# Bachelor of Science (Computer Science)
# B.Sc. (CS) Semester V

| Course Code | **US05CCSC51** | Title of the Course | **Object Oriented Programming Using C++** |
|---|---|---|---|
| Total Credits of the Course | 4 | Hours per Week | 4 |

| Course Objectives: | 1. To study the fundamental concepts and constructs of the C++ programming language<br>2. To learn the basic concepts of object-oriented programming using C++. |
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| Course Content | | |
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| Unit | Description | Weightage* (%) |
| 1. | **Object Oriented Programming (OOP) Concepts and C++**<br>– Structured programming vs. object oriented programming<br>– Basic OOP concepts: objects, classes, encapsulation, data hiding, inheritance, polymorphism<br>– Introduction to C++: structure of a C++ program, data types, variables, constants, expressions, statements and operators<br>– Usage of header files<br>– Control flow statements: if else, for loop, while loop, do while loop, switch, break and continue | 25 |
| 2. | **Input/Output, Arrays and Working with Classes**<br>– Basic I/O in C++<br>– Arrays in C++: introduction, declaration, initialization of one, two and multi-dimensional arrays, operations on arrays<br>– Working with strings: Introduction, declaration, string manipulation and arrays of string.<br>– Classes and objects in C++<br>– Constructors: default, parameterized, copy, constructor overloading and destructor<br>– Access specifiers, implementing and accessing class members<br>– Working with objects: constant objects, nameless objects, live objects, arrays of objects | 25 |
| 3. | **Functions, Function overloading and Inheritance**<br>– Introduction to functions, library and user-defined functions, parameters passing, default arguments,<br>– Functions overloading, inline functions, friend functions and virtual functions<br>– Inheritance: Introduction, derived class declaration, forms of inheritance<br>– Inheritance and member access ability, constructor and destructor in derived class, construction invocation and data member initialization. | 25 |

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| 4. | **Operator Overloading and Pointers**<br>– Operator Overloading: Introduction, overloaded operators, unary operator overloading, operator keyword, operator return values, binary operators overloading, overloading with friend function.<br>– Introduction to pointer, pointer variable, pointer arithmetic<br>– array of pointers, pointer to object<br>– Dynamic memory allocation | 25 |

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| Teaching-Learning Methodology | Multiple teaching approaches: lecture and discussion, exploration and inquiry, cooperative group work, demonstrations, and presentations |

Evaluation Pattern

| Sr. No. | Details of the Evaluation | Weightage |
|---|---|---|
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 15% |
| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | 15% |
| 3. | University Examination | 70% |

Course Outcomes: Having completed this course, the learner will be able to

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| 1. | Apply the knowledge of the fundamental concepts and constructs of the C++ programming language. |
| 2. | Carry out object-oriented programming using C++. |

Suggested References:

| Sr. No. | References |
|---|---|
| 1. | E Balagurusamy : Object Oriented Programming in C++, Tata McGraw-Hill Publishing Co. Ltd. |
| 2. | Robert Lafore : Object Oriented Programming in Turbo C++, Guide, Galgotia Pub. (P) Ltd. |
| 3 | Barkakati N. : Object Oriented Programming in C++, PHI. OOP's using C++ for Dummies. |

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## Bachelor of Science (Computer Science)
## B.Sc. (CS) Semester V

| Course Code | **US05CCSC52** | Title of the Course | **Visual Programming Through VB .NET** |
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| Total Credits of the Course | 4 | Hours per Week | 4 |

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| Course Objectives: | 1. To enable students to develop graphical programs using the .NET framework and the VB .NET programming language<br>2. To learn how to access databases and files in .NET programs |

| Course Content | | |
|---|---|---|
| Unit | Description | Weightage* (%) |
| 1. | **Introduction to .NET Framework and VB.NET**<br>– .NET Architecture, .NET Languages, Microsoft Intermediate Language (MSIL), The Just-In-Time (JIT) compiler, Working with Assemblies, The .NET framework class library<br>– VB.NET - introduction, applications and types of project<br>– Introduction to Visual Studio IDE<br>– Creating simple Windows Application using VB.NET<br>– Variables, data types, constants and operators<br>– Type casting, Boxing and Unboxing,<br>– Working with arrays and strings<br>– Creating simple Windows Application using VB.NET | **25%** |
| 2. | **VB.NET Basics**<br>– Use of conditional statement (if), multi-branching statement (select) and with…End with statement,<br>– Looping Statement: DO, FOR, FOR EACH… NEXT and WHILE, working with EXIT, CONTINUE and WITH statements<br>– Working with procedures – Introduction, types, use of parameters, parameter passing, calling procedures<br>– OOP concepts - Encapsulation, Inheritance, Interfaces and Polymorphism<br>– Working with modules, classes (partial) and namespaces<br>– Working with Windows Forms – Introduction, life cycle, basic properties, methods and events, use of simple windows forms control.<br>– Working with SDI and MDI forms | **25%** |

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| 3. | **Developing Windows Forms, Exception Handling**<br>– Working with basic controls – Button, CheckBox, CheckedListBox, ComboBox, DateTimePicker, GroupBox, HScrollBar, RadioButton, VscrollBar, Label, ListBox, PictureBox, TextBox and Time controls.<br>– Working with advanced controls – LinkLabel, RichTextBox, ColorDiolog, FontDialog, TreeView, Working with modules, classes (partial) and namespaces<br>– Error Handling: exception, structured exception using try…catch and final statement. | **25%** |
| 4. | **Database Programming with ADO.NET and Working with Files**<br>– ADO.NET – introduction and applications<br>– ADO.NET – architecture (connected and disconnected)<br>– Database connectivity using ADO.NET<br>– Use of Data sources, Server Explorer and working with Dataset<br>– Populating data in a DataGridView | **25%** |

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| Teaching-Learning Methodology | Multiple teaching approaches: lecture and discussion, exploration and inquiry, cooperative group work, demonstrations, and presentations |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 15% |
| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | 15% |
| 3. | University Examination | 70% |

| Course Outcomes: Having completed this course, the learner will be able to | |
|---|---|
| 1. | Develop graphical programs using the .NET framework and the VB .NET programming language. |
| 2. | Access databases and files in .NET programs |

| Suggested References: | |
|---|---|
| Sr. No. | References |
| 1. | Steven Holzner, VB.NET Black Book by Dreamtech publication. |
| 2. | Francesco Balena, Programming Microsoft Visual Basic.NET, Microsoft Press. |
| 3 | Bill Evjen, Billy Hollis, Bill Sheldon, Kent Sharkey and Tim McCarthy, Professional VB 2005 with .NET 3.0. |

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## Bachelor of Science (Computer Science)
## B.Sc. (CS) Semester V

| Course Code | **US05CCSC53** | Title of the Course | **Relational Database Management System** |
|---|---|---|---|
| Total Credits of the Course | 4 | Hours per Week | 4 |

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| Course Objectives: | 1. To introduce the students to the relational data model and RDBMS<br>2. To teach the SQL language for accessing an RDBMS |

| Course Content | | |
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| Unit | Description | Weightage* (%) |
| 1. | **Relational Database Theory and Data Modeling**<br>– The three-schema architecture for a Database Management System (DBMS)<br>– Introduction to data models (hierarchical, network, relational)<br>– Examples of current RDBMS products<br>– The relational data model: concepts and terminology, operations on data (DDL, DML), relationships and relationship types<br>– Integrity constraints<br>– Codd rules<br>– Entity-relationship modeling (different types of entities, attributes, relationships and their representation in the E-R diagram)<br>– Case studies of data modeling using E-R modeling | **25%** |
| 2. | **Introduction to SQL**<br>– SQL - introduction, advantages and disadvantages<br>– Data types – built-in (number, char, varchar2, date, raw, long raw)<br>– Types of SQL Statements: DDL (Data Definition Language), DML (Data Manipulation Language), DCL (Data Control Language), TCL (Transaction Control Language)<br>– Working with SQL*Plus – overview and basic commands like ed, start, get, save, exit, connect, set linesize, set pagesize and host<br>– Creating table and inserting data - CREATE TABLE, INSERT, retrieving data using query – SELECT, manipulating data – DELETE and UPDATE, modifying and removing table – ALTER TABLE and DROP TABLE. | **25%** |

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| 3. | **Data Constraints and Functions**<br>– Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE<br>– Null values, TAB table, DUAL table<br>– Operators – arithmetic, relational, logical, range searching, pattern matching and set<br>– Data constraints – Introduction, advantages and disadvantages<br>– Type of data constraints – NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK<br>– Modifying constraints, working with data dictionary and use of USER_CONSTRAINTS<br>– Functions – introduction, merits and demerits, types of functions (scalar and aggregate)<br>– Scalar: Numeric functions (ABS, FLOOR, MOD, POWER, ROUND, SIGN, SQRT and TRUNC), Character functions (CHR, ASCII, CONCAT, INITCAP, LOWER, SUBSTR, TRIM, UPPER), Date functions (ADD_MONTHS, LAST_DAY, NEXT_DAY, MONTHS_BETWEEN), Conversion functions (TO_NUMBER, TO_CHAR and TO_DATE)<br>– Aggregate fun: AVG, COUNT, MAX, MIN, SUM<br>– Miscellaneous functions – NVL, DECODE, COALESCE | |
| 4. | **Query, Subquery, Joins, Transaction Management and Reporting through SQL*Plus**<br>– Query and subquery, types of subquery<br>– Creation and manipulation of database objects – indexes, views, sequences and synonym<br>– Joining tables, types of joins (cross join, natural join, inner join, equijoin, outer joins, self-join).<br>– Data control language statements – GRANT and REVOKE<br>– Transaction control language statements – COMMIT, ROLLBACK and SAVEPOINT<br>– PL-SQL Block, CURSOR<br>– FUNCTION AND PROCEDURE | **25%** |

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| Teaching-Learning Methodology | Multiple teaching approaches: lecture and discussion, exploration and inquiry, cooperative group work, demonstrations, and presentations |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 15% |
| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | 15% |
| 3. | University Examination | 70% |

| Course Outcomes: Having completed this course, the learner will be able to | |
|---|---|
| 1. | Apply the basic knowledge of the relational data model and RDBMS |
| 2. | Use the SQL language for accessing an RDBMS |

| Suggested References: | |
|---|---|
| Sr. No. | References |
| 1. | An introduction to Database Systems : Bipin C. Desai, Galgotia Poblications Pvt. Ltd |
| 2. | Ivan Bayross : SQL,PL/SQL The programming language of Oracle, 3rd revised edition, BPB Publications |
| 3 | SQL/PLSQL for Oracle9i, P. S. Deshpande, dreamtech press, reprint edition 2009 |
| 4 | Understanding Database Management Systesm : S. Parthsarthy and B.W.Khalkar, First edition – 2007, Master Academy |

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## Bachelor of Science (Computer Science)
## B.Sc. (CS) Semester V

| Course Code | **US05CCSC54** | Title of the Course | **Computer Networks** |
|---|---|---|---|
| Total Credits of the Course | 4 | Hours per Week | 4 |

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| Course Objectives: | 1. To understand the basic concepts of computer networks and data communication.<br>2. To acquire knowledge of basic concepts related to network protocols and standards.<br>3. To learn fundamentals of wireless networking. |

| Course Content | | |
|---|---|---|
| Unit | Description | Weightage (%) |
| 1. | **Introduction**<br>– Computer networks: definition and advantages<br>– Classification of computer networks<br>– Introduction and differences among Local Area Networks (LANs), Metropolitan Area Networks (MANs), Wide Area Networks (WANs)<br>– Uses of Computer Networks<br>– Meaning of the basic terms: topology, data rate, modulation rate, spectrum, bandwidth, server, host | 25 |
| 2. | **Data Communication Fundamentals**<br>– Various types of transmission media<br>– Guided transmission media : Magnetic media, Twisted pair, Coaxial Cables, Fiber optics<br>– Introduction to the concept of Modulation, Type of Modulation, Serial transmission vs. Parallel transmission, Synchronous Transmission vs. Asynchronous Transmission, Circuit switching, Packet switching<br>– Concept of Multiplexing : Frequency Division Multiplexing, Time Division Multiplexing | 25 |
| 3. | **Layered Protocols and Satellite Communication**<br>– Protocol significance and hierarchies<br>– Design issues for the layers<br>– The OSI Reference model<br>– Examples of protocols for different layers of the OSI model<br>– Introduction to wireless networks<br>– Communication satellites<br>– Introduction to geosynchronous satellites | 25 |
| 4. | **Local Area Network Technology and Networking Devices**<br>– Types and characteristics of Local Area Networks | 25 |

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| | – LAN Topologies: Bus, Star, Ring, Tree, Complete (Mesh)<br>– functions of various networking components: modems, amplifiers, repeaters, hubs, switches, bridges, routers, gateway | |

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| Teaching-Learning Methodology | Blended learning approach incorporating traditional classroom teaching and online /ICT-based teaching practices. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 15% |
| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | 15% |
| 3. | University Examination | 70% |

| Course Outcomes: Having completed this course, the learner will be able to develop | |
|---|---|
| 1. | Ability to describe the significance and functioning of computer networks. |
| 2. | Understanding of the fundamental concepts related to data communication. |
| 3. | Knowledge of various network protocols and standards. |
| 4. | Knowledge of basic concepts related to wireless networking |

| Suggested References: | |
|---|---|
| Sr. No. | References |
| 1. | Behrouz Forouzan, introduction to data communications and networking, Tata McGraw-hill publishing co. Ltd., New Delhi, 1998, 4th edition. |
| 2. | Tanenbaum A. S., computer networks, 3rd edition prentice-hall of India Pvt. Ltd., New Delhi, 1997. |
| 3 | Stallings W., Data and Computer Communications, 3rd edition, Macmillan Pub. Company, New York, 1991. |

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## Bachelor of Science (Computer Science)
## B.Sc. (CS) Semester-V

| Course Code | **US05CCSC55** | Title of the Course | **Praticals** |
|---|---|---|---|
| Total Credits of the Course | 8 | Hours per Week | 16 |

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| Course Objectives: | 1. To study the object-oriented programming concepts using C++.<br>2. To learn VB.NET programming language.<br>3. To learn query processing techniques.<br>4. To lean the Network layout Diagrams. |

| Course Content | | |
|---|---|---|
| | Description | Weightage (%) |
| | Part-1: Practical based on US05CCSC51<br>Part-2: Practical based on US05CCSC52<br>Part-3: Practical based on US05CCSC53<br>Part-4: Practical based on US05CCSC54 | 100 |

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| Teaching-Learning Methodology | Hands on training through required ICT tools. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written / Practical Examination (As per CBCS R.6.8.3) | 30% |
| 2. | Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3) | - |
| 3. | University Examination | 70% |

| Course Outcomes: After completing this course, the learner will be able to | |
|---|---|
| 1. | gain the knowledge of object-oriented programming concepts using C++. |
| 2. | gain the knowledge of VB.NET Programming. |
| 3. | gain the knowledge of RDBMS. |
| 4. | Gain the knowledge of Network Topology along with layout diagram. |

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