 02   **Total Marks: 50**

Course Outcomes:
Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
Students will be able
1. To understand how C++ improves C with object oriented features
2. To learn syntax and semantics of C++ programming language
3. To learn how to write inline functions for efficiency and performance.
4. To learn how to overload functions and operators in C++.
5. To learn how to design C++ classes for code reuse.
6. To learn how inheritance promote code reuse in C++.
7. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

Unit – I: Introduction to C++ and Basics of Object oriented Programming   18 Hrs.

- **Some Concepts**: Procedure Oriented programming versus Object oriented programming, Benefits of C++ over C Language
- **Object oriented programming Concepts**: Object, class, Encapsulation, Abstraction, Polymorphism (static and dynamic), Inheritance
- **Basic C++ program**: Header file, using namespace std, main(), input (>> extraction using cin) and output (<< insertion using cout) operator, Structure of C++ Program
- **C++ Tokens**: Keywords (bool, class, delete, namespace, friend, operator keywords, and other C++ keywords), Introduction to Identifiers, constants, strings and operators as on C.
- **C++ Data Types**: Built –in /Fundamental (void, char, int, float, double), User defined(struct, union, enum, **class**), derived(array, function, pointer, **reference**)
- **Symbolic Constants**: const (simple, pointer)
- **Variable**: Definition, Declaration, Initialisation, Dynamic Initialisation and reference variables
- **Operators in C++**: DMA operators (new, delete), :: scope resolution operator, type cast operators(const_cast, static_cast, dynamic_cast, reinterpret_cast), manipulators(setw, endl, setprecision)
- **Functions**: Prototyping, Function Call(by value, by pointer, by reference), return by reference, default arguments, const arguments, inline function, constexpr function, function overloading(exact match, best match)

Unit – II: Object oriented Programming   18 Hrs.
- **C++ Class**: Difference between struct and class, class specification (class declaration with access modifiers/ visibility labels – private, public, protected members, member function definition inside as well as outside, object definition), Array (array as class member, array of objects), this pointer, static members (data members and member accessing function) and memory allocation of object,

scope of a variable (local, local to class, global)

- **Friend Function**: Characteristics, friend function and friend class
- **Constructor**: Definition, Characteristics, features, Types (Default, parameterized)
- **Destructor**: Definition, Dynamic constructor and need of destructor, exit(0) vs return(0) in main() with destructor
- **Operator overloading**: Concept, Rules, definition of operator function (member function, friend function) Overloading unary and binary operators..
- **Inheritance**: Concept (reusability), Types(single, multilevel, multiple, hierarchical, hybrid), defining derived class, introducing protected members, visibility of derived members, Diamond problem with hybrid inheritance(virtual inheritance) and virtual base class
- **Polymorphism**: Definition, types (Compile time/early binding/static binding, Run time/Late Binding/ dynamic binding), Pointer to object, Virtual and pure-virtual functions (abstract class), rules for virtual functions, virtual destructor.

Reference Books

1. Object Oriented Programming in C++ - Rajesh K. Shukla
2. Object Oriented Programming with C++ - Poonam Ponde
3. Object Oriented Programming with C++ - E Balagurusamy
4. Mastering C++ - K.R.Venugopal
5. C++ Programming - D. Ravichandran
6. A Tour of C++ (2nd Edition) - Bjarne Stroustrup.
7. The C++ Programming Language (4th Edition) - Bjarne Stroustrup.

Practical Based on DSC-12C

Use "Problem Solving Techniques" For Following problems and implement code through C++ programming language. It include: Problem Analysis, Algorithm, Flowchart, Output Tracing using Algorithm, Source Code with Output

First introduce Linux Operating System, GPU commands, C++ compilation process and components (cpp, g++, as only)with simple program and Debugging using(GDB).

Sr. No.	Content
1	**Function Default Argument:** i) To calculate perimeter of square(4*r), rectangle(2*l+2*b), triangle (a+b+c) ii) To calculate area of square(r*r), rectangle(l*b), trapezium(1/2*h*(s1+s2)) Keeping other argument to default value zero.
2	**Function Overloading:** i) To calculate perimeter of square(4*r), rectangle(2*l+2*b), triangle (a+b+c) ii) To calculate area of square(r*r), rectangle(l*b), trapezium(1/2*h*(s1+s2))
3	**Constructor And Destructor:** Demonstrate working of constructor (default, parameterised, copy) and destructor to allocate and de-allocate memory to or from an array of integers using DMA operators new and delete.
4	**Static Members:** Display counter which counts numbers of objects of class, counter is incremented in constructor and decremented in destructor.
5	**Friend Function:** Create two classes Celsius and Fahrenheit and define friend functions to add and to compare two temperatures.
6	**Operator Overloading:** To overload addition, multiplication, unary minus operator on class Integer
7	**Operator Overloading:** To overload TypeCast operator to convert temperature in Degree Celsius To Degree Fahrenheit and Degree Fahrenheit To Degree Celsius using classes Celsius and Fahrenheit. F=9/5*c+32
8	**Pure Virtual Function And Inheritance:** To specify base class Shape with pure virtual methods Input(), Perimeter() and Area(). Inherit three classes Square, Rectangle and Triangle from class Shape with appropriate data members and override methods Input(), Perimeter() and Area(). Use Pointer of class Shape to access objects of Three classes and Demonstrate working in "main" function.

B.Sc. Part –II Computer Science Optional (Semester– IV)
Course Code:DSC-11D   Computer Paper –VII
Course Title:Cyber Security Essentials-I
Total Contact Hours: 36 Hrs (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 50**

Course Outcomes:
Students will be able to:
1. Understand concept of information security management.
2. Learn different access controls methods.
3. Understand wireless network security.
4. Learn cyber security laws and importance of security audit.

Unit I: Information Security Management   **18 Hrs**
- **Information Security Overview:** Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols,Computer Forensics, Steganography, Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.

Unit II: Network Security, Access Controls, Cyber Security and Cyber Laws   **18 Hrs**
- **Wireless Network Security-** Components of wireless networks, Security issues in wireless, Wi-FiSecurity, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall.
- **Access Controls:** Overview of Authentication and Authorization, Overview of Intrusion Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems.
- **Cyber Security:** Email security: PGP and SMIME, Web Security: web authentication, SSL and SET, Database Security.
- **Cyber Security Laws**: Security Assurance, Security Laws, Intellectual Property Rights, International Standards, Security Audit- Need, Importance.

References:

1. Computer Network -AS Tannenbum
2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyber war, Hacking) - Harry Colvin.
3. How NOT To Use Your Smartphone - Rodney D Cambridge.
4. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book -A.M. Perry.
5. Cyber Security Essentials- James Graham, Richard Howard, Ryon Olson (E-book)
6. Network Security Secrets and Solutions – Stuart McClure, Joe Scambray, George Kurtz.
7. Information Assurance Handbook: Effective Computer Security and Risk Management Strategies – Corey Schou, Steven Hernandez.
8. Applied Network Security Monitoring: Collection, Detection, and Analysis – Chris Sanders, Jason Smith.
9. E-Commerce- Indian Perspective- P.T. Joseph S.J.
10. E-Commerce and Security- Kjell Orsborn (E-book)

B.Sc. Part –II Computer Science Optional (Semester– IV)
Course Code:DSC-12D   Computer Paper –VIII
Course Title:Data Structure Using C++
Total Contact Hours: 36 Hrs (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 50**

Course Outcomes: Students will be able to
1. Understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
2. Ability to choose appropriate data structures to represent data items in real world problems.
3. Ability to analyze the time and space complexities of algorithms.
4. Ability to design programs using a variety of data structures such as array, stacks, queues, linked list
5. Able to analyze and implement various kinds of searching and sorting techniques.

Unit – I: Introduction to Data structure & Linear Data Structures: Array, Stack and Queue
                                                                                                          18 Hrs.
   Concept of Abstract Data Types,
   Definitions – Data types, Data Object, Data structure (D-Data, A-Axioms, O-Operations), Classification (Primitive, Non-Primitive: Array, Files, List: Linear, Non-Linear), Basic Operations (Traversing, Searching, Insertion, Deletion, Sorting, Merging)
   Array – Definition as a Data Structure, Types (one Dimensional, multi dimensional),
   Applicationsof Array – Polynomial representation using array, Operations on Polynomial (Addition & Product)
   Sorting: Definition, Stable-Unstable Sorting, Adaptive-Non Adaptive Sorting, Order of Sorting (Increasing, Decreasing, Non Increasing, Non Decreasing)
   Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Quick sort
   Searching: Linear and Binary Search
   Stack: Definition, Operations (Push, Pop, Peek, Isfull, Isempty), Implementation using array
   Applications of stack: Recursion, Mathematical Expressions (Well-Parentheses, Notations: Infix, Prefix, Postfix, Conversion from Infix to Postfix and Infix to Prefix)
   Queue – Definition of queue, Operations (Enqueue, Dequeue, Peek, Isfull, Isempty), Types of queue (Linear, Circular, Priority), Implementation Linear Queue using array(Compaction), Implementation Circular Queue using array (Use of Counter), Applications of Queue

Unit – II: Non Linear Data Structures: Linked List and Trees   18 Hrs.
   Linked List: Concept of linked list, Types of Linked List (Singly-Doubly, Linear-Circular), Implementation of Linked list, Operations on linear linked list (Insertion, Deletion, Display, Search)
   Application: Implementation of stack and queue using linked list.
   Trees: Definition, Terminologies (Root, Child, Parent, Siblings, Descendant, Ancestor, Leaf/External node, Branch node/Internal node, Degree, Edge, Path, Level, Depth, Height of node, Height of tree, Forest)
   Binary Tree: Definition, Types (Full/Proper/Plane, Complete, Perfect, Skewed, Balanced), Array representation of Binary Tree
   Binary Search Tree: Definition, Representation, Operations (Insertion, Deletion, Search, Tree Traversal:Preorder, Inorder, Postorder)

Reference Books

1. Data Strucure using C and C++ -Rajesh Shukla
2. Data Strucure using C and C++ - Tanenbaum
3. Data Strucure using C++ - E Balagurusamy
4. Data Strucure using C++ - Yashwant Kanetkar
5. Data Strucure using C++ - D.S.Malik

Practical Based on DSC-12D

Use "Problem Solving Techniques" For Following problems and implement code through C++ programming language. It include: Problem Analysis, Algorithm, Flowchart, Output Tracing using Algorithm, Source Code with Output.

Sr. No	Content
1	**Polynomial**: Create a class Poly having member dynamic array of doubles and an integer for degree to represent polynomial. Write appropriate member functions and operators to initialise, assign, display and do following i) Evaluate polynomial for given value ii) Add to polynomials iii) Multiply two polynomials
2	**Stack And Application:**(Using Array) i) Implementation and Operations on Stack ii) Check Expression is Well-Parenthesized or not "Use [,(,{ brackets" iii) Conversion of infix expression to postfix and prefix "Use (only"
3	**Queue:**(Using Array) i) Implementation and Operations on Linear Queue ii) Implementation and Operations on Circular Queue(Use Count)
4	**Sorting**: i) Bubble sort ii)Insertion sort iii)Selection sort iv)Quick Sort(recursive function)
5	**Searching**: i) Linear Search ii) Binary Search
6	**Linked List**: i) Implementation and Operations on Linear Linked List ii) Implementation and Operations on Circular Linked List(Use Count) iii) Implementation and Operations on Circular Linked List
7	**Binary Tree**: Implementation and Operation of Binary Tree using array(use 0 to represent empty cell)
8	**Stack ,Queue and Binary Search Tree using Linked List**: i) Implementation and Operations using Linear Linked List on Stack ii) Implementation and Operations using Linear Linked List on Queue iii) Implementation and Operations using Circular Linked List on Circular Queue iv) Implementation and Operations (insert, display inorder preoder and post order with recursive function) using Linked List on BST.