RAICHUR UNIVERSITY, RAICHUR

Under Graduate Curriculum for Degree of Bachelor of Computer Applications

BCA

(I & VI Semester)

As per Revised NEP 2024
With Effect from the Academic year from 2024-25 and onwards

BCA
Academic Year 2024-25

Sem.	Type of Course	Theory/ Practical	Subject Title	Credits	No. of hour per week Theory / Practical	Duration of Exam	Internal Assessment Marks Theory / Practical	Semester end Exam Marks	Total Marks
I	Paper-1	Theory	Problem solving techniques using C	4	4	3 hrs.	20	80	100
		Practical	C – Programming Lab	2	4	3 hrs.	10	40	50
	Paper-2	Theory	IT Fundamentals	4	4	3 hrs.	20	80	100
		Practical	IT Lab	2	4	3 hrs.	10	40	50
	Paper-3	Theory	Discrete Mathematical Structures	4	4	3 hrs.	20	80	100
II	Paper-1	Theory	Data Structures using C	4	4	3 hrs.	20	80	100
		Practical	Data Structures Lab (using C)	2	4	3 hrs.	10	40	50
	Paper-2	Theory	OOP with Java	4	4	3 hrs.	20	80	100
		Practical	OOP Lab(using JAVA)	2	4	3 hrs.	10	40	50
	Paper-3	Theory	Computer Organization and Architecture	4	4	3 hrs.	20	80	100

Sem.	Type of Course	Theory/ Practical	Subject Title	Credits	No. of hour per week Theory / Practical	Duration of Exam	Internal Assessment Marks Theory / Practical	Semester end Exam Marks	Total Marks
III	Paper-1	Theory	Data Base Management System	4	4	3 hrs.	20	80	100
		Practical	Data Base Management System Lab	2	4	3 hrs.	10	40	50
	Paper-2	Theory	Web technologies	4	4	3 hrs.	20	80	100
		Practical	Web technologies Lab	2	4	3 hrs.	10	40	50
	Paper-3	Theory	Probability and Statistics	4	4	3 hrs.	20	80	100
IV	Paper-1	Theory	Python Programming	4	4	3 hrs.	20	80	100
		Practical	Python Programming Lab	2	4	3 hrs.	10	40	50
	Paper-2	Theory	Data Mining	4	4	3 hrs.	20	80	100
		Practical	Data Mining Lab	2	4	3 hrs.	10	40	50
	Paper-3	Theory	Computer Networks	4	4	3 hrs.	20	80	100
	Skills	Practical	Java Script programming	2	4	3 hrs.	10	40	50

Sem.	Type of Course	Theory/ Practical	Subject Title	Credits	No. of hour per week Theory / Practical	Duration of Exam	Internal Assessment Marks Theory / Practical	Semester end Exam Marks	Total Marks
V	Compulsory	Theory	Machine Learning	4	4	3 hrs.	20	80	100
		Practical	Machine Learning Lab (using python)	2	4	3 hrs.	10	40	50
	Compulsory	Theory	Cryptography and Information Security	4	4	3 hrs.	20	80	100
		Practical	Cryptography and Information Security Lab	2	4	3 hrs.	10	40	50
	Specialization	Theory	1. Software Engineering 2. Block Chain Technologies	4	4	3 hrs.	20	80	100
	Compulsory	Theory	Research Methodology	3	3	3 hrs.	20	80	100
	Elective- 1	Theory	Computer Concepts and office automation	3	3	3 hrs.	20	80	100
VI	Compulsory	Theory	Artificial Intelligence	4	4	3 hrs.	20	80	100
		Practical	Artificial Intelligence Lab	2	4	3 hrs.	10	40	50
	Compulsory	Theory	Operating System Concepts	4	4	3 hrs.	20	80	100
	Specialization	Theory	1. Cloud Computing 2. Internet of Things	4	4	3 hrs.	20	80	100
	Compulsory	Internship/ Industrial Project	Internship / Industrial Project	6					
	Elective- 2		Cyber Security And Cyber Law	3	3	3 hrs.	20	80	100

BCA
Programme Specific Outcomes (PSO):

On completion of the 03 years Degree in Computer Applications students will be able to:

- Demonstrate, solve and understand the major concepts in all the disciplines of Computer Applications.
- Understand practical skills so that they can understand and assess risks and work safely and competently in the laboratory.
- To apply standard methodology to the solutions of problems in Computer Applications.
- Provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes.
- Develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
- Employ critical thinking and the scientific knowledge to design, carry out, record and analyse the results of Computer Applications.
- To build confidence in the candidate to be able to work on his own in industry and institution of higher education.
- To develop an independent and responsible work ethics.

BCA Semester –I

Subject Title (Theory): Problem solving techniques using 'C'

Course Outcome (CO): After completion of course (Theory), students will be able to:
CO 1: Familiarize with fundamental concepts and computer programming.
CO 2: Learn fundamental concepts of programming by developing and executing programs in C.
CO 3: Focuses on the structured program.
CO 4: Various constructs and their syntax.

Total Hrs.: 60

Unit I **15 hrs.**

Computer Fundamentals: History & Evolution of Computers. Characteristics, Types and Generations of Computers. System logical Organization: Von - Neumann concept of computer with block diagram: Components of Computer & their functions. Input Devices, Output Devices, Storage Devices. Processor & Main Memory: Central Processing Unit: ALU & CU. Architecture of Processor & Main Memory, Processor Registers, Main Memory: Organization of Main Memory, Main Memory Capacity. RAM, ROM, PROM, EPROM, EEPROM, Cache Memory.

Computer Software: Types of Software: System Software & Application Software. Translators: Compiler, Interpreter Linker, Loader and Editor. Computer Languages: Machine Level, Assembly Level & High Level, Their Merits & Demerits. Planning a Computer Program: Algorithm, Flowchart and Pseudo code.

Unit II **15 hrs.**

Introduction to C: Over View of C: Introduction. Importance and Features of C. Structure of a C Program. Sample C Programs. Creating and Executing a C Program. Block diagram of execution of C program. Basic Concepts: C Character Set. C tokens: keywords, identifiers, constants and variables. Data types. Declaration & initialization of variables. Symbolic constants. Formatted I/O functions: *printf* and *scanf*: control stings and escape sequences, output specifications with *printf* functions. Unformatted i/o functions to read and display single character and a string: *getchar, putchar, gets* and *puts* functions.

Operators & Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment & decrement operators, bitwise operators, conditional operator and special operators. Computational Problems, Operator Precedence and Associatively. Evaluation of arithmetic expressions, Type conversion.

Unit III **15 hrs.**

Control Structures (Branching & Looping): Decision making with *if* statements: *simple if, if else* statements, *nested if_else* and *else_if ladder. Switch case* Statement. *goto, break*&*continue* statements. Looping Statements: Entry controlled and Exit controlled, *while, do-while*&*for* loops. Nested loops.

Arrays and Strings: One Dimensional arrays: Declaration, Initialization and Memory representation. Two Dimensional arrays: Declaration, Initialization and Memory representation. Declaring & Initializing string variables. String handling functions: *strlen, strcmp, strcpy and strcat.* Character handling functions: *toascii, toupper, tolower, isalpha, isnumeric* etc.

Unit IV **15 hrs.**

User Defined Functions: Need for user defined functions. Format of C user defined functions. Components of user defined functions: return type, name, parameter list, function body, return statement and function call. Categories of User defined functions: with and without parameters and return type.

Structures & Unions: Definition of Structure & Union. Declaring structure variables, Accessing structure members, Structure members initialization, Difference between structure and union.

Text Books:

1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)
2. V. Rajaraman: Computer Fundamentals
3. E. Balguruswamy: Programming in ANSI C (TMH)
4. V. Rajaraman: Programming in C (PHI – EEE)
5. Yashwant Kanitkar: Let us C
6. P.B. Kottur: Programming in C (Sapna Book House)

Reference Books:

1. Moris mano: Computer Organization & Architecture
2. Norton: Computer Applications
3. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
4. S. Byron Gottfried: Programming with C (TMH)
5. Kernighan &Ritche: The C Programming Language. (PHI)

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): C – Programming Lab

Course Outcome (CO): After completion of course (Practical), students will be able to:

CO 1: Understand the basics of programming by executing the simple programming
CO 2: Be able to design & execution of code.
CO 3: Have practical knowledge of arrays, strings & functions

List of Experiments:

1. Find the area of a circle and area of a triangle given three sides.
2. Largest of three numbers.
3. Reversing the digits of an integer.
4. GCD of two integers.
5. Generating prime numbers.
6. Computing nth Fibonacci numbers.
7. Finding Even and Odd numbers.
8. Exchanging the values of two variables.
9. Counting:Print number from 100 to 200 which are divisible by 7 and display their sum and count using for loop.
10. Summation of set of Numbers.
11. Factorial Computation.
12. Generation of Fibonacci sequence.
13. Array Order Reversal.
14. Finding the Maximum Number in a Set.
15. Removal of Duplicates from an Ordered Array.
16. Partitioning an Array.
17. Finding the k^{th} Smallest Element.
18. Read N (minimum 5) students marks and find number of students passed and fail depending on the marks.
19. Count the number of vowels, consonants and special characters in a given sentence.
20. To find the addition and subtraction of two matrices using function.

IT Fundamentals

CO1	Understanding the concept digitalComputers and Digital System The students will understand the Number System
CO-**2**	Understand an operating system and its working, and solve common problems related to operating systems
CO3	Explain the various components of data communication. Understand the Data security, Physical structure, type of connections, topology and Network.
CO4	Discuss elementary Internet concepts and history, use and customize a web browser, use e-mail to send and receive messages, create a website and publish a simple web page. use Web search tools, demonstrate Internet research tools.

Total Hours:60

Content	Hours
Unit – 1	
Digital Computers and Digital System: Introduction to Number System, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary arithmetic, Addition, Subtraction in the 1's and 2's complements system, Subtraction in the 9's and 10's complement system. Boolean Algebra: Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram. 10 Unit-4.	15
Unit-2	
Operating Computer using GUI Based Operating System: Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities. **Operating Systems:** Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands and Booting.	15
Unit-3	
Data communication components of communication - representation- text, numbers, images, audio, video – Data security – Physical structure – type of connections, topology – Categories – LAN, WAN, MAN – Inter connection - circuit, packet – protocols – standards – layered approach – ISO OSI model – functions of layers. Types of wireless communication (mobile, WiFi, WiMAX, Bluetooth, Infrared – concept and definition only) (10 Lectures)	15
Unit-4	
Internet Basics: Evolution of internet, Basic internet terms(Client, Server, MODEM, Web page, Web site, Home page, Browser, URL, ISP, Web server, Download & Upload, Online & Offline), Internet applications (e-mail, search engines, FTP, VOIP, Video Conferencing, Audio-Video streaming, Chatting).Using e-governance.	15

Text Books:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,

Reference:

1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelfth Edition,
2. R.G. Dromey, "How to solve it by Computer", PHI,
3. Computer Fundamentals, Anita Goel, Pearson, 2010.

Formative Assessment for Theory	
Assessment Occasion/type	**Marks**
Internal Assessment Test-1	**05**
Internal Assessment Test-2	**05**
Assignment	**10**
Total	**20**
Formative Assessment as per Guidelines	

Practical / Lab work to be performed

1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computer.
3. Basic Computer Hardware Trouble shooting.
4. LAN and WiFi Basics.
5. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trial ware; Internet Browsers, Programming IDEs,
6. System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to CCleaner and Jv16 Power Tools …)
7. Activities using Word Processor Software
8. Activities using Spreadsheets Software
9. Activities using Presentation Software
10. Activities involving Multimedia Editing (Images, Video, Audio …)
11. Tasks involving Internet Browsing
12. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer

Web References:

http://www.flowgorithm.org/documentation/

Subject Title (Theory): Discrete Mathematical Structure

Total: 60 Hrs

Course Outcome (CO): After completion of course (Theory), students will be able to:

- **CO 1 :**Define basic concepts of preposition logic and proofs.
- **CO 2 :** Define sets, sequences, sum and summation.
- **CO 3 :** Solve problems using counting techniques.
- **CO 4** : Solve problems using advance counting technique.
- **CO 5** : Introduction to induction & recursion and writing algorithms using recursion.
- **CO 6** : Studying the properties of relations.
- **CO 7** : Describe the origin of graph theory, illustrate different types of graphs.
- **CO 8** : Categorize trees.

Unit I: 15 hrs.

The Foundations: Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

Basic Structures: Sets, Functions, Sequences, Sums, and Matrices: Sets, Set operations, Functions, Sequences and Summations, matrices.

Unit II: 15 hrs.

Counting: Basics of counting, Pigeonhole principle, Permutation and Combination, Binomial Coefficient and Combinations, Generating Permutation and Combination.

Advanced Counting Techniques: Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion.

Unit III: 15 hrs.

Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections.

Relation: Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.

Unit IV: 15 hrs.

Graphs: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree traversal, Spinning Trees, Minimum Spanning Trees.

Text Books

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.

References

1. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003.
2. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI 1986.
3. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.
4. Discrete Mathematical Structures, Trembley and Manobar.