

Shakuntala Krishana Institute Of Technology

KD64

SYLLABUS (B.C.A)

BACHELORS OF COMPUTER APPLICATION

Semester-IIIrd

Course Code	Course Name	L	T	P	C
BCA-3001	Python Programming	3	0	0	3
BCA-3002	Data Structure Using C & C++	3	0	0	3
BCA-3003	Operating System	3	1	0	4
BCA-3004	Digital Electronics & Computer Organization	3	1	0	4
BCA-3005	Elements of Statistics	3	1	0	4
BCA-3001P	Computer Laboratory and Practical Work of Python	0	0	3	2
BCA-3002P	Computer Laboratory and Practical Work of DS	0	0	3	2
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Course Code **Course Name**
BCA-3001 Python Programming

L **T** **P** **C**
3 **0** **0** **3**

Course Outcomes: On completion of this course, the students will be able to,

CO 1	Understand the structure, syntax, and semantics of the Python language.
CO 2	Solve real world problems by applying the Python Data Structures, Objects, Functions and Modules.
CO 3	Apply the fundamental principles of Object Oriented Programming.
CO 4	Apply the basics of data science using advanced Python libraries.
CO 5	Build practical applications in Python.

UNIT-I

Python: Features of Python, Environmental setup, Installation and tools required for running, Basic Types Variable types and operators : Assigning values to variables Multiple Assignments Standard Data Types Set Map Single line comments using Multi-line comments using triple quote, Data Type Conversion Operators, Types of Operator, Conditional statement, Looping statements with else-Pass-Break continue.

UNIT-II

Number and List: Accessing values in List-Delete, update List element-Basic List operations- Indexing, Slicing and Matrices Built in methods and Functions for List-Accessing values in Tuple- Delete, List element-Basic Tuple operations Indexing, Slicing and Matrices Built in methods and Functions for Tuple.

UNIT-III

Dictionary and Function: Accessing values in Dictionary-Updating Dictionary-Deleting Dictionary – elements- Properties of Dictionary keys-Built in Dictionary Functions and Methods Defining Function- Calling function- Pass by reference vs value Function Arguments-Required arguments-Key word arguments-Default arguments-Variable- length arguments Recursion.

UNIT-IV

Modules and Packages: The Time Module and its functions-Calendar modules and its functions- Other modules and Functions Sum and Difference f time and date Import From import statement From import statement Executing modules, Local functions-Reload function Packages in Python.

UNIT-V

Exception handling: Exception handling and assertions-Standard Exceptions-Assertions in Python- Handling an exception-Except clause with no exception-Except Clause with multiple exception-Try-Finally Clause-Argument of an Exception Raising an Exception.

Referential Books:

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education

4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication



Course Code **Course Name**
BCA-3002 **Data Structure Using C & C++**

L **T** **P** **C**
3 **0** **0** **3**

Course Outcomes: On completion of this course, the students will be able to,

CO 1	Understand the structure, syntax, and semantics of the Python language.
CO 2	Solve real world problems by applying the Python Data Structures, Objects, Functions and Modules.
CO 3	Apply the fundamental principles of Object Oriented Programming.
CO 4	Apply the basics of data science using advanced Python libraries.
CO 5	Build practical applications in Python.

UNIT-I

Introduction to Data Structure and its Characteristics Array

Representation of single and multidimensional arrays; Sparse arrays – lower and upper triangular matrices and Tri-diagonal matrices with Vector Representation also.

UNIT-II

Stacks and Queues

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

UNIT-III

Lists

Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, two way lists and Use of headers

UNIT-IV

Trees

Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

UNIT-V

Graphs: Graph terminology, Representation of graphs, path matrix, BFS (breadth first search), DFS (depth first search), topological sorting, Warshall's algorithm (shortest path algorithm.)

Referential Books:

1. E. Horowitz and S. Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S. Salaria, " Data Structures & Algorithms" , Khanna Book Publishing Co. (P)Ltd.,2002
3. Y. Langsam et. Al., " Data Structures using C and C++" , PHI,1999



Course Code **Course Name**
BCA-3003 **Operating System**

L **T** **P** **C**
3 **1** **0** **4**

C01	Understand the basics of operating systems like kernel, shell, types and views of operating systems.
C02	Describe the various CPU scheduling algorithms and remove deadlocks.
C03	Explain various memory management techniques and concept of thrashing
C04	Use disk management and disk scheduling algorithms for better utilization of external memory.
C05	Recognize file system interface, protection and security mechanisms.
C06	Explain the various features of distributed OS like Unix, Linux, windows etc

UNIT-I

Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems.

Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations

UNIT-II

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling.

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-IV

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering.

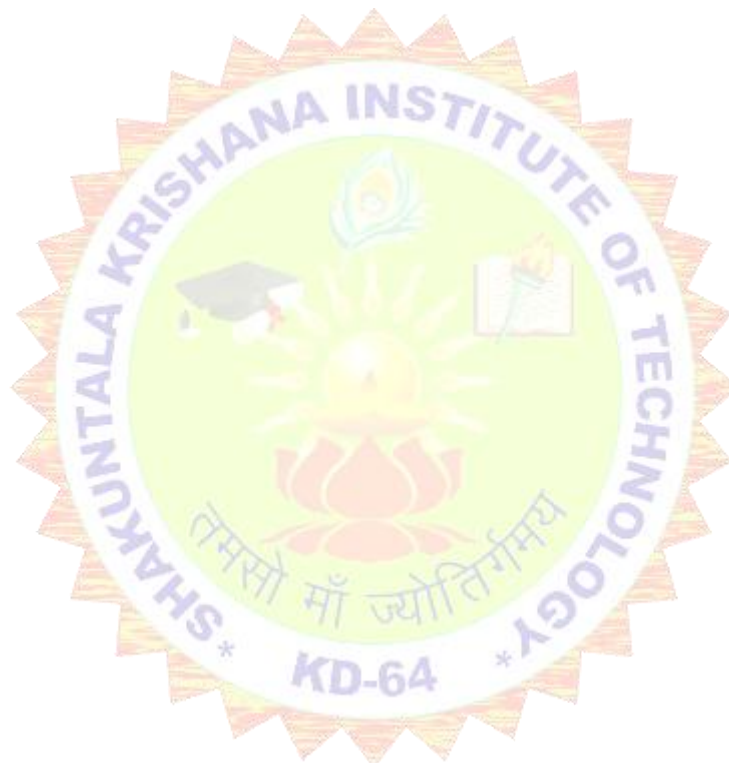
UNIT-V

Information Management: Introduction, A Simple File system, General Model of a File System,

Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection.

Referential Books:

1. Silberschatz and Galvin, “ Operating System Concepts”, Person, 5th Ed.2001
2. Madnick E., Donovan J., “ Operating Systems, Tata McGrawHill,2001
3. Tannenbaum, “Operating Systems”, PHI, 4th Edition,2000



Course Code	Course Name	L	T	P	C
BCA-3004	Digital Electronics & Computer Organization	3	1	0	4

C01	An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
C02	An ability to understand the functions of various hardware components and their building blocks
C03	An ability to understand and appreciate Boolean algebraic expressions to digital design
C04	An in depth understanding of sequential! Combinational circuits
C05	An in depth understanding of realization of different combinational/sequential circuits

UNIT-I

Number System & Boolean Algebra **Number System:** Binary, Octal, Decimal, Hexadecimal; Conversion of Number System; Binary Arithmetic & Complement, Binary Codes: Weighted & Non Weighted, Gray Code, Excess-3 Code. **Boolean Function;** Boolean Postulates; De-Morgan's Theorem; Boolean Expressions: Sum of Product, Product of Sum, Minimization of Boolean Expressions using K-Map; Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR; Implementations of Logic Functions using Gates; NAND- NOR Implementations; Multilevel gate Implementations.

UNIT-II

Combinational Circuits Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Adder Subtractor; **Magnitude Comparator:** Two Bit Magnitude Comparator, Three Bit Magnitude Comparator; **Multiplexer & De-Multiplexer:** 4*1 Multiplexer, 8*1 Multiplexer; **Decoder & Encoder;** Parity Checker & Generator; Code Converter.

UNIT-III

Sequential Circuit: Introduction to Flip Flops: SR, JK, T, D, Master Slave Flip Flops; Conversion of Flip Flops; Characteristic Table & Equation; Edge Triggering & Level Triggering; Excitation Table; State Diagram; State Table; State Reduction; Design of Sequential Circuits.

UNIT-IV

Registers Introduction of Registers; Classification of Registers; Register with Parallel Load; Shift Registers; Bidirectional Shift Register with Parallel Load. **Counters** Introduction of Counter; Asynchronous/Ripple Counters; Synchronous Counters; BCD Counter; 4-bit Binary Counter with Parallel Load; Design of Synchronous Counters; Ring Counter; Johnson Counter.

UNIT-V Memory Organization:

Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization.

Referential Books:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano

3. Digital Electronics (TMH) 1998 : Malvino and Leach
4. Computer Organization and Architecture : William Stallings
5. Digital fundamentals (Universal Book Stall) 1998 : Floyd, L.Thomas
6. Computer Organization (MC Graw-Hill, Signapore) : Hamcher, Vranesic and Zaky



Course Code **Course Name**
BCA-3005 **Elements of Statistics**

L **T** **P** **C**
3 **1** **0** **4**

Course outcomes (CO): At the end of the course, the students will be able to:

CO1	Organize, manage and present data.
CO2	Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.
CO3	Analyze statistical data using measures of central tendency, dispersion and location.
CO4	Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.
CO5	Translate real-world problems into probability models.

UNIT-I

Population, Sample and Data Condensation

Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

UNIT-II

Measures of Central Tendency

Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

UNIT-III

Measures of Dispersion:

Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation.

UNIT-IV

Permutations and Combinations

Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). ${}^n P_r = n!/(n-r)!$ (without proof). Combinations of 'r' objects taken from 'n' objects. ${}^n C_r = n!/(r!(n-r)!)$ (without proof). Simple examples, Applications.

UNIT-V

Sample space, Events and Probability

Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples.

Classical definition of probability, Addition theorem of probability without Proof (upto three events are

expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.

UNIT-VI

Statistical Quality Control

Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for \bar{X} and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}

Referential Books:

2. S.C. Gupta - Fundamentals of statistics - Sultan Chand & sons ,Delhi.
3. D.N. Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.



4. Montgomery D.C. – Statistical Quality Control - John Welly and Sons
5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.
6. Gupta S.P. – Statistical Methods , Pub – Sultan Chand and sons New Delhi

Course Code	Course Name	L	T	P	C
BCA-3001P	Computer Laboratory and Practical Work of Python	0	0	3	2

Practical will be based on Paper Python Programming: Covers UNIT-II, UNIT-III, UNIT-IV, UNIT-V of Syllabus

Course Code	Course Name	L	T	P	C
BCA-3002P	Computer Laboratory and Practical Work of DS	0	0	3	2

Practical will be based on Paper Data Structure: Covers UNIT-III, UNIT-IV, UNIT-V of Syllabus

