Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03AIIT51**	Title of the Course	**Operations Research - I**
Total Credits of the Course	**2**	Hours per Week	**2**

Course Objectives:	1. To study the fundamentals of operations research. 2. To learn the linear programming problems and transportation problems and how to solve them.

Course Content		
Unit	Description	Weightage* (%)
1.	**Operations Research (OR)** – History, meaning and application of OR. – Introduction to LPP, General and standard form of LPP. – Solution of LPP using Graphical Method.	25%
2.	**Linear Programming Problem (LPP)** – Solution of LPP using Simplex method and Big-m method – Duality in LPP (concept only)	25%
3.	**Transportation problem** – Introduction – Mathematical model of Transportation problem – Initial basic feasible solution by North-west corner rule, Least-cost method, Vogel's approximation method.	25%
4.	**Modified Distribution Method** – Modified Distribution Method for finding Optimum Solution of TP, Unbalanced TP, Degenerate and non- Degenerate TP.	25%

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools

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.	gain knowledge of the fundamentals of operations research.
2	understand the linear programming problems and transportation problems and knowledge of how to solve them.

Suggested References:	
Sr. No.	References
1.	Taha H. A. : Operations Research, Macmillan, New York (1987).
2.	Sharma S.D. : Operations Research. Kedar Nath Ram Nath & Co. Meerut , 1988-89.
3.	Gillett B. E.: Introduction to Operations Research - a computer oriented algorithmic approach, McGraw-Hill, 1976.
4.	Bronson Richard : Operations Research, Schaum's outline Series, 1983.
5.	Kapoor V K : Problems and solutions in Operations Research, Sultan Chand & sons, 1996.

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Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03CIIT52**	Title of the Course	**Computer 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 2. To learn the basic concepts of object-oriented programming using C++.

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

4.	**Operator Overloading, Pointers and Files** – Operator overloading : Introduction, overloaded operators, unary operator overloading, operator keyword, operator return values, binary operators overloading, overloading with friend function – Dynamic memory allocation – Files : introduction and applications – File operations : open, read, write, seek and close	

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 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 Application & Information Technology)
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Course Code	**US03CIIT53**	Title of the Course	**Visual Programming**
Total Credits of the Course	**4**	Hours per Week	**4**

Course Objectives:	1. To enable students to develop graphical programs using the .NET framework and the VB .NET programming language. 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** – .NET Architecture, .NET Languages, Microsoft Intermediate Language (MSIL), The Just-In-Time (JIT) compiler, Working with Assemblies, The .NET framework class library – VB.NET - introduction, applications and types of project – Introduction to Visual Studio IDE – Variables, data types, constants and operators – Type casting, Boxing and Unboxing, – Working with arrays and strings – Creating simple Windows Application using VB.NET	**25%**
2.	**VB.NET Basics** – Use of conditional statement (if), multi branching statement (select) and With…End With statement, – Looping Statement: DO, FOR, FOR EACH...NEXT and WHILE, Working with EXIT, CONTINUE and WITH statements – Working with procedures – introduction, types, use of parameters, parameter passing, calling procedures – Working with modules, classes (partial) and namespaces – Working with Windows Forms – Introduction, life cycle, basic properties, methods and events, use of simple windows forms control. – Working with SDI and MDI forms	**25%**
3.	**Developing Windows Forms, Exception Handling** – Working with basic controls – Button, Check Box, Checked List Box, ComboBox, Date Time Picker, Group Box, HScroll Bar, Radio Button, Vscroll Bar, Label, List Box, Picture Box, Text Box and Timer controls. – Working with advanced controls – Link Label, Rich Text Box, Color Diolog, Font Dialog, Tree View and Progress bar controls – Error Handling: exception, structured exception using try…catch and final Statement	**25%**

4.	**Persisting Data Using Databases and Files** – ADO.NET – introduction and applications – ADO.NET – architecture (connected and disconnected) – Database connectivity using ADO.NET – Use of Data sources, Server Explorer and working with Data Set – Populating data in a Data Grid View – Working with files	**25%**

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 Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03CIIT54**	Title of the Course	**Relational Database Management Systems-I**
Total Credits of the Course	**4**	Hours per Week	**4**

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

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction to DBMS, RDBMS and Data Modeling** – DBMS : Meaning, Advantages, Disadvantage – The three-schema architecture for a Database Management System (DBMS) – Introduction to data models (hierarchical, network, relational) – The relational data model: concepts and terminology, relationships and relationship types – Codd Rules – Difference between DBMS and RDBMS	**25%**
2.	**Introduction to SQL** – SQL - introduction , advantages and disadvantages – Data types – built-in (number, char, varchar2, date, raw, long raw) – Types of SQL Statements : DDL (Data Definition Language), – DML (Data Manipulation Language), DCL (Data Control Language), TCL (Transaction Control Language) – Working with SQL*Plus – overview and basic commands like ed, start, get, save, exit, connect, set linesize, set pagesize and host – 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%**

3.	**Data Constraints and Functions** – Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE – Null values, TAB table, DUAL table – Operators – arithmetic, relational, logical, range searching, pattern matching and set – Data constraints – Introduction, advantages and disadvantages – Type of data constraints – NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK – Modifying constraints, working with data dictionary and – use of USER_CONSTRAINTS – Functions – introduction, merits and demerits, types of functions (scalar and aggregate)	
4.	**Scalar , Conversion , Aggregate and Miscellaneous functions** – Scalar : Numeric functions (FLOOR, MOD, POWER, ROUND, 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) – Aggregate fun : AVG, COUNT, MAX, MIN, SUM – Miscellaneous functions – NVL, DECODE, COALESCE	**25%**

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.
5.	Orale9i The Complete Reference , Kevin Loney, George Koch, Oracle Press.

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Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03CIIT55**	Title of the Course	**Operating Systems**
Total Credits of the Course	**4**	Hours per Week	**4**

Course Objectives:	1. To introduce the students to the fundamentals of operating systems. 2. To teach CPU scheduling, memory management, process synchronization and deadlocks. 3. To impart basic knowledge of the Linux commands.

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction and Scheduling** – Introduction to Operating System, Operating System Services, – Different types of Operating Systems: Real time, Time sharing, Distributed and Multiprogramming. – OS Structure – Simple Structure, Layered Approach, Microkernel. – CPU Scheduling: Introduction to process, process control block, process scheduling – FCFS Scheduling, SJF scheduling, Priority scheduling, Round Robin scheduling	25%
2.	**Memory Management** – Memory Management: Concept, Basic memory management techniques: – Swapping, Demand Paging – The Optimal Page Replacement Algorithm – The LRU Page Replacement Algorithm – The FIFO Page Replacement Algorithm	25%
3.	**Process Synchronization, Deadlocks and Introduction to Linux** – Introduction to Cooperating process – Process Synchronization, – Critical Section Problem – Two process solution – Deadlock and characterization – Introduction to Linux System – Features of Linux	25%
4.	**Basic Linux commands** – Basic Commands: login, logout, date, man, pwd, who, dir, ls, cd,	25%

	mkdir, rmdir, wc, echo – Use of Wild card characters – Types of FAP, use of chmod command – Basic commands like cp, mv, rm, rev, file redirection, grep, cut, paste, find sort commands with example – Introduction to shell script: execution of it, shell script variable, expr, test commands – Control structure: if, if..else, case structure – Iteration: while, for construct, break, continue, exit commands	

Teaching-Learning Methodology	Multiple teaching approaches: lecture and discussion, exploration and inquiry, cooperative group work, 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 knowledge of the fundamentals of operating systems.
2.	understand the concepts like CPU scheduling, memory management, process synchronization and deadlocks.
3.	gain basic knowledge of the Linux commands.

Suggested References:	
Sr. No.	References
1.	Andrew S. Tanenbaum: Operating System Design & Implementation, Prentice Hall International.
2.	James Peterson and Abraham Silberschatz: Operating System Concept, Addition Wesley.
3.	Bryan Pfaffenberger - Linux Commands Instant reference , BPB Publication.
4.	Sumitabha Das - UNIX , Concepts and Applications – Tata McGraw-Hill Publications.
5.	Advanced Linux Programming – Samuel, Techmedia Publications.

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Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03CIIT56**	Title of the Course	**Practicals-I**
Total Credits of the Course	**4**	Hours per Week	**8**

Course Objectives:	1. To study the fundamental concepts and constructs of the C++ programming language 2. To learn the basic concepts of object-oriented programming using C++. 3. To enable students to develop graphical programs using the .NET framework and the VB .NET programming language. 4. To learn how to access databases and files in .NET programs.

Course Content		
Sr. No.	Description	Weightage*(%)
1.	Part-1 : Practical based on US03CIIT51	50
2.	Part-2 : Practical based on US03CIIT52	50

Teaching-Learning Methodology	Project-based learning in small groups and Hands on training through required ICT tools.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	apply the knowledge of the fundamental concepts and constructs of the C++ programming language.
2.	carry out object-oriented programming using C++.
3.	develop graphical programs using the .NET framework and the VB .NET programming language.

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Bachelor of Science (Computer Application & Information Technology)
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Course Code	**US03CIIT57**	Title of the Course	**Practicals-II**
Total Credits of the Course	**4**	Hours per Week	**8**

Course Objectives:	1. To introduce the students to the relational data model and RDBMS. 2. To teach the SQL language for accessing an RDBMS. 3. To introduce the students to the fundamentals of operating systems. 4. To teach CPU scheduling, memory management, process synchronization and deadlocks. 5. To impart basic knowledge of the Linux commands.

Course Content		
Sr. No.	Description	Weightage* (%)
1.	Part-1 : Practical based on US03CIIT53	50
2.	Part-2 : Practical based on US03CIIT54	50

Teaching-Learning Methodology	Project-based learning in small groups and Hands on training through required ICT tools.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

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
3.	apply the knowledge of the fundamentals of operating systems.
4.	understand the concepts like CPU scheduling, memory management, process synchronization and deadlocks.
5.	gain basic knowledge of the Linux commands.

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Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03SIIT58**	Title of the Course	**Software Testing**
Total Credits of the Course	**2**	Hours per Week	**2**

Course Objectives:	To impart knowledge of software testing fundamental.

Course Content		
Unit	Description	Weightage* (%)
1.	**Software Testing** – Quality Revolution – Software Quality – Role of Testing – Verification and Validation Failure, Error, Fault, and Defect – Notion of software reliability – Objectives of Testing – Concept of Complete Testing – Central Issue in Testing – Testing Activities	25%
2.	**Testing Fundamentals** – Examining the specification – Testing the software with blinders – Examining the code	25%
3.	**Applying your testing skills** – Configuration testing Compatibility testing Usability testing – Testing the documentation	25%
4.	**Testing Tools, Test Recording and Reporting** – Automated testing and test tools Writing and tracking test cases Reporting what you find	25%

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.	gain fundamental knowledge of software testing.

Suggested References:	
Sr. No.	References
1.	Ron Patton "Software Testing", Techmedia publication, 2000.
2.	Kshirasagar Naik and Priyadarshi Tripathy "Software Testing and Quality Assurance" Wiley Publications, Student edition,2013.
3.	Dr. K. V. K. K. Prasad ,"Software Testing Tools", Dreamtech, 2006.
4.	Andreas Spillner, Tilo Linz, Hans Schaefer ,"Software Testing Foundations" , Shoff Publishers and Distributors,2nd Edition, 2007.
5.	Srinivas D and Gopalswamy R "Software Testing : Principles and Practices", Pearson Education, 2006.

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Bachelor of Science (Computer Application & Information Technology)
B.Sc. (CA&IT) Semester III

Course Code	**US03SIIT59**	Title of the Course	**Management Information System**
Total Credits of the Course	**2**	Hours per Week	**2**

Course Objectives:	1. Management Information System (MIS) and information communication. 2. planning, decision making and elements of control.

Course Content		
Unit	Description	Weightage* (%)
1.	**MIS- Introduction** – Introduction to MIS, Function of MIS, Problems with MIS, Knowledge – requirements for MIS(7 areas) – Introduction to Information, Data – Information & management, Information Classifications – Definition: Data and Information, Data Characteristics.	25
2.	**Information Communication** – What is Information? Functions performed by information – Characteristics of information. – Communication System, Information in an organization. – System Concepts - Structure and elements, Objectives & types	25
3.	**Planning and Decision Making** – Planning and Planning terms, Objectives, Policies, Levels of Planning, Planning Problems. – Type and Sources of Planning Information – Tools of planning – Decision Making, Programmed and Non-Programmed decisions, Levels of Decision Making	25
4.	**Elements of Control** – Concept of control in management, Control cycle, Different Feedback loops, – Control in Organizations, Multiple control factors, Scope of management control – Total Quality Control (TQC) – Total Quality Management(TQM)	25

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.

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 understand	
1.	Management Information System (MIS) and information communication.
2.	Planning, decision making and elements of control.

Suggested References:	
Sr. No.	References
1.	Management Information Systems, T. Lucey, BPB Publication.
2.	Management Information Systems, WS Jawadekar.
3.	Management Information Systems, Kenneth C. Laudon, Jane P. Laudon.
4.	Management Information Systems, James A. O' Brien, George M. Markas.
5.	Management Information Systems, Ramesh Behl.

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