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**ST. TERESA'S COLLEGE, ERNAKULAM  
(AUTONOMOUS)**

**Affiliated to Mahatma Gandhi University, Kottayam**



**CURRICULUM FOR  
BACHELOR'S PROGRAMME IN  
COMPUTER APPLICATIONS (TRIPLE MAIN)**

Under Choice Based Credit & Semester System  
& Outcome Based Education

(2018 Admissions)

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## **BCA - B. Sc. COMPUTER APPLICATIONS (TRIPLE MAIN)**

### **PROGRAM SPECIFIC OUTCOMES**

**PSO1:** Associate the basic concepts of mathematical structures, and statistical principles with computer science

**PSO2:** Articulate Computational principles, fostering future learning to conform with technological advancements

**PSO3:** Analyze real world problems and integrate mathematical and statistical concepts to design computer based solutions

**PSO4:** Develop holistic professional growth with effective communication skills and economic consciousness to society

**PSO5:** Formulate innovative solutions to socially committed, industry relevant and strategic research problems

### **SEMESTER I**

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Course Type</b>
EN1A01B18	Fine-Tune Your English	4	Common Course I
CA1B01B18	Computer Fundamentals And Digital Principles	3	Core Course
CA1B02B18	Methodology Of Programming And C Language	3	Core Course
CA1BP01B18	Software Lab -I	2	Core Course
MT1B01B18	Discrete Mathematics & Trigonometry	3	Core Course
ST1B01B18	Descriptive Statistics	3	Core Course

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**SEMESTER I**  
**COMMON COURSE I**  
**EN1A01B18– FINE-TUNE YOUR ENGLISH**

**Credits: 4**

**Total Lecture Hours: 90**

**Course Outcomes:**

**CO1:** Recognize the basics of English grammar

**CO2:** Choose the appropriate word classes

**CO3:** Identify common errors in the use of English language in various contexts

**CO4:** Apply the rules of grammar to comprehend, speak, and write grammatically correct English

**CO5:** Compose materials for business communication

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	1	2	2	2	2
<b>CO2</b>	1	2	2	2	2
<b>CO3</b>	1	1	1	2	1
<b>CO4</b>	1	3	2	3	1
<b>CO5</b>	1	2	2	3	2

**Syllabus Content:**

**Module I (18 Hours)**

**The Sentence and its Structure**

How to Write Effective Sentences – Phrases: What are They? – The Noun Clauses – The Adverb Clause – “If All the Trees Were Bread and Cheese” – The Relative Clause – How Clauses are Conjoined

**Module II (18 Hours)**

**Word-Classes and Related Topics**

Understanding the Verb – Understanding Auxiliary Verbs – Understanding Adverbs – Understanding Pronouns – The Reflexive Pronoun – The Articles I – The Articles II – The Adjective – Phrasal Verbs – Mind your Prepositions

**Module III (18 Hours)**

**To Err is Human**

Concord – Errors – Common and Uncommon

**Spelling and Pronunciation**

Pronunciation: Some Tips – More Tips on Pronunciation – An awesome Mess? – Spelling Part II

**Module IV (18 Hours)**

**Tense and Related Topics**

‘Presentness’ and Present Tenses – The ‘Presentness’ of a Past Action – Futurity in English – Passivation

**Interrogatives and Negatives**

Negatives – How to Frame Questions – What’s What? – The Question Tag

**Module V (18 Hours)**

**Conversational English**

Some time expressions – Is John There Please?

**Miscellaneous and General Topics**

Reading

Letter Writing **In addition there will be an essay question on a general topic.**

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**SEMESTER I**  
**CORE COURSE**

**CA1B01B18 - COMPUTER FUNDAMENTALS AND DIGITAL PRINCIPLES**

**Credits: 3**

**Total Lecture Hours: 72**

**Course Outcomes:**

**CO1:** Differentiate the different types of computers, Operating Systems and basics of Networks and Internet

**CO2:** Illustrate the conversion between various number systems and the construction of binary code

**CO3:** Design simplified logical expression for digital circuits

**CO4:** Describe the working of combinational and sequential circuits and construct digital circuits of medium complexity

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	1	1	2
<b>CO2</b>	3	2	2	1	2
<b>CO3</b>	2	3	3	1	2
<b>CO4</b>	2	3	2	1	2

**Syllabus Content:**

**Module I**

**( 12 Hrs)**

Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application program. Characteristics of computers. Input Devices – Keyboard, Mouse, Optical input devices, Output devices – Monitors and Printers, Primary & Secondary Memory

**Module II**

**(15 hrs)**

Introduction to Operating Systems and Networking: Definition of an Operating System - Different types of PC Operating Systems. Computer Networks- categories of networks - LAN, WAN, MAN. The Internet - Working of Internet - Major Features of the Internet.

**Module III**

**(15 hrs)**

Number Systems: Base or radix, Positional number system, Popular number systems (Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, Complements in binary number systems,  $1^S$  Complement,  $2^S$  Complement and their applications, Signed magnitude form, BCD numbers- concept and addition, Parity.

**Module IV**

**(15 hrs)**

Boolean Algebra and Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Don't care conditions, XOR and its applications, parity generator and checker.

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**Module V**

**(15 hrs)**

Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Adders-Half adder, Full adder( need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers (working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle), : Concept of Registers, Shift Registers, Counters.

**SEMESTER I**

**CORE COURSE**

**CA1B02B18 - METHODOLOGY OF PROGRAMMING AND C LANGUAGE**

**Credits: 3**

**Total Lecture Hours: 72**

**Course Outcomes:**

**CO1:** Develop an algorithm/flowchart to analyze and solve a computational problem

**CO2:** Develop legible\* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators

**CO3:** Develop legible C programs with arrays, structure or union for storing the data to be processed

**CO4:** Construct memory efficient C programs by the application of pointers for array processing and parameter passing and files for input and output storage.

\*Legible : Legibility of a program means the following,

1. Logic of the program should be clear and understandable.
2. Programming standards for indentation and formatting should be followed.
3. Naming conventions should be followed, while naming variables and program.
4. Concise comments should be provided wherever necessary.

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	2	1	3
<b>CO2</b>	2	2	3	1	1
<b>CO3</b>	2	3	2	1	1
<b>CO4</b>	2	3	2	1	2



**Syllabus Content:**

**Module I**

**( 12 Hrs)**

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging.

**Module II**

**(15 hrs)**

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators.

**Module III**

**(15 hrs)**

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control-for loops, nested for loops, while loops, do while loop.

**Module IV**

**(15 hrs)**

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer, Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays.

**Module V**

**(15 hrs)**

Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

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**SEMESTER I**

**CORE COURSE**

**CA1BP01B18 - SOFTWARE LAB -I**

**Credits: 3**

**Total Lecture Hours: 72**

**Course Outcomes:**

**CO1:** Analyze a computational problem and develop an algorithm/flowchart to find its solution

**CO2:** Develop legible\* C programs with branching and looping statements, which uses  
Arithmetic, Logical, Relational or Bitwise operators.

**CO3:** Develop legible C programs with arrays, structure or union for storing the data to be  
processed.

**CO4:** Construct memory efficient C programs by the application of pointers for array processing  
and parameter passing and files for input and output storage.

\*Legible : Legibility of a program means the following,

1. Logic of the program should be clear and understandable.
2. Programming standards for indentation and formatting should be followed.
3. Naming conventions should be followed, while naming variables and programs.
4. Concise comments should be provided wherever necessary.

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	2	1	3
<b>CO2</b>	2	2	3	1	1
<b>CO3</b>	2	2	2	1	1
<b>CO4</b>	2	2	2	1	2

**Syllabus Content:**

1. Programs to familiarize printf() and scanf() functions.
2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.
3. Programs Based on One dimensional and two dimensional arrays.
4. Programs on Strings and string handling functions.
5. Programs based on Pointers, operations on pointers, Arrays & Pointers,
6. Programs based on functions, Call by value, Call by reference, Recursion,
7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions
8. Simple programs using pointers and malloc().

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**SEMESTER I**

**CORE COURSE**

**MT1B01B18 - DISCRETE MATHEMATICS & TRIGONOMETRY**

**Credits: 3**

**Total Lecture Hours: 72**

**Course Outcomes:**

**CO1:** Explain the propositional Calculus in Mathematical Logic and apply various methods for proving theorems

**CO2:** Discuss Set theory, Relations, Functions, ordered sets and lattices

**CO3:** Derive the formulae involving the hyperbolic ratios and illustrate the separation of circular and hyperbolic functions into real and imaginary parts

**CO4:** Apply  $C + iS$  method for the summation of an infinite series

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	2	1	2
<b>CO2</b>	3	2	2	1	2
<b>CO3</b>	3	2	2	1	2
<b>CO4</b>	3	1	2	1	1

**Syllabus Content:**

**Module 1 (20 hrs)**

**Mathematical Logic:**

Propositional logic, Propositional equivalences, Predicates and quantifiers, Rules of inference, Introduction to proofs.

**Module 2 (12 hrs)**

**Set theory:** Sets, set operations, functions

**Module 3 (20 hrs)**

**Ordered sets & Lattices :** Poset, Product set & order, Hasse diagrams of partially ordered sets, Minimal & Maximal, and First & Last point, Lattices, Lattices as partially ordered sets.

**Module 4**

**Trigonometry : (20 hrs)**

Circular and hyperbolic functions of a complex variable Separation into real and imaginary parts.

Factorisation of  $x^n-1$ ,  $x^n+1$ ,  $x^{2n} - 2x^na^n\cos n\theta + a^{2n}$ . Summation of infinite series by

C + iS method.

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**SEMESTER I**

**CORE COURSE**

**ST1B01B18 - DESCRIPTIVE STATISTICS**

**Credits: 3**

**Total Lecture Hours: 72**

**Course Outcomes:**

**CO1:** Describe the basic concepts of Statistics

**CO2:** Manage raw data by constructing tables and expressing them by diagrams and graphs.

**CO3:** Illustrate the fundamental characteristics of data

**CO4:** Evaluate the different types of Index numbers

**Mapping of Course Outcomes with Program Specific Outcomes**

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	2	1	1
<b>CO2</b>	3	2	2	1	2
<b>CO3</b>	2	2	3	2	2
<b>CO4</b>	2	2	3	2	1

**Syllabus Content:**

**Module I**

**(20 hours)**

Introduction to Statistics, Population and Sample, Collection of Data, Various methods of data collection, Census and Sampling. Methods of Sampling – Simple Random Sampling– stratified sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, Classification and Tabulation, Frequency Table, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram.

**Module II**

**(20 hours)**

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Partition values- Quartiles, Deciles, Percentiles, Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation.

Graphical representation – histogram, frequency polygon, frequency curve, ogives and stem and leaf chart.

**Module III**

**(16 hours)**

Raw Moments, Central Moments, Inter Relationships (First Four Moments), Skewness – Measures – Pearson's, Bowley's and Moment Measure; Kurtosis- Measures of Kurtosis – Moment Measure, Measure based on partition values.

**Module IV**

**(16 hours)**

Index Numbers – definition, limitations, uses, Simple Index Numbers; Weighted Index Numbers – Laspeyer's, Paasche's and Fisher's Index Numbers, Test of Index Numbers, Construction of Index Numbers, Cost of Living Index Numbers – Family Budget Method, Aggregate Expenditure Method.