

Courses of Studies

(Under CBCS)

For B.C.A. Programme

in

Software Development

(Syllabus of Courses Effective from the Academic Year: 2022-23)



**PARISHKAR COLLEGE
OF GLOBAL
EXCELLENCE
AUTONOMOUS**

Syllabus of Courses to be offered

(Core courses, Department Elective Courses and Open Elective
Courses)

Preamble

The objective of this programme is to prepare the students for the society at large. Parishkar College of Global Excellence visualize all its programmes in the best interest of their students and in this endeavour, it offers a new vision to all its Under-Graduate course. we have adopted an approach that has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programmes will prepare the students for both, academia, and Professional. They will be able to Understand Operative and ethical and Professional Responsibility.

The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and skills for employability. In short, each programme prepares students for sustainability and life-long learning.

The new curriculum of Bachelor of Computer Applications (Data Science) offer students' core papers that help build their foundation in computer science. The choice of generic electives and skill enhancement courses enable students to pursue an area of their interest in the field of computer science and application. The contents of each course have been carefully designed to prepare students with knowledge and skill sets that will not only make them industry ready but also foster entrepreneurial and innovative thinking. The new curriculum of Bachelor of Computer Applications (Data Science) is structured in a way that the students acquire in depth knowledge in data science and analysis. The comprehensive curriculum design bestows excellent career opportunities to explore new vistas in present competitive corporate arena. It offer students core papers that help build their foundation in the corporate as well as Government sector. The choice of general electives and skill enhancement courses enable students to pursue an area of their interest it the field of computer science. The contents of each course have been carefully designed to prepare students with knowledge and skill sets that will not only make them industry ready but also foster innovative thinking.

CREDIT DISTRIBUTION FOR BCA (DATA SCIENCE)

S.No.	Course	Credits	Total Credits	
1.	Core Paper-12	6	12 × 6	72
2.	Ability Enhancement - 2	4	2 × 4	8
3.	Skill Enhancement - 4	4	4 × 4	16
4.	Discipline Elective Course - 4	6	4 × 6	24
5.	General Elective Course - 4	6	2 × 6	12
Total				134

SUBJECT SCHEME:

Semester	Subject 1 (Credit-6)	Subject 2 (Credit-6)	Ability Enhancement (Credit-4)	Skill Enhancement (Credit-4)	DSE Paper (Credit-6)	GE Paper (Credit-6)
I	Discrete Structure	Introduction to Programming (4+2)	English Communication	Introductory Computer Skill (2+2)		
II	Understanding Computer System	Programming with C/C++ (4 + 2)		Mathematical & Computational Thinking		Web Designing Using HTML & CSS (4 + 2)
III	Data Structure Using C++	Design and Analysis of Algorithm		Professional & Leadership & Management	Programming in Java / .NET	
IV	Advance Data Structure Using C++	Database Management System		Competitive Coding & Industry Exposure	Object Oriented Analysis and Design (OOAD)	
V	Fundamental of Artificial Intelligence	Software Engineering			Advanced Data Structures and Algorithms with C++/ JAVA	Programming in Javascript / JQuery
VI	Introduction to Virtualization and Cloud Computing	Information Security and Cyber laws	Environmental Science		Project Work / Dissertation	

BCA

(Software Development)

SEMESTER – I

DISCRETE STRUCTURE

UNIT I: Introduction

Sets - finite and Infinite sets, uncountably Infinite Sets; Functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion, Matrices.

UNIT II: Logic & Proofs

Propositional Logic, Propositional Equivalences, Predicates & Quantifiers, Inference Theory, Introduction to Proofs, Normal forms, Proof Methods & Strategy

UNIT III: Algorithms, the Integers

Algorithms, Growth of Functions, Complexity of Algorithms, Summation formulas and properties, Bounding Summations, approximation by Integrals, Number Theory, Matrices

UNIT IV: Recurrences

Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem

UNIT V: Graph Theory

Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Colouring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

Recommended Books:

1. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition, McGraw Hill 2006
2. C.L. Liu, D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition, Tata McGraw Hill, 1985,
3. T.H. Cormen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms, John Wiley Publication, 1988
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008

INTRODUCTION TO PROGRAMMING

UNIT I: Introduction to Computer (10 Lectures)

Introduction, Basic block diagram and functions of various components of computer, Concept of Hardware and Software, Types of software, Compiler, and Interpreter

UNIT II: Introduction to Programming

Basic Difference between Procedure Oriented Language and Object-Oriented Language, Concepts of Machine level, Assembly level and High-level programming, Flow charts and Algorithms

UNIT III: Control Structures & Functions

Simple statements, Decision making statements, looping statements, Nesting of control structures, break and continue statement, goto statement, Concept of user defined functions, prototype, definition of function, parameters, parameter passing, calling a function, Macros, Pre-processing

UNIT IV: Arrays

Concept of array, One- and Two-dimensional arrays, declaration and initialization of arrays, String, String storage, Built-in string functions

UNIT V: Programming with Scratch

Downloading & Installation of Scratch, Introduction Scratch & its environments, Basic components of Scratch Window. Create Scratch Program & Sprite programming. Scratch Block category, Repeating block, For Logic: Control blocks, animate name in Scratch, add sound in your Script, changing look, Colour & size of Script, Working with Multiple Sprite.

Reference Books:

1. Let us C, Yashwant Kanitkar
2. C: The Complete Reference, Herbert Schildt, McGrawHill
3. Computer fundamentals and Programming in C, Pradip dey and Manas Ghosh, Oxford
4. <http://scratch.mit.edu>

ENGLISH COMMUNICATION

UNIT I

Essential English Vocabulary of day-to-day life (around 1500 words) and Basic Grammar usage for Spoken English}

- Parts of the speech (noun, pronoun, adjective, adverb etc.)
- Types of the sentences (affirmative, negative, interrogative- Y/N, Wh.)
- Use of is, are, am, do, does, did, has, have, had, has been, had been, will etc.
- Use of may, might, can, could, would, should, must etc. [To express invitation, request, gratitude, asking for information, seeking permission etc.]
- Use of a, an, the
- Use of in, into, at, over, above etc.
- Some special constructions like feel like going to, had better, used to, as if, be, get, let etc

UNIT II

- Speaking Practice (Solo/Monologue)
 - 1) Greeting and Self-introduction
 - 2) Daily routine
 - 3) My family
 - 4) My village/city
 - 5) My school/College
 - 6) My hobby
 - 7) My favourites etc.
- Speaking Practice (Dialogue/Group Discussion/Public Speech)
- Listening Practices {Storytelling and listening, listening to recorded conversations, loud reading, Mock interviews, listening to English news, listening speeches, and watching English movies with subtitles (as homework, self-study material)}
- Translating sentences from Hindi to English and vice versa.

UNIT III

Writing Skills: Letter Writing, Report Writing, Email Writing, Answer writing

UNIT IV

- Theory of communication: Types and modes of communication
- (Verbal Communication. Non-Verbal Communication. Visual Communication)

UNIT V

Language of communication: Personal, Social and Business Communication; Intra-personal, Interpersonal and Group Communication; Barriers and Strategies of Communication

Note: The units I and II of the Spoken English part should be learned collectively. Daily students should learn small grammar topic, 20 essential words and one module of speaking practice in the institute or learning at home.

INTRODUCTORY COMPUTER SKILLS

UNIT I

Computer Fundamental: Introduction to Computer, Definition, Characteristics, History & Generation, Hardware & Software, Uses of Computer, Input & Output Devices, Computer Memory, Types of Windows, Windows Concept Features (Desktop, Taskbar, Start Menu, My Computer, Recycle bin) Windows Accessories (Calculator, Notepad, Paint, Word Pad, Character Map, Windows Explorer, Entertainment, System Tools, Communication) DOS Commands (Internal & External).

UNIT II

Software Packages: Types of Office Suite, MS-Office (MS-Word, MS-Excel, MS-PowerPoint, Outlook), MS-Word (Ribbon & Tabs, Quick Access Toolbar, Proofing Features, Modify Page Layout, Mail-Merge, Drop-Cap), MS-Excel (Concept of Worksheet & Workbook, Formulas, Charts, Graphs, Pivot table, Macros), Power-Point (Create Presentation, Insert Picture & Clipart, Animation & Transition, Slide Effects, Slide Layout), Outlook (Introduction to Outlook), Latest versions of MS-Office

UNIT III

Networking Concept: Introduction to Networking, Network Strategies, LAN, WAN, MAN, Transmission Media (Wired, Wireless), Networking Devices, IP Addresses, MAC Address, Cyber Security and Awareness (Type of Cyber threats, How to Identify Safe website and Portal).

UNIT IV

Introduction to Web Technologies, World Wide Web, Elements of the Web, Browsers, Search Engine, Mails, News and Chat, Security and privacy issues (Cookies, firewalls, executable applets and scripts, blocking system), Audio & Video Streaming, Subscription, *E-Commerce* (Digital Payment & Platforms, Mobile Communication, Digital Signature, Host and Join online meetings on Google Meet and Zoom).

UNIT V

MS-Access (table, queries, forms, reports), Creating and editing Database, customizing tables, linking tables, designing, and using forms, Consumer Complaint Portals, RTI, Introduction to E-Mitra Working, Online Reservation (IRCTC, Airlines, Buses)

Suggested Readings:

1. P.K Sinha, "Computer Fundamentals", BPB Publications.
2. Raja Raman, Fundamentals of Computers, Fourth edition, Prentice Hall India Pvt. Limited.
3. Peter Norton, "Introduction to Computers", 4th Edition, TMH Ltd.
4. B. Ram," Computers Fundamentals", New Age International Publications, New Delhi.

SEMESTER – II

UNDERSTING COMPUTER SYSTEM

UNIT I

Introduction to digital electronics and computer arithmetic

Logic gates, Boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units. Number systems, complements, fixed and floating-point representation, character representation, addition, subtraction, magnitude comparison, and multiplication and division algorithms for integers

UNIT II

Basic Computer Organization and Design

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT III

Central Processing Unit / Memory Organization / Input-Output Organization ()

Register organization, arithmetic and micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, Cache memory, Associative memory, mapping. Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Hardwired and micro-programmed design approaches, Case study - design of a simple hypothetical CPU.

UNIT IV

Introduction to Operating System

Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems. Processor and user modes, kernels, system calls and system programs.

UNIT V

Process & Memory Management

System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter- process communication; deadlocks, Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, John Wiley Publications 2008. Edition,
2. A.S. Tanenbaum, Modern Operating Systems, Edition, Pearson Education 2007.

3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.
6. M. Mano, Computer System Architecture, Pearson Education 1992

PROGRAMMING WITH C / C++

UNIT I

Introduction to C and C++

History, Overview of Procedural and Object Oriented Programming, Objects and Classes, Compilation and Execution in C and C++, IDE, Language Elements, Lexical structure of C and C++, Syntax and Semantics, C Keywords, Instructions, Machine/Natural/Artificial Languages, Portability, Literals (Char; Integer, floating-point, and double type number; scientific notations, strings), Comments, **main()** function, **return** keyword, Number Systems (Binary, Octal, Decimal, Hexadecimal), Basic Operators (Arithmetic, Logical and Bitwise), Variables, Constants.

UNIT II

Data Types, Evaluation, Basic I/O (UGC, IIS, CPP IPC)

Data Types, Types of Data Types, Modifiers, Type Casting, Declaration of Variables, Scope of Variables, Basic I / O (printf(), scanf(), cin, cout, getc(), getchar(), putc(), puts(), putchar() etc.), Header Files (stdio.h, iostream.h, stdlib.h etc.), formatting output, format specifiers, Operators (Unary, Binary, incremental and decremental, Bitwise Shifting, Logical, truth tables, User Defined data types (Structure and Union), Abstract Data Type (ADT).

UNIT III

Flow Control Statements (Decision Making and Looping) (UGC)

Conditional statements (If, If-Else, if-else-if, if-else-if-else), Nested conditional statements, switch-case statements, default keyword, Control Instructions, Loops: **while**, **for**, **do...while**, iterating through Sequences, Infinite Loops, Loop Elements and Loop Execution, Nested Loops, Controlling Loop Execution: **break**, **continue**.

UNIT IV

Functions, Arrays and Vectors (UGC, UCLA, CPP IPC, CISCO)

Definition of Functions (Void, Inline), Parameters, Call by Value, Call by Reference, Function Returning Value, Command Line Arguments / Parameters, Functions with Variable Number of Arguments, Creating and Initializing Arrays, Indexing, Manipulating Arrays, Types of Arrays (Single and Multi-Dimensional), Sorting Data in Arrays, Arrays of Objects, STL Vectors.

UNIT V

Pointers and Memory Allocation in C++ (UGC, CPP IPS, UCLA,

Pointers and Address Operator, Pointer Variables, Pointer Arithmetic, Initializing Pointers, Using Arrays as Pointer, Pointers as Function Parameters, Returning Pointers from Function, Pointers to class Objects and Structures, Pointers to Pointers, Smart Pointers, Differentiating between static and dynamic memory allocation, malloc(), calloc() and free() functions, use of new and delete operators.

UNIT VI

Classes & Objects in C++ (IIS University, MIT, UGC)

Defining & Using Classes, Objects as Parameters, Class Constructor, Constructor Overloading, Destructor, This Pointer, Function Overloading by number and type of arguments, Operator Overloading (including assignment operators, unary operators), Class Variables and Functions, Access Specifiers, Copy Constructor, Friend Functions & Classes.

UNIT VII

Inheritance, Polymorphism and Exception Handling

Introduction to Inheritance (Multi-level and Multiple), Polymorphism (Virtual & Pure Virtual Function), Basic Exception Handling (Using catch, throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books:

1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill. 2013
2. Bjrane Stroustrup, "A Tour of C++", Second Edition, Addison-Wesley. 2018.
3. Tony Gaddis, Judy Walters, Godfrey Muganda, "Starting Out with C++ Early Objects", 10th edition. 2019.
4. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.

MATHEMATICAL AND COMPUTATIONAL THINKING

UNIT I

Fundamentals of Mathematics

Number line and Number system, Units and measurement, 3-D geometry and angles, Simple Expression and Equation, Work, Distance and Time, Profit and Loss, Mean and Median

UNIT II

Introduction and Descriptive Statistics for Exploring Data

Pie Chart, Line chart, Scatter plot, Bar Graph, Confidence Interval, Providing Context is Key for Statistical Analyses, Pitfalls when Visualizing Information

UNIT III

Producing Data and Sampling

Introduction, Population V/S Samples, their real-world use in conducting analysis and research, Simple Random Sampling and Stratified Random Sampling, Bias and Chance Error, Variance, Observation vs. Experiment, Confounding, and the Placebo Effect, The Logic of Randomized Controlled Experiments, Distributions in Graphical format (Histograms and density plots)

UNIT IV

Understanding Visualization

Graphical Integrity (Is the information represented trustable?), Graphical heuristics: Lie Factor and Spark Lines (Edward Tufte), Data Density, Small Multiples, Graphical heuristics: Data-ink ratio (Edward Tufte), Graphical heuristics: Chart junk (Edward Tufte), The Truthful Art (Alberto Cairo) {Give as self-study content / Reference material}, Dark Horse Analytics (Optional) {Used as source of Case studies}, Graphics Lies, Misleading Visuals

UNIT V

Mathematics in Various Branch

Climatology and Meteorology, Relativity and Cosmology, Microbiology and Genomics, Crystal and Lattice Structures, Optics and Gravity, Financial Mathematics, Neuroscience

WEB DESIGNING USING HTML & CSS

Unit – I

Introduction

Introduction, The HTML, The Head, Title, The Body, Colours, Attributes, Lists, ordered and unordered, Headings, paragraphs, The doctype, The meta tag & the Unicode character set.

Unit – II

Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link Within a Document, Anchor tags & Hyper-links, linking to other websites, Opening a link in a new browser window/tab

Unit – III

Putting an Image on a Page, Using Images as Links, Putting an Image in the Background, creating a Table, Table Headers, Captions, Spanning Multiple Columns, Styling Table

Unit – IV

Introduction to HTML Forms, Different types of element HTML Forms, Basic Input and Attributes, Other Kinds of Inputs, Different types of HTML Tags, Creating HTML Forms

Unit – V

Introduction to CSS, Types of Style sheet, styling forms with CSS, CSS Property (colour, background, borders, margin and padding, height and width), Filter Effects, Where to Go from Here

REFERENCES:

1. Virginia DE Bolt, Integrated HTML and CSS A Smarter, Faster Way to Learn Wiley / Skybox, 2006
2. Cassidy Williams, Camryn Williams Introduction to HTML and CSS, O'Reilly, 2015
3. CBH Publication, Website designing and Multimedia
4. <https://www.geeksforgeeks.org/>
5. <https://www.uniraj.ac.in/> (UOR)