

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## Bachelor of Computer Applications (BCA)

### Semester - II Syllabus

(Scheme of Teaching and Evaluation for BCA Programme (Basic/Honours) aligning to NEP  
-2020 as per Govt. of Gujarat Dated 11/07/2023)

## BCA Semester – II (First Year)

**Subject Title: Programming in ‘C’**

**Subject Code: CAM203-1C**

**Subject Type: Major**

### Rationale:

To develop the concept of programming using world’s most popular Middle Level Language ‘C’.

### Learning Outcomes:

The students will be able to:

- Develop Users Define Function.
- Use the concept of Structure and Union.
- Store data with the use of File Handling.
- Know the importance of reference process by Pointer.
- Know the concept of Dynamic Memory Allocation.

### Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	30	60	50	50	100

### Course Content:

**Unit I** [Weightage=25% approx., Lectures=7, Practical’s= 14]

**User-Defined Functions:** Introduction, Need for user-defined functions, Elements of UDF (function definition, function call and function declaration), return value and their types, Category of functions - No Arguments and No Return values, With Argument No Return values, No Argument With Return values, With Arguments With Return values, Nesting of functions, Recursion.

**Unit II** [Weightage=25% approx., Lectures=7, Practical's= 14]

**Structures:** Introduction, Structure definition, declaration and initialization of structure, accessing structure member, Comparison of Structures and Arrays, Arrays of structures variable, Array within structure, Concept of structures within structures, Structures and Functions.

**Union:** Introduction, Union definition, declaration and initialization of union, accessing union member, Comparison of Structure and Union.

**Unit III** [Weightage=25% approx., Lectures=8, Practical's = 16]

**Pointers:** Introduction, Concept and Application of Pointers, accessing the address of a variable, declaring and initializing pointers, accessing a variable through its pointer, pointer expressions, pointer increments and scale factor, pointers and arrays (one dimensional), pointers and character strings, array of pointer, pointers and functions.

**Unit IV** [Weightage=25% approx., Lectures=8, Practical's= 16]

**File Management in C:** Introduction and Application, defining and opening a file, closing a file, file handling functions, command line arguments.

**Dynamic Memory Allocation:** Introduction, memory allocation functions (malloc, calloc, free, realloc).

**Text Book:**

- Programming in ANSI C, Balagurusamy, Tata McGraw-Hill.

**Reference Books:**

- Programming in C, by Pradip Dey & Manas Ghosh, Publisher–Oxford.
- The Complete Reference, Herbert Schildt Fourth Edition.
- Let Us C, Yashwant Kanetkar, BPB Publications.
- Programming in C, by Reena Thareja Publisher–Oxford.

**Reference Links:**

- [www.carrerskill.com](http://www.carrerskill.com)
- [www.mcqsets.com](http://www.mcqsets.com)
- [www.indiabix.com](http://www.indiabix.com)
- [www.sanfoundry.com](http://www.sanfoundry.com)

**Practical List:**

- Programs with the use of all types of user defined functions.
- Programs with the use of structure.
- Programs with the use of union.
- Programs with the use of pointers.
- Programs with the use of different file handling functions.

# BCA Semester – II (First Year)

**Subject Title: Database Management System**

**Subject Code: CAM204-1C**

**Subject Type: Major**

## Rationale:

To develop the understanding of the basic concepts of data in general and Relational Database System in particular, also execute every tiny elements of the Database.

## Learning Outcomes:

The students will be able to:

- Understand the concept of Database.
- Recognize the elements of Database for Real Life Applications.
- Identify the key relationship between Database components.
- Comprehend Database concept, Data Models, various approaches to Database Design, strength of Relational Model.

## Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	30	60	50	50	100

## Course Content:

**Unit I** [Weightage=25% approx., Lectures=7, Practical's= 14]

**Introduction to Database Management System (DBMS):** Database Concept, Advantages of DBMS, Application of DBMS, Overview of Database Models: Hierarchical Model, Network Model, Relational Model and Object Oriented Model.

**Data Modeling:** Entity types, entity set, attribute and key, relationships, relation types, ER diagrams, database design using ER diagrams.

**Entity Relationship Model:** Entity, Attributes, Relationships, E-R Modeling Symbols.

**Unit II** [Weightage=25% approx., Lectures=7, Practical's= 14]  
**Data Modeling using Entity Relationship Model:** Concepts of composite, derived and multivalve attributes, relationships, relation types, Connectivity and Cardinality, Aggregation, Generalization.  
**Relational Database Model:** DBMS Vs. RDBMS, Tables and Characteristics, Keys: Super Key, Candidate Key, Primary Key, Foreign Key, Composite Key, Relational Set Operators - Union, Intersect, Difference, Divide, Product.

**Unit III** [Weightage=25% approx., Lectures=8, Practical's= 16]  
**Introduction to SQL:** Overview, Characteristics of SQL, Advantage of SQL, SQL data types and literals. Basics of SQL Types of SQL Statements: DDL, DML, DCL, TCL.  
Basic SQL Queries: SQL operators, Creating Database, Creating, Modifying and Deleting Tables, Queries: Insert, Select, Update, Delete, Where Clause, Order By.

**Unit IV** [Weightage=25% approx., Lectures=8, Practical's= 16]  
**Advanced SQL:** Logical operators: BETWEEN, IN, AND, OR and NOT.  
**Aggregate functions:** Count, Sum, Min, Max, Avg.  
**SQL Scalar Functions:** Date and Time, Numeric, String, Conversion, functions handling Null values, Grouping, Having Clause, Joins (Self Join, Inner & Outer joins).

**Reference Books:**

- Database system concepts', 6th Edition –Abraham Silberschatz, Henry Korth, S, Sudarshan, (McGraw Hill International )
- Database systems : "Design implementation and management"- Rob Coronel, 4thEdition, (Thomson Learning Press)
- Database Management Systems - Raghu Ramkrishnan, Johannes Gehrke Second Edition, (McGraw Hill International )
- Database Systems – a Practical approach to design , implementation & Management Thomes M. Colnnolly, Carolyn E. Begg, Pearson 4th Ed.

**Practical List:**

- Implement SQL queries to perform various DDL Commands.
- Implement SQL queries to perform various DML Commands.
- Retrieve data using SELECT command and various SQL operators.
- SQL queries using Comparison Operators, Logical Operators in WHERE clause · SQL queries to Sort data using ORDER BY clause
- SQL queries to perform various aggregate functions on data.
- Implement SQL queries using Set operators
- SQL queries based Joins
- SQL queries based Group by and having clause
- Transaction based queries using COMMIT, ROLLBACK, SAVEPOINT

# BCA Semester – II (First Year)

**Subject Title: Software Engineering**

**Subject Code: CAE202-1C**

**Subject Type: Minor**

## **Rationale:**

A Systems Development approach can be implemented using Software Engineering, where System Requirement Specification for a software design can be studied using functional oriented or object oriented approach as well as various Testing techniques can be executed.

## **Learning Outcomes:**

The students will be able to:

- Prepare Software Requirement Specification (SRS) document.
- Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
- Ensure the quality of software product, different quality standards and software review techniques.
- Apply various Testing techniques and test planning.
- Able to understand Agile Development.

## **Teaching and Evaluation Scheme:**

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	60	-	50	50	100

## **Course Content:**

### **Unit I**

**[Weightage=25% approx., Lectures=15]**

**Introduction to Software and Software Engineering:** The Evolving Role of Software, Software- A Crisis on the Horizon and Software Myths, Software Engineering - A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component-Based Development, Process, Product and Process.

**Requirement Analysis and Specification:** Understanding the Requirement, Requirement Modeling, Software Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering.

## **Unit II**

**[Weightage=25% approx., Lectures=15]**

**Managing Software Project:** Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning, Project Scheduling & Tracking, Risk Analysis & Management (Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation).

**Software Design:** Design Concepts and Design Principal, Architectural Design, Component Level Design (Function Oriented Design, Object Oriented Design), User Interface Design, Web Application Design.

## **Unit III**

**[Weightage=25% approx., Lectures=15]**

**Software Coding & Testing:** Coding Standard and coding Guidelines, Code Review, Software Documentation, Testing Strategies, Testing Techniques and Test Case, Test Suites Design, Testing Conventional Applications, Testing Object Oriented Applications, Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner).

## **Unit IV**

**[Weightage=25% approx., Lectures=15]**

**Quality Assurance and Management:** Quality Concepts and Software Quality Assurance, Software Reviews (Formal Technical Reviews), Software Reliability, the Quality Standards: ISO 9000, CMM, Six Sigma for SE, SQA Plan.

**Software Maintenance and Configuration:** Management Types of Software Maintenance, Re Engineering, Reverse Engineering, Forward Engineering, the SCM Process, Identification of Objects in the Software Configuration, Version Control and Change Control.

### **Text Book:**

Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions.

### **Reference Books:**

- Ian Sommerville, Software engineering, Pearson education Asia.
- Pankaj Jalote, Software Engineering – A Precise Approach Wiley.
- Software Engineering Fundamentals by Ali Behforooz & Frederick Hudson OXFORD. · Rajib Mall, Fundamentals of software Engineering, Prentice Hall of India.
- Engineering Software as a Service An Agile Software Approach, Armando Fox and David Patt.

### **Reference Links:**

- <https://www.tutorialspoint.com/>
- <https://www.javatpoint.com/>

# BCA Semester – II (First Year)

**Subject Title: Computer Oriented Numerical and Statistical Methods**

**Subject Code: MDC202-1C**

**Subject Type: MDC**

## Rationale:

Computer Oriented Numerical Methods provide the understanding of various concepts of numerical methods like Numerical Errors in calculations and Interpolation.

Computer Oriented Statistical Methods includes collection and analysis of statistical data, types of data and its frequency distribution, Measures of Central Tendency and Dispersion, Correlation and Regression.

## Learning Outcomes:

The students will be able to:

- Learn concept cause & consequence of errors in the application of numerical computing for solving various problems.
- Apply different interpolation techniques to real life technical problem.
- Understand Applications of mathematics in real-life domain.
- Know different central tendency and dispersion measures.
- Implement Correlation and Regression concepts in real world applications.

## Teaching and Evaluation Scheme:

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
4	60	-	50	50	100

## Course Content:

**Unit I** [Weightage=25% approx., Lectures=15]

**Numerical Errors:** Numerical Error, Different types of errors in numerical computation (Absolute, Relative, Truncation, Round Off, Percentage), Floating point numbers, Normalized Floating Point (addition, subtraction, multiplication, division, underflow, overflow).

**Unit II** [Weightage=25% approx., Lectures=15]

**Numerical Interpolation:** Interpolation, Extrapolation, Forward Differences, Backward Differences, Newton's Forward and Backward Difference Interpolation Formulas, Lagrange Interpolation and Inverse Interpolation Formula (Examples Only).

### **Unit III**

**[Weightage=25% approx., Lectures=15]**

**Measures of Central Tendency and Dispersion:** Collection of Statistical Data and Analysis, Different Types of Data (Simple, Discrete, Continuous), Measures of Central Tendency for all types of Data (Mean, Median, Mode), Measures of Dispersion for all types of Data (Range, Variance, Standard Deviation, Coefficient of Variance).

### **Unit IV**

**[Weightage=25% approx., Lectures=15]**

**Correlation and Regression:** Correlation, Correlation Types, Coefficient of Correlation, Scatter Diagram Method, Karl Pearson's Method, Spearman's Rank Method, Regression, Difference between Correlation and Regression, Regression lines.

#### **Text Books:**

- Scientific and Statistical Computing: Authors(s): Ketan Gajjar, Parag Shah Publication: Nirav Prakashan.
- Computer Oriented Numerical Methods: Authors(s): R.S. Salaria Publication: Khanna Book Publishing Co. Ltd.
- Numerical Methods: Authors(s): Dr. V.N. Vedmurthy, Dr. Ch.S.N. Iyenger Publication: Vikas Publishing House Pvt. Ltd.

#### **Reference Books:**

- Scientific and Statistical Computing: Author(s): Heena Timani Publication: Books India
- Statistical Methods: Author(s): S. P. Gupta Publication: S. Chand.
- Statistics for Business and Economics: Author(s): J. S. Chandan Publication: Vikas Publishing House Pvt. Ltd.
- Computer Oriented Numerical and Statistical Techniques: Author(s): R. Singh, I. Singh Publication: Khanna book Publishing Co. (Pvt.) Ltd.
- Introductory methods of Numerical Analysis [5th Ed.]: Author(s): S.S. Sasrty Publication: PHI Learning Pvt. Ltd.
- Mathematics for Computer Students: Author(s): Rex Wilton Publication: BPB Publication.
- Computer Oriented Numerical Methods: Author(s): V. Rajaraman Publication: Prentice Hall of India.

# BCA Semester – II (First Year)

**Subject Title: Foundation Course in English Language**

**Subject Code: AEC205-1C**

**Subject Type: AEC**

## **Rationale:**

The course has been designed in order to provide inputs for accuracy as well as fluency while using the language. It aims at enhancing the expressional skills of the students by providing a space to speak and write extensively. Also, it focuses imparting required mechanism for both the forms of expressions.

## **Learning Outcomes:**

The students will be able to:

- Do day to day conversations and functional use of basic structures.
- Understand concepts of grammar and its usage.
- Do routine correspondence.
- Acquire comprehension and presentation skills.

## **Teaching and Evaluation Scheme:**

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
2	30	-	25	25	50

## **Course Content:**

### **Unit I**

**[Weightage=35% approx., Lectures=12]**

**Speaking / Enhancing Speaking Skills :** Introducing oneself, talking about friends and family members suggested conversations, contracted forms, describing oneself using adjectives, Talking - to and about friends and family members in various social situations - suggested conversations, using simple present and present continuous, using suggested vocabulary to talk about family, talking about future, using since and for, tag questions, Talking - about daily activities, suggested vocabulary and conversations, adverbs of frequency, Talking - about Job interviews - suggested conversations, expressing opinions, Small talks - suggested conversations, using present perfect, Talking - about Holidays and travel-suggested conversations and special usages.

**Unit II** [Weightage=30% approx., Lectures=10]

**Grammar:** Parts of speech: Noun, Pronoun, Verb, Adverb, Adjective, Preposition, Connectives, Tenses: using Tenses - simple Present or Present progressive, Present Perfect or Simple Past, Simple Past or Past Perfect, Simple Future or Future Progressive, Future Perfect, Present Perfect, Continuous, Past Perfect Continuous, Future Perfect Continuous, Modals use of : 'Be', 'Do', 'Have', Can – Could, Shall – Should, Will – Would, May – Might, Must – Ought to, Dare – Need, Subject – Verb Agreement, Active Passive Voice - Basic Rules, Omissions of the objects, Passive Voice - Transitive verb, Two Objects, Preposition, Imperative sentences.

**Unit III** [Weightage=25%approx., Lectures=6]

**Writing skills:** Note taking and note making - Importance, features of a good note, making effective class-notes, five methods of preparing notes, useful tips, Circulars and memo writing - Informative and official circulars, inter office memo - structure and style.

**Unit IV** [Weightage=10% approx., Lectures=2]

**Art of Book Reviews:** Writing to Presentation, Book reviews - process of writing, writing reviews and making presentations tips.

**Reference Books:**

- Spoken English for My world by: Sabina Pillai, Oxford University Press Publication.
- Communication Skills by: Sanjay Kumar and Pushpa Lata, Oxford University Press publication.
- English for Academic and Professional Skills by: Anand Mahanad, Tata McGraw Hill Publishing Company Limited, New Delhi, 2013.

# BCA Semester – II (First Year)

**Subject Title: Project Work - II**

**Subject Code: SEC202-1C**

**Subject Type: SEC**

## **Rationale:**

The core objective of the subject is to provide Project and Practical based deep learning, concept understanding, its analysis, deriving inferences and documenting it towards productive outcome of the subjects Programming in 'C', Database Management System that is an integral part of the BCA curriculum.

## **Learning outcomes:**

In reference to the subjects Programming in 'C' and Database Management System the students will be able to:

- Gain knowledge of Project based Practical aspect in the respective subject.
- Understand Fundamentals and Importance of the selected concept.
- Implement the learning during the specific course.
- Get real-life application experience during project execution.
- Perform teamwork and get acquainted with Project Based Learning.

## **Teaching and Evaluation Scheme:**

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
2	-	60	25	25	50

## **Course Content:**

### **Project Work – II**

**[Weightage=100% approx., Practical's=60]**

Project Work – II based on the Areas pertaining to subjects Programming in 'C' and Database Management System shall be executed based on choice-based domain and Project titles will be selected in groups with specific count of members. The entire project work will be studied, analyzed, implemented inference learning will be derived and submitted in reference to the below Phase wise guidelines.

### **Phase I: Preliminary Learning**

Group Details  
Project Title  
Project Domain  
Project Definition

**Phase II: Core Learning**

Project Overview  
Detail Explanation  
Advantages  
Challenges

**Phase III: Inference Learning**

Real Life Applications  
Conclusion  
Future Enhancement  
References

**Please Note: The Project Work shall be submitted as a Project Work – II Presentation / Report / Project Demonstration.**

# BCA Semester – II (First Year)

**Subject Title: Environmental Studies**

**Subject Code: VAC201-1C**

**Subject Type: VAC**

## **Rationale:**

To focus on Environmental Science that is an interdisciplinary subject which appeals on the content of several disciplines to offer a balanced scientific and holistic perspective of environmental issues. It will provide knowledge, skills, and attitudes to identify, prevent, and solve environmental problems and thereby prepare students for ultimate careers in diverse fields of relevance to environmental management and to sustainable development of the nation.

## **Learning Outcomes:**

The students will be able to:

- Stimulate interest in the Environment.
- Understand the interdisciplinary and holistic nature of the environment.
- Develop knowledge and understanding of Environmental issues and principles and the ability to apply Environmental Management.
- Provide an understanding of interactions between people and the Environment.
- Increase an awareness of the importance of living in harmony with the Environment.
- Develop an understanding of how natural resources and the environment affect the quality of life and the quest for sustainable development of the nation.

## **Teaching and Evaluation Scheme:**

Credits	Duration in Hours		Maximum Marks		Total
	Theory	Practical	CCE (Formative)	SEE (Summative)	
2	30	-	25	25	50

## **Course Content:**

### **Unit I**

[Weightage=50% approx., Lectures=15]

**Ecology and Environment:** Definition, scope, and basic principles of ecology and environment, Natural Resources – Renewable and Non-renewable resources, Current Environmental issues – Climate Change, Global warming, Acid rain, Ozone layer depletion, Pollution - Air, Water, Soil, Marine, Thermal, Noise pollution - causes and effects.

### **Unit II**

[Weightage=50% approx., Lectures=15]

**Ecosystem:** Basic concepts, components of the Ecosystem, Trophic levels, food chains and food web, Ecological pyramids, Ecosystem functions, Energy flow in ecological systems, Energy efficiencies.

**Biogeochemical Cycles:** Importance, Gaseous and sedimentary cycles: Carbon, Nitrogen, Phosphorus, Hydrogen, and Sulfur Cycles.

**Reference Book:**

Basics of Environmental Studies, 4<sup>th</sup> Edition, B. R. Shah, Snehal Popli, Mahajan Publishing House.