**B.Sc COMPUTER SCIENCE**
(Choice Based Credit System)
(with effect from the academic year 2017-2018 onwards)

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| IV   | 21 | Non-Major Elective | 1. Fundamentals of Internet  
2. Basic Programming Design | 2 | 2 |

**Subtotal** | **30** | **22** |

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| III  | 24 | Major Elective - I | 1. Multimedia Applications  
2. Embedded System  
3. Open Source Technologies | 5 | 4 |
| IV   | 25 | Allied -IV | E-Commerce | 4 | 3 |
| III  | 26 | Allied Practical - IV | PYTHON | 4 | 2 |
| IV   | 27 | Skill Based II Common | Personality Development & Yoga | 4 | 4 |
| IV   | 28 | Non-Major Elective | 1. HTML  
2. Programming in C | 2 | 2 |

| V     | Extension Activity | NCC, NSS, YRC, YWF | 0 | 1 |

**Subtotal** | **30** | **23** |

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| III  | 34 | Major Elective - II | 1. Mobile Computing  
2. Cryptography  
3. Cloud Computing | 5 | 4 |
| III  | 35 | Skill Based Common | Computers for Digital Era | 2 | 2 |

**Subtotal** | **30** | **24** |

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| III  | 42 | Major Elective - III | 1. Network Security  
2. Big Data Analytics  
3. Neural Networks | 4 | 4 |

**Subtotal** | **30** | **29** |

**Total credits** | 140 |
Objective: To obtain knowledge about the structure of the programming language C and to develop the program writing and logical thinking skill.

Unit – I: INTRODUCTION


(14L)

Unit – II: CONTROL STRUCTURES


(10L)

Unit – III: ARRAYS

One-dimensional arrays – Declaration of One-dimensional arrays – Initialization of One-dimensional arrays - Two-dimensional arrays – Initialization of Two-dimensional arrays – Multi-dimensional arrays. Character Arrays and Strings:- Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – String Handling Functions.

(10L)
Unit – IV: FUNCTIONS


(14L)

Unit – V: POINTERS AND FILES


(12L)

Text Book :


Reference Books:

Objective: To develop skills in implementing algorithms through the programming language C and to explore the features of C by applying sample problems.

Each exercise should be completed within two hours.

It is compulsory to complete all the exercises given in the list in the stipulated time.

1. To find all possible roots of a quadratic equation using if statement
2. Program to check vowel or consonant using switch case statement
3. Evaluate Sine series using while loop
   \[ \sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots - \frac{x^n}{n!} \]
4. Sort a list of numbers in ascending order
5. Search an element in an array
6. Reverse a number
7. Check the given string is palindrome or not
8. Find the binomial coefficient \( \binom{n}{r} \) value using recursion
9. Multiply two matrices (check for compatibility)
10. Transpose of a matrix
11. Find the sum of ‘n’ numbers by making function call
12. Alphabetical sorting (passing array as argument to function)
13. Exchange values using pointers and function
14. Prepare the student details using structure
15. Prepare mark sheet using file
Discrete Mathematics

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**Objective:** To apply basic concepts for clear understanding of mathematical principles and to solve practical problems.

### Unit – I: RELATIONS
- Introduction to Relations
- Binary relation
- Classification of Relations
- Composition of Relations
- Inverse of Relation
- Closure operation on Relations
- Matrix representation of Relation - digraphs. (9L)

### Unit – II: FUNCTIONS
- Introduction to Functions
- Addition and Multiplication of Functions
- Classifications of Functions
- Composition of Function
- Inverse Function. (6L)

### Unit – III: MATHEMATICAL LOGIC
- Introduction
- Statement (Propositions)
- Laws of Formal Logic
- Basic Set of Logical operators/operations
- Propositions and Truth Tables
- Algebra Propositions
- Tautologies and Contradictions
- Logical Equivalence
- Logical Implication
- Normal Forms. (10L)

### Unit – IV: MATRIX ALGEBRA
- Introduction
- Definition of a Matrix
- Types of Matrices
- Operations on Matrices
- Related Matrices
- Transpose of a Matrix
- Symmetric and Skew-symmetric Matrices
- Complex Matrix
- Conjugate of a Matrix
- Determinant of a Matrix
- Typical Square Matrices
- Adjoint and Inverse of a Matrix
- Singular and Non-singular Matrices
- Adjoint of a Square Matrix
- Properties of Adjoint of a Matrix
- Properties of Inverse of a Matrix. (10L)

### Unit – V: GRAPH
- Introduction
- Graph and Basic Terminologies
- Types of Graphs
- Sub Graph and Isomorphic Graph
- Operations on Graphs
- Representation of Graph. (10L)

**Text Book:**
DISCRETE MATHEMATICS, Swapan Kumar Chakraborty and Bikash Kanti Sarkar, OXFORD University Press.

**Reference Books:**
INTRODUCTION TO COMPUTERS

(For the Institutions with B.Sc. (Maths) Programme not opting Physics / Chemistry as Allied Subjects with effect from 2017-18 and onwards for Semesters - I & II and also for Semesters - III & IV of the 2016-17 batch)

Aim

The Allied paper is to gain fundamental knowledge in computer

Objectives

• To know the characteristic, parts and applications of computers
• To know the various devices and familiarize with their functions
• To know the usage of internet

UNIT I:


UNIT II:

Computer Memory and Storage: Introduction, memory hierarchy, Random Access memory (RAM), Read only memory (ROM), RAM, ROM and CPU interaction. Types of Secondary storage devices, Magnetic tape, magnetic disk, types of magnetic disk, optical disk, type of optical disks, USB drives.

UNIT III:


UNIT IV:


UNIT V:

The Internet: Introduction, Evolution of Internet – Basic Internet terms – Getting connected to Internet – Internet Applications – Data over Internet.


Text Book

Introduction to Computers and Information Technology, Dr. D.Glory Ratna Mary, Mrs. S. Selvanayahi, Dr. V. Joseph Peter, Jupiter Publications

Reference Book

1. Introduction to Computer Science, Second Edition, ITL Education Solutions Ltd, Pearson Education
Objective: To develop skills in implementing algorithms through the programming Language C and to explore the features of C by applying sample problems.

Each exercise should be completed within two hours.
It is compulsory to complete all the exercises given in the list in the stipulated time.

(Any open source Office or MS Office)

1. Usage of Numbering, Bullets, Indents and Headers in a Word Document
2. Prepare a Calendar in a Word Document
3. Design a wedding invitation in Word Document
4. Usage of Spell Check, Find and Replace
5. Picture Insertion and Alignment
6. Prepare a semester wise mark statement for a computer class of 20 students using any spreadsheet’ worksheet. Total, average and rank the student marks. Give proper headings. Make the column headings bold and italic.
7. Consider the sample employee worksheet and calculate their salary.
8. Use any spreadsheet to use mathematical, statistical and logical functions
9. Use any spreadsheet to plot a chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).
11. Create a student database and create validation rules for fields like age, date of birth, pincode etc.
12. Enter data to the student database using a form.
13. Create a query and add criteria to the query.
14. Create a tabular auto report.
15. Customize a report in report design.

Reference Books:
1. Microsoft Office 2016 Step By Step, Lambert, Joan , Frye, Curtis D., Phi Learning
2. Microsoft Access 2016 Step By Step, By Lambert, Joan Phi Learning
3. Microsoft Excel 2016 Step By Step, Curtis Frye, Phi Learning
4. Browse the Internet for Open Source Office Software
Objective: To develop skills in office automation by applying sample problems.

1. Text editing with different styles (Wedding or Invitation Card)
2. Table creation and editing (Calendar or Timetable)
3. Cut, Paste, find and replace usage
4. Mathematical symbols, suffix and super fix, equation creation and editing
5. Worksheet for Payroll
6. Worksheet for EB billing
7. Use any spreadsheet to plot a chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).
8. Database Creation for library books
9. Database Creation for employee’s details
10. Presentation for a seminar with dynamic provisions
Object Oriented Programming in C++

**Objective:** To gain the basic knowledge of object oriented programming concepts and to understand the detail idea of C++ streams, Inheritance, Overloading of operators, functions, constructors, File Handling and templates concepts of C++ programming.

**Unit – I: Principles of Object Oriented Programming**

Basic Concepts of Object Oriented Programming. **Classes and Objects:** Introduction – Specifying a Class – Defining Member Functions – Making an Outside Function Inline – Nesting of Member Functions - Private Member Functions – Static Data Members – Static Member Functions – Arrays of Objects – Objects as function arguments – Friendly Functions – Returning Objects .

**Unit – II: Constructors and Destructors**


**Unit – III: Operator Overloading, Type Conversions and Inheritance**


**Unit – IV: Pointers, Virtual Functions and Polymorphism**

Pointers - Pointers to Objects – this Pointer – Pointers to Derived Classes – Virtual Functions - Pure Virtual Functions. **Managing Console I/O Operations:** Introduction – C++ Streams – C++ Stream Classes – Unformatted I/O operations – Managing Output with Manipulators.
Unit – V: Files and Templates


**Templates:** Introduction - Class Templates – Function Templates. (10L)

**Text Book:**


**Reference Book:**

Programming in C++

Objective: To gain knowledge about the object oriented programming concepts and C++ streams, Inheritance, Overloading of operators, functions, constructors, File Handling and templates concepts of C++ programming by implementing sample programs.

Each exercise should be completed within three hours.

It is compulsory to complete all the exercises given in the list in the stipulated time.

1) Program with a Class and Member Functions.
2) Program to Overload Function.(minimum three geometric figures)
3) Program to implement Parameterized Constructor.
4) Program to implement Friend Function (minimum two classes)
5) Program to Overload Unary Minus Operator.
6) Program to Overload Binary Plus Operator.
7) Program to implement Multiple Inheritance for Family Details.
8) Program to implement Multilevel Inheritance for Bank Customer Details.
9) Program to implement Hierarchical Inheritance for Students Details.
10) Program to implement Virtual Function.
Digital Design

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Objective: To understand the concept of digital systems, to operate on various number systems and simplify Boolean functions and to distinguish logical and combinational circuits.

Unit – I: Number Systems, Codes and Digital Logic

- Binary Number System
- Binary to Decimal Conversion
- Octal Numbers
- Hexadecimal Numbers
- The ASCII Code
- The Excess-3 Code
- The Gray Code.

**Digital Logic:**
- The Basic gates NOT, OR , AND

(10L)

Unit – II: Combinational Logic Circuits

- Boolean Laws and Theorems
- Sum of Products Method
- Truth Table to Karnaugh Map
- Pairs, Quads and Octets
- Karnaugh Simplifications
- Don’t Care Conditions
- Product of Sums Method
- Product of Sums Simplification.

(10L)

Unit – III: Data Processing and Arithmetic circuits

- Multiplexers
- De-multiplexers
- 1-of-16 Decoders
- BCD-to-Decimal Decoders
- Seven-Segment decoders
- Encoders
- Exclusive-OR gates.

**Arithmetic Circuits:**
- Binary Addition
- Binary Subtraction
- Unsigned Binary Numbers
- Sign-Magnitude Numbers
- 2’s Complement Representation
- 2’s Complement Arithmetic.

(10L)

Unit – IV: Flip-Flops

- RS Flip Flops
- Edge Triggered RS Flip Flops
- Edge Triggered D Flip Flops
- Edge Triggered JK Flip Flops
- JK Master Slave Flip Flops.

(8L)

Unit – V: Registers

- Types of Registers
- Serial in serial out
- serial in parallel out
- parallel in serial out
- parallel in parallel out
- Universal Shift Register.

(7L)

Text Book:


Reference Book:

Programming in C

(For the Institutions with B.Sc. (Maths) Programme not opting Physics / Chemistry as Allied Subjects with effect from 2017-18 and onwards for Semesters - I & II and also for Semesters - III & IV of the 2016-17 batch )

Objective: To obtain knowledge about the structure of the programming language C and to develop the program writing and logical thinking skill.

Unit – I: INTRODUCTION


Unit – II: CONTROL STRUCTURES


Unit – III: ARRAYS

One-dimensional arrays – Declaration of One-dimensional arrays – Initialization of One-dimensional arrays - Two-dimensional arrays – Initialization of Two-dimensional arrays – Multi-dimensional arrays. Character Arrays and Strings:- Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – String Handling Functions.
Unit – IV: FUNCTIONS


Unit – V: POINTERS AND FILES


Text Book:

Reference Books:

Objective: To understand and make effective use of Linux utilities and Shell scripting language to solve problems.

Each exercise should be completed within three hours.

It is compulsory to complete all the exercises given in the list in the stipulated time.

1. Use any text editor in linux(say vi) to enter a C program to find the largest of three numbers, compile using gcc and display the output.
2. Use any text editor in linux(say vi) to enter a C program to find the factorial of a given number, compile using gcc and display the output.
3. Linux commands
   a. ls, mkdir, rmdir, cd, pwd, find, du (Directory oriented)
   b. cat, cp, rm, mv, wc (File oriented)
   c. ps, kill, batch, grep (Process oriented)
   d. write, mail, wall (Communication oriented)
4. Linux commands
   a. date, who, who am i, man, cal, echo, bc (General purpose)
   b. Pipe, Filter
5. Write a shell script to display date in the mm/dd/yy format, time, username and current directory.
6. Write a shell script to find the sum of digits of a given number.
7. Write a program to generate Fibonacci series.
8. Write a program to check whether given string is palindrome or not
9. Write a shell script to find factorial of a given integer.
10. Write a shell script to generate mark sheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.

Reference Books:

1. Linux: A practical approach, B. Mohamed Ibrahim, Firewall Media
2. Comdex Linux and Open Office course kit revised and upgraded, Gupta, Wiley India.
3. A practical guide to Linux command, editors, and shell programming 2/e; Mark G Sobell, Prentice Hall.
4. Linux Lab - Open source Technology : Ambavade - Dreamtech
C Programming - List of Practicals

(For the Institutions with B.Sc. (Maths) Programme not opting Physics / Chemistry as Allied Subjects with effect from 2017-18 and onwards for Semesters - I & II and also for Semesters - III & IV of the 2016-17 batch)

1. Write a program to convert the temperature from Fahrenheit to Celsius.
2. Write a program to test whether the given year is leap year or not.
3. Write a program to read two integers m and n and print the prime numbers in between them.
4. Write a program to evaluate the series \( e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \cdots \)
5. Write a program to arrange the given set of numbers in ascending order.
6. Write a program to read two matrices and to find the sum and product of the matrices.
7. Write a program to check whether a given string is Palindrome or not.
8. Write a program to find Factorial value, Fibonacci, GCD value-Recursion.