

# **MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE (Deemed to be University)**

**MADANAPALLE**

**[www.mits.ac.in](http://www.mits.ac.in)**



**Department of Computer Applications**

**Course Structure**

**&**

**Detailed Syllabi (R26)**

**For the students admitted to**

**Bachelor of Computer Applications from the Academic Year 2026 – 27 Batch onwards**



**BCA Regular Three Year U.G. Degree Course**

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE**

**(Deemed to be University)**

**MADANAPALLE**

**BCA Three Year Curriculum Structure**

|                      |                                              |
|----------------------|----------------------------------------------|
| <b>Total Credits</b> | 120 Credits from 2026 Admitted Batch onwards |
|----------------------|----------------------------------------------|

**I. Induction Program and Holistic Development Activities**

| <b>Sl.No</b> | <b>Title</b>                     | <b>Duration</b>                                     |
|--------------|----------------------------------|-----------------------------------------------------|
| 1            | Induction Program<br>(Mandatory) | Three weeks' duration at the<br>start of First Year |

**R26 - Curriculum Structure  
I Year I Semester**

| S. No.       | Category | Course Code | Course Title                                                   | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|----------------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                                | L              | T        | P         | Total     |           |
| 1            | PCC      | 26BGMATTC01 | Discrete Mathematics                                           | 3              | 1        | 0         | 4         | 4         |
| 2            | PCC      | 26BGBCATC01 | C Programming                                                  | 3              | 0        | 0         | 3         | 3         |
| 3            | MDC      | 26BGHUMHC01 | Indian Knowledge System                                        | 2              | 0        | 0         | 2         | 2         |
| 4            | VAC      |             | <b>Value-Added Course - I</b><br>(Refer ANNEXURE – I)          | 2              | 0        | 0         | 2         | 2         |
| 5            | AEC      | 26BGENGJC01 | Communication Skills                                           | 2              | 0        | 0         | 2         | 2         |
| 6            | PCC      | 26BGBCALC01 | C Programming Laboratory                                       | 0              | 0        | 4         | 4         | 2         |
| 7            | SEC      | 26BGBCASC01 | Office Automation Tools                                        | 2              | 0        | 4         | 6         | 4         |
| 8            | AEC      | 26BGENGKC01 | Communication Skills Laboratory                                | 0              | 0        | 2         | 2         | 1         |
| 9            | EEC      |             | <b>NSDC - Certification Course – I</b><br>(Refer ANNEXURE – V) | 0              | 0        | 2         | 2         | 0         |
| <b>Total</b> |          |             |                                                                | <b>14</b>      | <b>1</b> | <b>12</b> | <b>27</b> | <b>20</b> |

**I Year II Semester**

| S. No.       | Category | Course Code | Course Title                                                    | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|-----------------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                                 | L              | T        | P         | Total     |           |
| 1            | PCC      | 26BGMATTC02 | Probability and Statistics                                      | 3              | 0        | 0         | 3         | 3         |
| 2            | PCC      | 26BGBCATC02 | Object Oriented Programming                                     | 3              | 0        | 0         | 3         | 3         |
| 3            | PCC      | 26BGBCATC03 | Database Management Systems                                     | 3              | 0        | 0         | 3         | 3         |
| 4            | PCC      | 26BGBCATC04 | Computer Organization and Architecture                          | 3              | 0        | 0         | 3         | 3         |
| 5            | VAC      |             | <b>Value-Added Course - II</b><br>(Refer ANNEXURE – I)          | 2              | 0        | 0         | 2         | 2         |
| 6            | PCC      | 26BGBCALC02 | Object Oriented Programming Laboratory                          | 0              | 0        | 4         | 4         | 2         |
| 7            | PCC      | 26BGBCALC03 | Database Management Systems laboratory                          | 0              | 0        | 4         | 4         | 2         |
| 8            | SEC      | 26BGBCASC02 | PC Hardware and Networking                                      | 1              | 0        | 2         | 3         | 2         |
| 9            | AEC      |             | <b>Additional Language Course</b><br>(Refer ANNEXURE – II)      | 2              | 0        | 0         | 2         | 0         |
| 10           | EEC      |             | <b>NSDC - Certification Course – II</b><br>(Refer ANNEXURE – V) | 0              | 0        | 2         | 2         | 0         |
| <b>Total</b> |          |             |                                                                 | <b>17</b>      | <b>0</b> | <b>12</b> | <b>29</b> | <b>20</b> |

(L = Lecture, T = Tutorial, P = Practical, C = Credit

**R26 – Tentative Curriculum Structure  
II Year I Semester**

| S. No.       | Category | Course Code | Course Title                                                     | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|------------------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                                  | L              | T        | P         | Total     |           |
| 1            | MDC      | 26BGBCATC05 | Data Structures                                                  | 3              | 0        | 0         | 3         | 3         |
| 2            | PCC      | 26BGBCATC06 | Java Programming                                                 | 3              | 1        | 0         | 3         | 4         |
| 3            | PCC      | 26BGBCATC07 | Software Engineering                                             | 3              | 0        | 0         | 3         | 3         |
| 4            | VAC      | 26BGBCAVC01 | Quantitative Aptitude                                            | 2              | 0        | 0         | 2         | 2         |
| 5            | PCC      | 26BGBCALC04 | Data Structures Laboratory                                       | 0              | 0        | 4         | 4         | 2         |
| 6            | PCC      | 26BGBCALC05 | Java Programming Laboratory                                      | 0              | 0        | 4         | 4         | 2         |
| 7            | SEC      | 26BGBCASC03 | Scientific Computing                                             | 2              | 0        | 4         | 6         | 4         |
| 8            | EEC      |             | <b>NSDC - Certification Course – III</b><br>(Refer ANNEXURE – V) | 2              | 0        | 0         | 2         | 0         |
| <b>Total</b> |          |             |                                                                  | <b>15</b>      | <b>1</b> | <b>12</b> | <b>28</b> | <b>20</b> |

**II Year II Semester**

| S. No.       | Category | Course Code | Course Title                                                    | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|-----------------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                                 | L              | T        | P         | Total     |           |
| 1            | PCC      | 26BGBCATC08 | Python Programming                                              | 3              | 0        | 0         | 3         | 3         |
| 2            | PCC      | 26BGBCATC09 | Operating Systems                                               | 3              | 0        | 0         | 3         | 3         |
| 3            | PCC      | 26BGBCATC10 | Computer Networks                                               | 3              | 0        | 0         | 3         | 3         |
| 4            | OE       |             | <b>Open Elective</b><br>(Refer ANNEXURE – III)                  | 3              | 0        | 0         | 3         | 3         |
| 5            | PCC      | 26BGBCALC06 | Python Laboratory                                               | 0              | 0        | 4         | 4         | 2         |
| 6            | PCC      | 26BGBCALC07 | Operating System Laboratory (UNIX)                              | 0              | 0        | 4         | 4         | 2         |
| 7            | PCC      | 26BGBCALC08 | Computer Networks Laboratory                                    | 0              | 0        | 4         | 4         | 2         |
| 8            | SEC      | 26BGBCASC04 | Web Programming                                                 | 1              | 0        | 2         | 3         | 2         |
| 9            | EEC      |             | <b>NSDC - Certification Course – IV</b><br>(Refer ANNEXURE – V) | 0              | 0        | 2         | 2         | 0         |
| <b>Total</b> |          |             |                                                                 | <b>13</b>      | <b>0</b> | <b>16</b> | <b>29</b> | <b>20</b> |

(L = Lecture, T = Tutorial, P = Practical, C = Credit)

**R26 – Tentative Curriculum Structure  
III Year I Semester**

| S. No.       | Category | Course Code | Course Title                                                   | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|----------------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                                | L              | T        | P         | Total     |           |
| 1            | PCC      | 26BGBCATC11 | Entrepreneurship                                               | 3              | 0        | 0         | 3         | 3         |
| 2            | PCC      | 26BGBCATC12 | Artificial Intelligence                                        | 3              | 0        | 0         | 3         | 3         |
| 3            | DE       |             | <b>Discipline Elective - I</b><br>(Refer ANNEXURE – IV)        | 3              | 0        | 0         | 3         | 3         |
| 4            | DE       |             | <b>Discipline Elective - II</b><br>(Refer ANNEXURE – IV)       | 3              | 0        | 0         | 3         | 3         |
| 5            | PCC      | 26BGBCALC09 | Artificial Intelligence Laboratory                             | 0              | 0        | 4         | 4         | 2         |
| 6            | SEC      | 26BGBCASC05 | Computer Graphics and Design Tools                             | 1              | 0        | 2         | 3         | 2         |
| 7            | INT      | 26BGBCAIC01 | Internship                                                     | 0              | 0        | 8         | 8         | 4         |
| 8            | EEC      |             | <b>NSDC - Certification Course – V</b><br>(Refer ANNEXURE – V) | 0              | 0        | 2         | 2         | 0         |
| <b>Total</b> |          |             |                                                                | <b>13</b>      | <b>0</b> | <b>16</b> | <b>29</b> | <b>20</b> |

**III Year II Semester**

| S. No.       | Category | Course Code | Course Title                                              | Hours Per Week |          |           |           | Credits   |
|--------------|----------|-------------|-----------------------------------------------------------|----------------|----------|-----------|-----------|-----------|
|              |          |             |                                                           | L              | T        | P         | Total     |           |
| 1            | MDC      | 26BGHUMHC02 | Principles of Management                                  | 2              | 0        | 0         | 2         | 2         |
| 2            | DE       |             | <b>Discipline Elective - III</b><br>(Refer ANNEXURE – IV) | 3              | 0        | 0         | 3         | 3         |
| 3            | DE       |             | <b>Discipline Elective - IV</b><br>(Refer ANNEXURE – IV)  | 3              | 0        | 0         | 3         | 3         |
| 4            | DE       |             | <b>Discipline Elective - V</b><br>(Refer ANNEXURE – IV)   | 3              | 0        | 0         | 3         | 3         |
| 5            | SEC      | 26BGBCASC06 | Mobile Application Development                            | 2              | 0        | 2         | 4         | 3         |
| 6            | PR       | 26BGBCAPC01 | Capstone Project                                          | 0              | 0        | 12        | 12        | 6         |
| <b>Total</b> |          |             |                                                           | <b>13</b>      | <b>0</b> | <b>14</b> | <b>27</b> | <b>20</b> |

(L = Lecture, T = Tutorial, P = Practical, C = Credit)

## VALUE-ADDED COURSES

| Value-Added Course - I  |             |                                          |   |   |   |   |
|-------------------------|-------------|------------------------------------------|---|---|---|---|
| S. No                   | Course Code | Course Title                             | L | T | P | C |
| 1                       | 26BGHUMVC01 | Yoga and Physical Fitness                | 2 | 0 | 0 | 2 |
| 2                       | 26BGHUMVC02 | Sports and Yoga                          | 2 | 0 | 0 | 2 |
| 3                       | 26BGHUMVC03 | NCC and NSS                              | 2 | 0 | 0 | 2 |
| 4                       | 26BGCIVVC01 | Disaster Management                      | 2 | 0 | 0 | 2 |
| Value-Added Course - II |             |                                          |   |   |   |   |
| S. No                   | Course Code | Course Title                             | L | T | P | C |
| 1                       | 26BGCIVVC02 | Environmental Science and Sustainability | 2 | 0 | 0 | 2 |
| 2                       | 26BGHUMVC04 | Indian Constitution                      | 2 | 0 | 0 | 2 |
| 3                       | 26BGMBAVC01 | Business Ethics                          | 2 | 0 | 0 | 2 |
| 4                       | 26BGMBAVC02 | Innovation and Design Thinking           | 2 | 0 | 0 | 2 |

**ADDITIONAL LANGUAGE COURSE**

| <b>S. No</b>                                                    | <b>Course Code</b> | <b>Course Title</b> |
|-----------------------------------------------------------------|--------------------|---------------------|
| 1                                                               | 26BGENGJC02        | German              |
| 2                                                               | 26BGENGJC03        | Japanese            |
| 3                                                               | 26BGENGJC04        | Hindi               |
| Any other Regional/ Foreign Language may be appended in future. |                    |                     |

| <b>OPEN ELECTIVE</b>                                                                |                    |                                         |                                        |
|-------------------------------------------------------------------------------------|--------------------|-----------------------------------------|----------------------------------------|
| (To be offered under MOOC's Category from SWAYAM – NPTEL)                           |                    |                                         |                                        |
| <b>S. No.</b>                                                                       | <b>Course Code</b> | <b>Course Title</b>                     | <b>Course Offered by Department of</b> |
| 1                                                                                   | 26BG MBAOM01       | E – Business                            | Management                             |
| 2                                                                                   | 25BG MBAOM02       | AI in Human Resource Management         | Management                             |
| 3                                                                                   | 25BG MBAOM03       | AI in Marketing                         | Management                             |
| 4                                                                                   | 25BG MBAOM04       | Artificial Intelligence for Investments | Management                             |
| 5                                                                                   | 25BG MBAOM05       | Management Information System           | Management                             |
| 6                                                                                   | 25BG MBAOM06       | HR Analytics                            | Management                             |
| 7                                                                                   | 25BG COMOM01       | Learning Analytics Tools                | Multidisciplinary                      |
| Any new Interdisciplinary Course offered by SWAYAM NPTEL can be appended in future. |                    |                                         |                                        |

## LIST OF DISCIPLINE ELECTIVE COURSES

### Discipline Elective - I

| S. No | Course Code | Course Title                 | L | T | P | C |
|-------|-------------|------------------------------|---|---|---|---|
| 1     | 26BGBCADC01 | Advanced Data mining         | 3 | 0 | 0 | 3 |
| 2     | 26BGBCADC02 | Software Project Management  | 3 | 0 | 0 | 3 |
| 3     | 26BGBCADC03 | Introduction to Data science | 3 | 0 | 0 | 3 |
| 4     | 26BGBCADC04 | Cyber Security               | 3 | 0 | 0 | 3 |

### Discipline Elective - II

| S. No | Course Code | Course Title                     | L | T | P | C |
|-------|-------------|----------------------------------|---|---|---|---|
| 1     | 26BGBCADC05 | Introduction to Machine Learning | 3 | 0 | 0 | 3 |
| 2     | 26BGBCADC06 | Cloud Computing                  | 3 | 0 | 0 | 3 |
| 3     | 26BGBCADC07 | Software Testing                 | 3 | 0 | 0 | 3 |
| 4.    | 26BGBCADC08 | Internet of Things               | 3 | 0 | 0 | 3 |

### Discipline Elective - III

| S. No | Course Code | Course Title                       | L | T | P | C |
|-------|-------------|------------------------------------|---|---|---|---|
| 1     | 26BGBCADC09 | Digital Image Processing           | 3 | 0 | 0 | 3 |
| 2     | 26BGBCADC10 | Applied Cryptography               | 3 | 0 | 0 | 3 |
| 3     | 26BGBCADC11 | Big Data Analytics                 | 3 | 0 | 0 | 3 |
| 4     | 26BGBCADC12 | Cloud Computing for Data Analytics | 3 | 0 | 0 | 3 |

**Discipline Elective - IV**

| <b>S. No</b> | <b>Course Code</b> | <b>Course Title</b>           | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|--------------|--------------------|-------------------------------|----------|----------|----------|----------|
| 1            | 26BGBCADC13        | Data Visualization Techniques | 3        | 0        | 0        | 3        |
| 2            | 26BGBCADC14        | Deep Learning                 | 3        | 0        | 0        | 3        |
| 3            | 26BGBCADC15        | Ethical Hacking               | 3        | 0        | 0        | 3        |
| 4            | 26BGBCADC16        | Data Security and Privacy     | 3        | 0        | 0        | 3        |

**Discipline Elective - V**

| <b>S. No</b> | <b>Course Code</b> | <b>Course Title</b>                 | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|--------------|--------------------|-------------------------------------|----------|----------|----------|----------|
| 1            | 26BGBCADC17        | Object Oriented Analysis and Design | 3        | 0        | 0        | 3        |
| 2            | 26BGBCADC18        | Natural Language Processing         | 3        | 0        | 0        | 3        |
| 3            | 26BGBCADC19        | Quantum Computing                   | 3        | 0        | 0        | 3        |
| 4.           | 26BGBCADC20        | Cloud Security                      | 3        | 0        | 0        | 3        |

## **BCA I Year I Semester**

BCA I Year I Semester

26BGMATTC01 DISCRETE MATHEMATICS

L T P C  
3 1 0 4

**Pre-requisite** Mathematics at Intermediate or Equivalent Level

**Course Description:**

Discrete Mathematics is a foundational course designed to introduce students to the essential concepts for computer applications. This course is crucial for students in computer science, computer applications, computing, and related fields, providing the mathematical framework necessary for the analysis.

**Course Objectives:**

This course enables students to

1. Apply propositional logic and formal reasoning techniques in computational problem solving and algorithmic thinking.
2. Analyse sets, relations, and functions for modeling computational structures, databases, and software systems.
3. Use counting principles and combinatorial methods in hashing, coding, probability, and complexity analysis.
4. Interpret ordered structures, equivalence relations, and partial orders for data organization and dependency analysis.
5. Apply graph and tree concepts in computer networks, data structures, optimization, and artificial intelligence applications.

**UNIT I PROPOSITIONAL CALCULUS AND FORMAL REASONING 12 hours**

**Propositional Calculus:** Propositions and Truth tables, Well-formed formulas and semantics, Tautology, Contradiction, and Contingency, Logical Equivalences, Truth Functions and Normal forms. **Formal reasoning:** Proof Rules and Derived Rules.

**UNIT II SET THEORY, RELATIONS AND FUNCTIONS 12 hours**

**Set Theory:** Sets and Subsets, Operation on sets, Bags, Tuples, Lists, Strings and Languages. **Relations:** Types of Relations, Properties of Binary relations, Composition of relations, Closures. **Functions:** Definitions and Examples, Floor and Ceiling Functions, GCD, MOD, LOG and MAP functions, Composition of functions, Invertible functions, Properties and Applications.

**UNIT III COUNTING TECHNIQUES AND COMBINATORICS 12 hours**

**Counting Techniques:** Counting finite sets, Counting Principles, The Pigeonhole Principle, Hash functions and Hash tables. **Combinatorics:** Two Counting Rules, Permutations, Combinations, Binomial Coefficients, Combinations with Repeated Elements

**UNIT IV ORDERED RELATIONS AND THEIR REPRESENTATIONS 12 hours**

**Equivalence Relations and Equivalence Classes,** Partitions and Generating Equivalence Relations, Order Relations and Partial Orders, Hasse Diagram Representations, Topological Ordering, Well-Founded Orders, Ordinal Numbers.

**UNIT V GRAPHS AND TREES 12 hours**

**Introduction to Graphs,** Definition and Examples, Degree of vertices, Graph Representations, Isomorphic Graphs, Colouring Graphs. **Trees:** Terminology and properties of Trees, Subtrees,

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Ordered and Unordered Trees, Tree Representations, Binary and Binary Search Trees, Spanning Trees with Prim's Algorithm.

### Course Outcomes:

After completing this Unit, students will be able to

**CO1:** Construct logical expressions and validate arguments using proof techniques and normal forms.

**CO2:** Model computational and real-world problems using sets, relations, and mathematical functions.

**CO3:** Solve counting and combinatorial problems arising in computing and information sciences.

**CO4:** Represent and analyse ordered relations, equivalence classes, and hierarchical structures.

**CO5:** Design and analyse graph- and tree-based computational models and algorithms

### Text Book(s)

1. James L. Hein, Discrete Structures, Logic, and Computability, 4<sup>th</sup> ed, Jones & Bartlett Learning, 2020.

### Reference Books

1. Ali Grami, Discrete Mathematics: Essentials and Applications, 1<sup>st</sup> ed, Elsevier Science, 2022.
2. Thomas Koshy, Discrete Mathematics with Applications, 1<sup>st</sup> ed, Elsevier Science, 2004.
3. Kenneth H. Rosen, Kamala Krithivasan, Discrete Mathematics and Its Applications, 8<sup>th</sup> ed, McGraw Hill, 2021.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

**Pre-requisite** Nil

**Course Description:**

This course introduces the fundamentals of problem solving and programming using the C language. It covers basic concepts such as algorithms, flowcharts, data types, operators, control statements, arrays, functions, pointers, structures, and file handling. The course helps students develop logical thinking and programming skills for solving real-world problems.

**Course Objectives:**

This course enables students to

1. Understand problem-solving techniques and fundamentals of C programming.
2. Develop programs using decision-making and looping constructs.
3. Implement arrays, strings, and functions for modular programming.
4. Familiarize students with pointers and user-defined data types.
5. Develop applications using file handling and pre-processor directives

**UNIT I FUNDAMENTALS OF PROGRAMMING AND C BASICS 9 hours**

Problem Solving Techniques, Algorithms and Flowcharts, Programming Languages and Translators, Structure of C Program, Tokens, Keywords, Identifiers, and Constants, Variables and Data Types, Input and Output Functions, Compilation and Execution Process, Operators and Expressions, Type Conversion and Operator Precedence..

**UNIT II CONTROL STATEMENTS AND LOOPING 9 hours**

Decision Making Statements: if, if-else, nested if, else-if ladder, switch, Looping Statements: while, do-while, for, Nested Loops, Jump Statements: break, continue, goto, Programs using Control Structures.

**UNIT III ARRAYS, STRINGS AND FUNCTIONS 9 hours**

Counting Techniques: Counting finite sets, Counting Principles, The Pigeonhole Principle, Hash functions and Hash tables. Combinatorics: Two Counting Rules, Permutations, Combinations, Binomial Coefficients, Combinations with Repeated Elements

**UNIT IV POINTERS AND USER DEFINED DATA TYPES 9 hours**

Introduction to Pointers , Pointer Arithmetic , Pointers with Arrays and Functions , Dynamic Memory Allocation , Structures and Unions , Nested Structures and Arrays of Structures , Enumerated Data Types (enum) , typedef Declaration

**UNIT V FILE HANDLING AND PREPROCESSOR DIRECTIVES 9 hours**

Introduction to File Handling, File Operations, Command Line Arguments, Preprocessor Directives Macros and Header Files, Error Handling Functions.

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### Course Outcomes:

After completing this unit students will be able to

**CO1:** Understand the fundamentals of problem solving and basic structure of C programs.

**CO2:** Apply decision-making and looping statements to solve computational problems.

**CO3:** Develop modular programs using arrays, strings, and functions.

**CO4:** Analyze and implement programs using pointers and user-defined data types.

**CO5:** Design applications using file handling and pre-processor directives

### Text Book(s)

1. E. Balagurusamy, *Programming in ANSI C*, McGraw Hill Education, 9th Edition 2024
2. Yashavant P. Kanetkar, *Let Us C*, BPB Publications, 20th Edition 2022.
3. Reema Thareja, *Introduction to C Programming*, Oxford University Press, 2nd Edition 2022.

### Reference Books

1. Paul Deitel and Harvey Deitel, *C How to Program*, Pearson Education, 9th Edition 2023.
2. Brian W. Kernighan and Dennis M. Ritchie, *the C Programming Language*, Pearson Education, 2nd Edition Updated 2022.
3. S. Anandamurugan, *Programming for Problem Solving Using C*, S.K. Kataria & Sons, 1st Edition (2023), Reprint 2024.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year I Semester

26BGHUMHC01 INDIAN KNOWLEDGE SYSTEM

L T P C  
2 0 0 2

Pre-requisite Nil

**Course Description:**

This course sensitizes students to the rich heritage of Indian culture and civilization. It covers ancient knowledge paradigms, traditional literature, and the scientific, mathematical, and medical contributions of ancient Indian scholars. The course also explores the local wisdom of tribal and ethnic communities, indigenous conservation practices, and traditional knowledge relevant to modern sustainability and well-being.

**Course Objectives:**

This course enables students to

1. Provide an understanding of the foundations, evolution, and significance of Indian Knowledge Systems and their role in shaping Indian civilization.
2. Familiarize students with the major philosophical traditions, value systems, and ethical principles embedded in Indian thought.
3. Create awareness about India's contributions to science, technology, healthcare, and indigenous innovations.
4. Develop an appreciation of traditional Indian approaches to sustainable living, environmental conservation, and resource management.
5. Promote awareness regarding the protection, preservation, and dissemination of Indian Knowledge Systems for future generations.

**UNIT I FOUNDATIONS OF INDIAN KNOWLEDGE SYSTEMS**

**6 hours**

Meaning, Nature, and Scope of Indian Knowledge Systems - Evolution of Indian Knowledge Traditions -Sources of Indian Knowledge: Vedas, Upanishads, Epics, Puranas, and Oral Traditions- Guru and Shishya Parampara - Significance and Contemporary Relevance of IKS

**UNIT II INDIAN PHILOSOPHY AND VALUE SYSTEMS**

**6 hours**

Introduction to Indian Philosophical Traditions - Concepts of Dharma, Karma, Purusharthas, and Moksha - Overview of Nyaya, Yoga, Vedanta, Buddhism, and Jainism - Human Values and Ethical Living in Indian Thought - Relevance of Indian Values in Personal and Professional Life.

**UNIT III INDIAN KNOWLEDGE IN SCIENCE AND TECHNOLOGY**

**6 hours**

Contributions to Mathematics: Decimal System and Concept of Zero - Astronomy and Scientific Heritage of Ancient India - Ayurveda and Traditional Healthcare Systems- Architecture, Metallurgy, and Indigenous Technologies.

**UNIT IV INDIAN KNOWLEDGE SYSTEMS AND SUSTAINABLE LIVING**

**6 hours**

Ecological Wisdom in Indian Traditions - Traditional Water Conservation Practices - Indigenous Agricultural Knowledge - Sustainable Consumption and Resource Management Editing, Proofreading, Summarising; Presentation-introduction-transitions

**UNIT V PROTECTION AND PRESERVATION OF IKS**

**6 hours**

Protection, preservation, and conservation of IKS, Documentation of IKS, Approaches for conservation of nature and bio-resources, Strategies for protection and conservation of IKS

### Course Outcomes:

After completing this Unit, students will be able to

**CO1:** Explain the fundamental concepts, sources, and evolution of Indian Knowledge Systems.

**CO2:** Describe the key philosophical traditions, values, and ethical principles of Indian thought and their relevance to personal and professional life.

**CO3:** Identify and appreciate India's contributions to mathematics, astronomy, healthcare, architecture, metallurgy, and indigenous technologies.

**CO4:** Analyze the role of traditional Indian knowledge in promoting sustainability, environmental conservation, and responsible resource utilization.

**CO5:** Demonstrate awareness of the need for protection, preservation, and documentation of Indian Knowledge Systems and their relevance in contemporary society.

### Text Book(s)

1. Mahadevan, B., *Introduction to Indian Knowledge System: Concepts and Applications*, PHI Learning, 1st Edition/2022.
2. Kapur, K., & Singh, A.K. (Eds.), *Indian Knowledge Systems*, Vol. 1, Indian Institute of Advanced Study, Shimla, 1st Edition/2005.

### Reference Books

1. Nair, S.N., *Echoes of Ancient Indian Wisdom*, Hindology Books, New Delhi, 1st Edition/2008.
2. Das, S.K., *The Education System of Ancient Hindus*, Gyan Publication House, Latest Edition/Reprint.
3. Sankaracharya, Tatvabodh, *Central Chinmay Mission Trust*, Bombay, Latest Edition/1995

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year I Semester

26BGENGJC01 COMMUNICATION SKILLS

L T P C  
2 0 0 2

Pre-requisite Nil

**Course Description:**

This course is designed to develop the communication competence of BCA and BBA students for academic, professional, and digital contexts. It introduces the fundamental principles and practices of communication and focuses on language accuracy, speech clarity, reading and study skills, writing and composition skills, and listening and oral communication skills. The course enables students to comprehend, analyse, and evaluate academic, business, and technical texts. It also helps them produce coherent and effective written communication and participate confidently in presentations, group discussions, debates, interviews, and workplace interactions. In addition, the course familiarises students with the ethical and responsible use of AI-assisted technologies to support learning, communication, and professional development. Through a balanced integration of theory and practice, the course prepares students for higher education, employability, professional success, and lifelong learning.

**Course Objectives:**

This course enables students to

1. Recall the fundamental concepts and techniques of English pronunciation, reading, writing, listening, speaking, and interpersonal communication.
2. Explain the principles of effective oral, written, verbal, non-verbal, and digital communication in academic and professional contexts.
3. Apply appropriate pronunciation, reading, writing, listening, and speaking skills to perform communication tasks effectively in academic, professional, and workplace settings.
4. Analyse spoken and written communication by identifying key information, language features, communication strategies, and contextual meaning.
5. Evaluate oral and written communication for accuracy, fluency, coherence, effectiveness, professional etiquette, and the ethical use of AI-assisted communication tools.

**UNIT I INTRODUCTION TO COMMUNICATION**

**6 hours**

Introduction to Communication: Definition, Importance and Significance of Communication; Process and Principles of Communication; Modes of Communication: Verbal Communication (Oral and Written) and Non-Verbal Communication; Barriers to Communication; Forms of Oral and Written Communication; Types of Communication: Intrapersonal, Interpersonal, Social, Academic, Business, Professional and Digital Communication; Communication Etiquette; Strategies for Effective Communication Development: Goal Setting, Planning, Time Management, Accountability, Active Listening, Reading Habits, Vocabulary Building, Learning Journals, Confidence Building, Feedback and Self-Evaluation, Ethical Use of AI Tools for Learning and Communication, Presentation-structure-topic.

**UNIT II SPEECH CLARITY AND LANGUAGE ACCURACY**

**6 hours**

Speech clarity: Vowels, Diphthongs and Consonants; Syllables; Weak Forms and Connected Speech; Accent Rules; Rhythm and Rhythmic Patterns; Intonation Patterns and Usage; Reading Sentences, Dialogues and Paragraphs. Language Accuracy: Parts of Speech; Content and Structural Words; Types of Phrases; Types of Sentences by Form: Simple, Compound and Complex Sentences; Types of Sentences by Function: Affirmative, Negative, WH-Questions and Yes/No Questions; Functional Grammar and Language in Use: Simple Present and Frequency Adverbs, Present Continuous, Present Perfect and Present Perfect Continuous, Past Tense with Time Adverbials and Connectors, Past Continuous with When and While, Future Tense, modals; Voice; Reported Speech; Presentation-generating main ideas.

**UNIT III READING AND STUDY SKILLS**

**6 hours**

Understanding Reading: Purpose, Types and Importance of Reading; Reading Strategies: Skimming, Scanning, Predicting, Inferring, Identifying Main Ideas and Supporting Details, Contextual Guessing, Vocabulary Building Strategies, Note-Making and Summarising; Reading for Gist and Detail; Reading Visual Information: Graphs, Charts, Tables, Diagrams, Flowcharts and Infographics; Reading and Analysing Academic, Business and Technical Texts: Identifying Key Concepts and Terminology, Understanding Definitions and Classifications, Analysing Processes and Procedures; Reading Textbooks and Preparing Notes; Reading Technical Documents, Research Articles and Business Reports; Presentation-supporting details

**UNIT IV WRITING AND COMPOSITION SKILLS**

**6 hours**

Writing Process: Brainstorming, Planning, Organising, Drafting, Revising, Editing and Publishing; Paragraph Writing: Structure, Topic Sentence, Supporting Details and Concluding Sentence; Unity, Coherence and Cohesion; Types of Paragraphs: Narrative, Descriptive, Opinion, Compare-and-Contrast, Cause-and-Effect and Process Paragraphs; Essay Writing: Structure (Introduction, Body and Conclusion), Thesis Statement and Topic Sentence; Types of Essays: Expository, Process, Persuasive, Cause-and-Effect and Problem-and-Solution Essays; Writing from Visual Information: Graphs, Pie Charts, Tables, Diagrams and Flowcharts; Writing Overviews and Summaries; Professional Writing: Professional Emails, Project Reports, Business Correspondence and Technical Documents; Using AI Technologies in Writing: Idea Generation, Drafting, Editing, Proofreading, Summarising; Presentation-introduction-transitions

**UNIT V LISTENING AND ORAL COMMUNICATION SKILLS**

**6 hours**

Purpose and Importance of Listening and Oral Communication; Types of Listening; Barriers to Effective Listening; Listening Strategies: Predicting, Listening for Gist and Detail, Listening for Specific Information, Listening for Sequence and Process Information, Note-Taking, Inferencing and Summarising; Listening Comprehension Tasks: Form Completion, Note Completion, Table Completion, Flowchart Completion, Multiple-Choice Questions and Short-Answer Questions; Oral Communication Skills: Self-Introduction, Dialogues, Role Plays, Presentations-practice, JAM Talks (PREP, PEEL and 5W1H Methods), Group Discussions, Debates, interview, AI-Assisted Communication Practice and Feedback Using AI Tools.

## Department of Computer Applications

### Course Outcomes:

After completing this Unit, students will be able to

- CO1:** Recall the fundamental concepts and techniques of English pronunciation, reading, writing, listening, speaking, and interpersonal communication.
- CO2:** Explain the principles of effective oral, written, verbal, non-verbal, and digital communication in academic and professional contexts.
- CO3:** Apply appropriate pronunciation, reading, writing, listening, and speaking skills to perform communication tasks effectively in academic, professional, and workplace settings.
- CO4:** Analyse spoken and written communication by identifying key information, language features, communication strategies, and contextual meaning.
- CO5:** Evaluate oral and written communication for accuracy, fluency, coherence, effectiveness, professional etiquette, and the ethical use of AI-assisted communication tools.

### Text Book(s)

1. Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principles and Practice (3rd Edition). Oxford University Press, 2022.
2. Swan, Michael. Practical English Usage (4th Edition). Oxford University Press, 2016
3. Zemach, Dorothy E., and Lisa A. Rumisek. Writers at Work: The Paragraph. Cambridge University Press, 2021.

### Reference Books

1. Bowen, José Antonio, and C. Edward Watson. Teaching with AI: A Practical Guide to a New Era of Human Learning. Johns Hopkins University Press, 2024.
2. Bovee, Courtland L., and John V. Thill. Business Communication Today (16th Edition). Pearson, 2025

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year I Semester

26BGBCALC01 C PROGRAMMING LABORATORY

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 4 | 2 |

Pre-requisite Nil

**Course Description:**

This laboratory course provides practical exposure to C programming through hands-on coding exercises. Students learn to develop, execute, debug, and test programs using structured programming concepts such as control statements, arrays, functions, pointers, structures, and file handling techniques.

**Course Objectives:**

1. Develop programming skills using the C programming language.
2. Implement logical solutions using decision-making and looping statements.
3. Develop programs using arrays, strings, and functions.
4. Familiarize students with pointers, structures, and file handling concepts.
5. Enhance problem-solving and debugging skills through practical programming exercises.

**LIST OF EXPERIMENTS**

**Total Hours 60**

1. Write a program to perform all arithmetic, relational, logical, bitwise, and assignment operations using menu-driven approach.
2. Write a program to implement calculator operations using switch-case and user-defined functions.
3. Write a program to solve quadratic equations using decision-making statements.
4. Write a program to generate Fibonacci series using recursion and compare it with iterative approach.
5. Write a program to find prime numbers in a given range and count the total number of primes.
6. Write a program to check whether a number is palindrome, Armstrong, and perfect number.
7. Write a program to perform insertion, deletion, searching, and sorting on one-dimensional arrays.
8. Write a program to perform matrix addition, subtraction, multiplication, and transpose using two-dimensional arrays.
9. Write a program to perform string operations such as length, copy, concatenate, compare, reverse, and palindrome check without using built-in string functions.
10. Write a program to implement user-defined functions for mathematical operations such as GCD, LCM, power, and factorial.
11. Write a program using recursive functions to solve factorial, Fibonacci, sum of digits, and Tower of Hanoi.
12. Write a program to pass arrays, strings, and structures to functions and return processed results.
13. Write a program using pointers to swap numbers, find largest element in an array, and perform string operations.
14. Write a program using dynamic memory allocation (malloc(), calloc(), realloc(), free()) for storing and processing student records.

## Department of Computer Applications

15. Write a program using structures and nested structures to maintain employee/student details and perform searching and sorting.
16. Write a program to read and write student details into a file and display records based on user choice.
17. Write a program to implement file handling for inventory management / library management system using create, read, update, delete, and append operations.
18. Write a program to implement command-line arguments for arithmetic or file-based operations.
19. Write a program to implement menu-driven mini project such as Student Record Management System / Library Management System / Bank Account Management System using arrays, structures, functions, pointers, and file handling.
20. Develop a mini application integrating functions, arrays, pointers, structures, recursion, and file handling concepts.

### Course Outcomes:

After completing this unit students will be able to

**CO1:** Develop simple C programs using basic programming constructs.

**CO2:** Implement programs using decision-making and looping statements.

**CO3:** Develop applications using arrays, strings, and functions.

**CO4:** Analyse and implement programs using pointers and structures.

**CO5:** Design applications using file handling concepts and modular programming.

### Text Book(s)

1. Yashavant P. Kanetkar, *Let Us C*, BPB Publications, 20th Edition 2022
2. Reema Thareja, *Programming in C*, Oxford University Press, 2nd Edition 2022.
3. E. Balagurusamy, *Programming in ANSI C*, McGraw Hill Education, 9th Edition 2024

### Reference Books

1. Byron S. Gottfried, *Programming with C*, McGraw Hill Education, 4th Edition Reprint 2022.
2. Behrouz A. Forouzan and Richard F. Gilberg, *Computer Science: A Structured Programming Approach Using C*, Cengage Learning, 3rd Edition Reprint 2023.
3. R.G. Dromey, *How to Solve it by Computer Using C*, Pearson Education, 2nd Edition Reprint 2022.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination.

BCA I Year I Semester

26BGBASC01 OFFICE AUTOMATION TOOLS

L T P C  
2 0 4 4

Pre-requisite Nil

**Course Description:**

This course introduces students to fundamental and advanced concepts of MS Office tools including MS Word, MS Excel, and MS PowerPoint along with basic exposure to AI-based office automation tools. The course focuses on developing practical skills in document creation, spreadsheet management, presentations, data analysis, and automation techniques. Students will also learn MS Access for database management and explore AI applications in modern office environments. The course is designed to enhance productivity, digital literacy, and professional documentation skills required in academic and industrial environments.

**Course Objectives:**

This course enables students to

1. Introduce the basic and advanced features of MS Word, MS Excel, and MS PowerPoint.
2. Develop skills in creating, formatting, and managing professional documents and presentations.
3. Enable students to use spreadsheet functions for data analysis and decision-making.
4. Provide knowledge of database creation using MS Access.
5. Introduce AI-based tools for office automation and productivity enhancement

**UNIT I INTRODUCTION TO MS OFFICE & MS WORD**

**12 hours**

MS-Word: Features of MS-Word, MS-Word Window components, working with formatted text, Shortcut keys, Formatting documents- Forming tables. Finding & replacing text, go to(F5) command, proofing text (Spell-check, Auto correct), Difference between Wizard and Template- Customize the Quick Access Tool Bar—Macros- Inserting pictures- Tables Insert tables Mail merging, Printing documents, Tables, Insert tables, Mathematical calculations on tables data. Insert Text Box etc.

**List of Lab Exercises**

1. Student Marks Sheet (Basic Excel Operations).
2. Employee Salary Sheet (Functions + IF Condition).
3. AI-based Sales Data Analysis (Sorting, Min/Max, Chart idea).

**UNIT II INTRODUCTION TO MS EXCEL & ITS FEATURES**

**12 hours**

MS-Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheet, cell entries (numbers, labels, and formulas), spell check ,find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its parts, Some useful Functions in Excel (SUM,AVERAGE,COUNT, MAX,MIN, IF).

**List of Lab Exercises**

1. Student Marks Sheet (Basic Excel Operations)
1. Employee Salary Sheet (Functions + IF Condition)
2. AI-based Sales Data Analysis (Sorting, Min/Max, Chart idea)

**UNIT III MS-POWERPOINT AND ITS APPLICATIONS**

**12 hours**

MS-Power Point: Features & Uses, - Slide Components- Templates & Layouts- Text Editing & Formatting- Master Slide & Design- Adding Elements- Slide Management- Animations & Transitions- Multimedia- Slide Show & Printing.

**List of Lab Exercises**

1. Student Mark List (Basic Excel Operations)
2. Employee Salary Sheet (Functions + IF Condition)
3. AI-powered Slide Design using Master Slide.

**UNIT IV MS ACCESS – DATABASE MANAGEMENT SYSTEM**

**12 hours**

Introduction to MS Access- Database concepts and structure- Creating Tables- Relationships between tables- Queries- Forms creation for data entry- Reports, Sorting, filtering- Basic database operations.

**List of Lab Exercises**

1. Creating a Basic Database in MS Access
2. Creating Query, Form and Report in MS Access
3. AI-assisted Database Design and Query Generation

**UNIT V INTRODUCTION TO AI IN OFFICE AUTOMATION**

**12 hours**

Introduction to Artificial Intelligence in Office Automation- AI-based Productivity Tools- AI Writing and Content Generation Tools- AI Tools in MS Word, MS Excel, and MS PowerPoint- Microsoft Copilot in Office Applications- AI-assisted Spreadsheet Analysis, Presentation creation, Email Writing Assistant- Meeting Transcription Tool. Ethical Issues and Limitations of AI- Future Trends in AI-based Office Automation.

**List of Lab Exercises**

1. AI-based Document and Presentation Creation using Copilot AI-assisted Spreadsheet Analysis.
2. AI-assisted Spreadsheet Analysis using Copilot
3. AI-based Presentation and Communication Tools using PowerPoint and Copilot

**Course Outcomes:**

After completing this unit students will be able to

**CO1:** Apply MS Word features to create, format, and manage professional documents.

**CO2:** Develop presentations using MS PowerPoint with multimedia, animations, and templates.

**CO3** Perform data analysis using MS Excel functions, formulas, and charts.

**CO4** Create and manage simple databases using MS Access.

**CO5:** Utilize AI-based tools for document creation, spreadsheets, presentations, and office automation tasks.

**Text Book(s)**

1. Computer Fundamentals–Pradeep.K.Sinha: BPB Publications, 2004.
2. Shelly, Cashman & Vermaat – *Microsoft Office 365: Introductory Concepts and Techniques*, Cengage Learning, 2019.
3. R.K. Taxali – *PC Software for Windows*, Tata McGraw Hill, 2001.

**Reference Books**

1. Joan Lambert & Curtis Frye – Microsoft Office 2019 Step by Step, Microsoft Press, 2019.
2. Bittu Kumar – MS Office 2016/2019 Guide, Vikas Publishing House, 2020.
3. Gary B. Shelly – Discovering Computers & Microsoft Office, Cengage Guy Brook Hart; *Instant IELTS*; Cambridge University Press, 2004

**Mode of Evaluation:** Continuous Internal Evaluation, Assignments, Mid Term Tests, End Semester Examination.

**Pre-requisite** Nil

**Course Description:**

The Communication Laboratory is a skill-oriented course designed to develop students' communicative competence in English for academic, professional, and workplace contexts. The course provides practical training in pronunciation, reading, writing, listening, and speaking through interactive and experiential learning activities. Students engage in pronunciation practice, reading and writing tasks, listening exercises, conversations, role plays, presentations, and group discussions to enhance their language proficiency and communication confidence. The course also focuses on verbal, non-verbal, interpersonal, and digital communication skills essential for success in business, technology, and professional environments. Furthermore, it encourages collaborative learning, self-reflection, and the ethical use of AI-assisted tools for continuous communication development and employability.

**Course Objectives:**

This course enables students to

1. Identify the fundamental features of English pronunciation and the essential components of listening, speaking, reading, and writing.
2. Explain the principles and strategies of speech clarity, active listening, effective reading, organised writing, interpersonal communication, and the ethical use of AI-assisted tools.
3. Apply appropriate language and communication strategies in conversations, role plays, reading and writing activities, presentations, JAM sessions, group discussions, and debates.
4. Analyse spoken, written, and visual texts to determine their main ideas, supporting details, language features, organisational patterns, and contextual meaning.
5. Evaluate oral and written communication in terms of clarity, fluency, coherence, accuracy, relevance, effectiveness, audience appropriateness, and professional etiquette.

**No of Topics List of Exercises/Activities:**

- 1 Introduction to communication Laboratory; objectives; Activities and Assessment Plan  
Ice breaking activities, Group divisions, Group Leaders responsibilities, Accountability
- 2 Self-Introduction controlled Practice  
Active listening, note taking, feedback and self-evaluation
- 3 Pronunciation Practice: Vowels, diphthongs, consonants, The Schwa and weak forms Practice-  
Word Accent-  
Rhythmic patterns practice-Intonation practice: sentences-paragraphs
- 4 Talking about daily routine and questioning-Speaking practice  
Narration of past experiences and questioning-Speaking practice
- 5 Polite requests, asking information, giving advice, interrupting - Speaking practice  
Reporting the speech – role plays

- 6 Reading and analysing a text's content words. Identifying topic sentence, main ideas, supporting details, other language elements of a text.  
Practice Summarising
- 7 Reading and understanding a text through reading strategies  
Reading visual information and interpreting Graphs, charts, tables and infographics
- 8 Analysing a technical or business text and making study notes  
Reading and understanding a research article or business report
- 9 Process writing practice,  
Paragraph writing: opinion, compare and contrast, cause and effect, process paragraph
- 10 Essay writing structure: Writing thesis statement and explanatory essay writing  
Essay writing: expository, problem solution, cause and effect, persuasive
- 11 Writing assignments, writing from visual information  
Email writing, report writing, AI assisted Writing
- 12 Listening for gist and main ideas, specific information, note taking  
Listening comprehension tasks: form completion, table completion
- 13 JAM session practice
- 14 Group discussion and debate

### Course Outcomes:

After completing this unit students will be able to

- CO1:** Identify English speech sounds, word accent, rhythm, intonation, and the basic features of effective listening, speaking, reading, and writing.
- CO2:** Explain suitable strategies for active listening, reading comprehension, summarising, note-making, structured writing, polite interaction, and ethical AI-assisted learning.
- CO3:** Demonstrate appropriate communication skills through self-introductions, conversations, role plays, summaries, paragraphs, essays, emails, reports, listening tasks, JAM sessions, group discussions, and debates.
- CO4:** Analyse spoken, written, technical, business, research, and visual materials to identify relevant information, main ideas, supporting details, textual organisation, and contextual meaning.
- CO5:** Evaluate individual and peer performance in oral and written communication and provide constructive feedback based on established linguistic and professional criteria.

### Text Book(s)

1. Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principles and Practice (3rd Edition). Oxford University Press, 2022.
2. Swan, Michael. Practical English Usage (4th Edition). Oxford University Press, 2016.
3. Zemach, Dorothy E., and Lisa A. Rumisek. Writers at Work: The Paragraph. Cambridge University Press, 2021.

**Reference Books**

1. Roach, Peter. A Course in Phonetics and Phonology (4th Edition). Cambridge University Press, 2009.
2. Glendinning, Eric H. Study Reading: A Course in Reading Skills for Academic Purposes (2nd Edition). Cambridge University Press, 2004.
3. Zemach, Dorothy E., and Lisa A. Rumisek. Writers at Work: From Paragraph to Essay. Cambridge University Press, 2021.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination.

## **BCA I Year II Semester**

BCA I Year II Semester

26BGMATTC02 PROBABILITY AND STATISTICS

L T P C  
3 0 0 3

Pre-requisite Nil

**Course Description:**

This course introduces the fundamental concepts of probability and statistics essential for data analysis and decision-making in computing applications. It covers probability theory, random variables, and standard probability distributions, followed by descriptive statistical methods for summarizing data. The course also includes techniques for analyzing relationships between variables using correlation and regression, and methods of statistical inference such as estimation and hypothesis testing. Emphasis is placed on practical problem-solving and applying statistical tools to real-world scenarios relevant to computer science and information systems.

**Course Objectives:**

This course enables students to

1. Understand the fundamental concepts of probability and their applications in problem solving.
2. Learn random variables and important probability distributions used in real-world scenarios.
3. Apply descriptive statistical methods for summarizing and analysing data.
4. Analyse relationships between variables using correlation and regression techniques.
5. Understand the principles of statistical inference and perform hypothesis testing.

**UNIT I PROBABILITY**

**9 hours**

Random experiment, sample space, events; axioms of probability; addition and multiplication theorems; conditional probability; independent events; Bayes' theorem and applications

**UNIT II RANDOM VARIABLES AND DISTRIBUTIONS**

**9 hours**

Random variables (discrete and continuous); PMF, PDF and CDF; mathematical expectation, variance and standard deviation; binomial distribution; Poisson distribution; normal distribution and its properties.

**UNIT III DESCRIPTIVE STATISTICS**

**9 hours**

Introduction to statistics and types of data; measures of central tendency (mean, median, mode); measures of dispersion (range, variance, standard deviation, coefficient of variation); moments, skewness and kurtosis (basic concepts); data presentation through tables, diagrams, histograms, frequency polygon and ogives.

**UNIT IV CORRELATION AND REGRESSION**

**9 hours**

Correlation: meaning and types; Karl Pearson's coefficient of correlation; Spearman's rank correlation; regression analysis: lines of regression, least squares method, simple linear regression, multiple linear regression

**UNIT V STATISTICAL INFERENCE**

**9 hours**

Population and sample; sampling techniques (basic concepts); estimation (point and interval estimation); hypothesis testing: null and alternative hypotheses, level of significance, Type I and Type II errors; tests of significance: Z-test, t-test, chi-square test

### Course Outcomes:

After completing this unit students will be able to

**CO1:** Understand basic concepts of probability and random variables

**CO2:** Apply probability distributions in problem solving

**CO3:** Analyse and summarize data using statistical measures

**CO4:** Evaluate relationships using correlation and regression

**CO5:** Perform hypothesis testing using statistical inference

### Text Book(s)

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2022.
2. P. Gupta, Statistical Methods, Sultan Chand & Sons, 2024.
3. Sheldon Ross, a First Course in Probability, Pearson, 2019.

### Reference Books

1. Walpole, Myers, Myers & Ye, Probability and Statistics for Engineers and Scientists, Pearson, 2017.
2. Hogg, McKean & Craig, Introduction to Mathematical Statistics, Pearson, 2018.
3. Montgomery & Runger, Applied Statistics and Probability for Engineers, Wiley, 2019.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year II Semester

26BGBCATC02 OBJECT ORIENTED PROGRAMMING

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

Pre-requisite: C

**Course Description:**

To impart the principles of object-oriented programming and their advantages over procedural programming. To develop problem-solving skills by creating real-world applications using OOP features.

**Course Objectives:**

This course enables students to

1. Introduce the fundamental concepts of object-oriented programming and compare them with procedure-oriented programming approaches.
2. Develop programming skills in C++ using classes, objects, constructors, destructors, and member functions.
3. Enable students to apply inheritance and polymorphism for designing reusable and extensible programs.
4. Provide knowledge of pointers, virtual functions, templates, and exception handling in C++ for advanced programming.
5. Build problem-solving ability through object-oriented design and implementation of real-world applications.

**UNIT I PRINCIPLES OF OBJECT-ORIENTED PROGRAMMING**

**9 hours**

Characteristics of object-oriented languages, C++ Program structure, Procedure Oriented Programming vs Object Oriented Programming, C++ constructs and syntax, tokens, variables, data-types, type conversion, operators, Expressions, Namespace, flow Control and decision, making statements..

**UNIT II CLASSES AND OBJECTS**

**9 hours**

Abstraction mechanism: Classes, Objects, member data, member functions - Constructors and types destructors, inline function, friend function -- array of objects, objects as function arguments - memory allocation for objects, static members static data and static function

**UNIT III INHERITANCE AND COMPILE TIME POLYMORPHISM**

**9 hours**

Inheritance: Derived Classes – Single inheritance – Multilevel Inheritance – Multiple Inheritance - Hierarchical inheritance – Hybrid inheritance. Operator Overloading: Compile time Polymorphism – Overloading Functions, Overloading Operators, Overloading Unary Operators – Overloading Binary Operators – Operator Overloading with Friend Functions

**UNIT IV POINTERS AND RUNTIME POLYMORPHISM**

**9 hours**

Pointers with arithmetic operations - this pointer – Pointers to Derived classes and Base classes - Compile time versus Runtime Polymorphism - Virtual functions - Late Binding - Abstract classes- Pure virtual functions and Virtual Destructors - Virtual base class.

**UNIT V TEMPLATES AND EXCEPTION HANDLING**

**9 hours**

Class Templates - Function Templates – Overloading of Template Functions - String, iterators, hashes, IO streams; Exception Handling

## Department of Computer Applications

### Course Outcomes:

After completing this unit students will be able to

- CO1:** Explain the principles of object-oriented programming and write basic C++ programs using appropriate syntax, operators, data types, and control structures.
- CO2:** Design and implement programs using classes, objects, constructors, destructors, inline functions, friend functions, and static members.
- CO3:** Apply inheritance and operator/function overloading to develop reusable programs demonstrating compile-time polymorphism.
- CO4:** Use pointers, virtual functions, abstract classes, and runtime polymorphism concepts in C++ program development.
- CO5:** Develop generic and robust C++ applications using templates, strings, I/O streams, and exception handling mechanisms.

### Text Book(s)

1. Deitel, P., & Deitel, H. (2024). C++ how to program: An objects-natural approach. Pearson Education.
2. Bronson, G. (2011). A first book of C++. Course Technology Inc.
3. Balagurusamy, E. (2020). Object oriented programming with C++. McGraw Hill Education.

### Reference Books

1. Balagurusamy, E. (2015). Object oriented programming with C++. McGraw Hill Education

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year II Semester

26BGBCATC03 DATABASE MANAGEMENT SYSTEMS

L T P C  
3 0 0 3

Pre-requisite C

**Course Description:**

This course provides a comprehensive understanding of Database Management Systems, focusing on database architecture, Entity Relationship (ER) modeling, relational data models, normalization techniques, storage organization, query processing, and transaction management. Students will learn how to design, implement, and manage databases efficiently using relational models and SQL. The course also emphasizes data integrity, database security, concurrency control, and performance optimization techniques used in modern database systems.

**Course Objectives:**

This course enables students to

1. Understand the basic concepts, architecture, purpose, and applications of database systems.
2. Learn ER modelling concepts and design databases using entities, relationships, attributes, keys, and constraints.
3. Understand relational database concepts, relational algebra, relational calculus, SQL queries, and normalization techniques.
4. Gain knowledge about storage structures, file organization, query processing, and transaction management.
5. Apply database concepts and techniques in designing efficient and secure database solutions

**UNIT I DATABASE ARCHITECTURE AND ER DIAGRAM**

**9 hours**

Introduction, History, purpose and applications of Database - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modelling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, sub classes; super classes, inheritance, specialization and generalization.

**UNIT II RELATIONAL DATA MODEL**

**9 hours**

Relational model concepts, Relational constraints, Relational Languages: Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations-Aggregate Functions-Nested Sub Queries-Views -Modification Of Database-Joined Relations.

**UNIT III DATA NORMALIZATION**

**9 hours**

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization First normal form – Second normal form – Third normal form – Boyce-code normal form – Fourth normal form – Fifth normal form

**UNIT IV STORAGE AND FILE ORGANIZATION**

**9 hours**

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage –B+ trees.

**UNIT V QUERY PROCESSING AND TRANSACTION MANAGEMENT**

**9 hours**

Query Processing - Transaction Concept - Concurrency Control –Locks based protocol -Deadlock Handling-AdvancedDatabases-Temporal Databases-Spatial Databases-Graph Databases-Introduction to NOSQL

## Department of Computer Applications

### Course Outcomes:

After completing this unit students will be able to

- CO1:** Explain the concepts, architecture, components, and applications of Database Management Systems.
- CO2:** Design ER diagrams and relational database schemas using entities, relationships, keys, and constraints.
- CO3:** Apply SQL, relational algebra, relational calculus, and normalization techniques for database design and query processing.
- CO4:** Describe storage structures, file organization methods, RAID concepts, and transaction management techniques.
- CO5:** Analyse concurrency control, locking protocols, deadlock handling, and develop efficient database solutions for real-world applications.

### Text Book(s)

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database Systems Concepts, 7th Edition, McGraw Hill, 2019
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, third Edition, 2002.
3. Carlos Coronel, Steven Morris, Database Systems: Design, Implementation, and Management, Cengage Learning, 13th Edition, 2019

### Reference Books

1. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2020.
2. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year II Semester

26BGBCATC04 COMPUTER ORGANIZATION AND ARCHITECTURE

L T P C  
3 0 0 3

**Pre-requisite** None

**Course Description:**

This course introduces the fundamental concepts of computer organization and architecture. It covers digital logic, data representation, processor organization, memory hierarchy, input/output organization, and parallel processing concepts. The course helps students understand the internal working of computer systems and their components.

**Course Objectives:**

This course enables students to

1. Understand the basic organization and architecture of computer systems.
2. Explain data representation and arithmetic operations in digital computers.
3. Familiarize students with processor organization and instruction execution.
4. Understand memory hierarchy and input/output organization.
5. Introduce concepts of parallel processing and modern computer architectures

**UNIT I FUNDAMENTALS OF COMPUTER ORGANIZATION 9 hours**

Basic Structure of Computer System, Functional Units of a Computer, Von Neumann Architecture, Register Transfer and Micro Operations, Bus Structure and Interconnection, Instruction Cycle and Execution Cycle

**UNIT II DATA REPRESENTATION AND ARITHMETIC OPERATIONS 9 hours**

Number Systems and Conversions, Signed and Unsigned Numbers, Binary Arithmetic Operations, 1's and 2's Complement Representation, Floating Point Representation, Character Representation Codes (ASCII, Unicode), Arithmetic Logic Unit (ALU).

**UNIT III PROCESSOR ORGANIZATION 9 hours**

CPU Organization, Instruction Formats and Addressing Modes, Instruction Set and Execution, Stack Organization, Control Unit Organization, Hardwired and Microprogrammed Control, RISC and CISC Architectures.

**UNIT IV MEMORY AND INPUT/OUTPUT ORGANIZATION 9 hours**

Memory Hierarchy, Cache Memory, Main Memory and Secondary Memory, Virtual Memory, Input and Output Devices, I/O Organization and Data Transfer Methods, Direct Memory Access (DMA), Interrupts and Interrupt Handling.

**UNIT V PARALLEL PROCESSING AND MODERN ARCHITECTURES 9 hours**

Parallel Processing Concepts, Pipelining, Multiprocessor Systems, Multicore Architecture, Introduction to GPU Architecture, Performance Measurement and Evaluation, Recent Trends in Computer Architecture.

**Course Outcomes:**

After completing this unit students will be able to

- CO1:** Understand the basic structure and functional units of computer systems.  
**CO2:** Apply data representation and arithmetic operations in digital systems.  
**CO3:** Analyze processor organization and instruction execution mechanisms.  
**CO4:** Explain memory hierarchy and input/output organization concepts.  
**CO5:** Understand parallel processing and modern architectural concepts.

## Department of Computer Applications

### Text Book(s)

1. M. Morris Mano, Computer System Architecture, Pearson Education, 3rd Edition 2022.
2. Carl Hamacher ed.al, Computer Organization and Embedded Systems, McGraw Hill Education, 6th Edition 2023.
3. William Stallings, Computer Organization and Architecture, Pearson Education, 11th Edition 2022

### Reference Books

1. David A. Patterson and John L. Hennessy, *Computer Organization and Design*, Morgan Kaufmann, 6th Edition 2021.
2. V. Carl Hamacher, *Computer Organization*, McGraw Hill Education, 5th Edition Reprint 2022.
3. Smruti R. Sarangi, *Computer Organization and Architecture*, McGraw Hill Education, 1st Edition Reprint, 2023.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

BCA I Year II Semester

26BGBCALC02 OBJECT ORIENTED PROGRAMMING LABORATORY

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 4 | 2 |

Pre-requisite Nil

**Course Description:**

This laboratory course provides hands-on training in **Object-Oriented Programming using C++**. It enables students to develop programming skills in C++ by implementing concepts such as classes, objects, constructors, destructors, inheritance, polymorphism, pointers, templates, and exception handling. The course emphasizes practical problem-solving and object-oriented program design through coding exercises that strengthen students' ability to build modular, reusable, and efficient software solutions

**Course Objectives:**

1. Provide practical exposure to C++ programming using basic syntax, control structures, operators, and expressions.
2. Develop object-oriented programming skills through the implementation of classes, objects, constructors, destructors, and friend functions.
3. Enable students to apply inheritance, function overloading, and operator overloading in solving programming problems.
4. Familiarize students with pointers, runtime polymorphism, templates, and exception handling through hands-on programming practice.
5. Enhance problem-solving and coding skills by designing and implementing C++ programs based on real-world object-oriented concepts.

**LIST OF EXPERIMENTS:**

**60 Hours**

1. Write a C++ program to demonstrate the use of basic input/output statements, variables, constants, data types, operators, and expressions.
2. Write a C++ program to perform type conversion and implement control statements such as if, switch, for, while, and do-while.
3. Write a C++ program to create a class with data members and member functions to display and manipulate student/employee details.
4. Write a C++ program to illustrate constructors (default, parameterized, and copy constructors) and destructors.
5. Write a C++ program to demonstrate inline functions and friend functions.
6. Write a C++ program to implement an array of objects and pass objects as function arguments.
7. Write a C++ program to illustrate the use of static data members and static member functions.
8. Write a C++ program to implement single inheritance and multilevel inheritance.
9. Write a C++ program to implement multiple inheritance and hierarchical inheritance.
10. Write a C++ program to demonstrate function overloading and operator overloading for unary and binary operators.
11. Write a C++ program to illustrate pointer arithmetic and the use of the **this** pointer.

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12. Write a C++ program to demonstrate pointers to base and derived classes.
13. Write a C++ program to implement runtime polymorphism using virtual functions.
14. Write a C++ program to demonstrate abstract classes, pure virtual functions, and virtual destructors.
15. Write a C++ program to implement function templates and class templates.
16. Write a C++ program to demonstrate overloading of template functions.
17. Write a C++ program to illustrate the use of strings, iterators, hashes, and input/output streams.
18. Write a C++ program to handle exceptions using **try, throw, and catch** blocks

### Course Outcomes:

After completing this unit students will be able to

- CO1:** Develop C++ programs using tokens, data types, operators, expressions, and control structures.
- CO2:** Implement classes and objects with constructors, destructors, inline functions, friend functions, static members, and arrays of objects.
- CO3:** Apply inheritance, function overloading, and operator overloading to design reusable object-oriented programs.
- CO4:** Demonstrate the use of pointers, virtual functions, abstract classes, and runtime polymorphism in C++ programs.
- CO5:** Develop generic and robust C++ applications using templates, strings, iterators, I/O streams, and exception handling technique

### Text Book(s)

1. Deitel, P., & Deitel, H. (2024). C++ how to program: An objects-natural approach. Pearson Education.
2. Bronson, G. (2011). A first book of C++. Course Technology Inc.
3. Balagurusamy, E. (2020). Object oriented programming with C++. McGraw Hill Education.

### Reference Books

1. Balagurusamy, E. (2015). Object oriented programming with C++. McGraw Hill Education.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination.

BCA I Year II Semester

26BGBCALC03 DATABASE MANAGEMENT SYSTEMS LABORATORY

L T P C  
0 0 4 2

Pre-requisite Nil

**Course Description:**

This course provides practical knowledge of SQL used in database application development. Students learn to create, modify, retrieve, and control data using SQL commands such as DDL, DML, DCL, and TCL. The course also covers advanced SQL concepts including nested queries, joins, views, and locking mechanisms.

**Course Objectives:**

1. Understand the fundamentals of SQL and relational database concepts.
2. Create and manage database objects using DDL commands.
3. Perform data manipulation and transaction management using DML, DCL, and TCL commands.
4. Apply advanced SQL concepts such as nested queries, joins, views, and locking mechanisms.
5. Understand concurrency control and locking mechanisms in databases.

**LIST OF EXPERIMENTS:**

**60 Hours**

1. Create a database and design normalized tables using DDL commands such as `CREATE`, `ALTER`, `DROP`, and `TRUNCATE`. Define suitable attributes, primary keys, foreign keys, unique constraints, `NOT NULL`, and `CHECK` constraints.
2. Insert single and multiple records into related tables using `INSERT` statements while enforcing referential integrity and domain constraints.
3. Perform data modification and deletion using `UPDATE` and `DELETE` statements with complex conditions, and verify the effect of changes on dependent tables.
4. Retrieve data using SQL `SELECT` statements with column aliases, sorting, filtering, and computed columns from one or more tables.
5. Use the `WHERE` clause for advanced filtering with comparison, logical, `LIKE`, `BETWEEN`, `IN`, `NOT IN`, `IS NULL`, and wildcard operators.
6. Perform aggregate and grouped operations using `COUNT()`, `SUM()`, `AVG()`, `MIN()`, and `MAX()`, along with `GROUP BY` and `HAVING` to generate summary reports.
7. Retrieve related data from multiple tables using `INNER JOIN`, `LEFT JOIN`, `RIGHT JOIN`, and self-join operations to analyze relationships between entities.
8. Implement subqueries and correlated subqueries in `SELECT`, `WHERE`, and `FROM` clauses to solve complex retrieval problems.
9. Create and use views for data abstraction and security, and perform operations on simple and complex views.
10. Execute transaction control operations using `COMMIT`, `ROLLBACK`, and `SAVEPOINT`, and observe the effect of transactions on consistency and recovery.
11. Study locking and concurrency control mechanisms by simulating concurrent transactions and identifying issues such as lost updates, dirty reads, non-repeatable reads, and phantom reads.
12. Create indexes and analyze query performance for frequently accessed columns, and compare query execution with and without indexing.
13. Write PL/SQL programs using variables, conditional statements, loops, and cursors to perform database operations programmatically.

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14. Create triggers for automatic validation, auditing, or updating of records during `INSERT`, `UPDATE`, and `DELETE` operations.
15. Develop a mini database application such as Student Information System, Library Management System, or Inventory Management System using tables, joins, views, transactions, and PL/SQL concepts.

### Course Outcomes:

After completing this unit students will be able to

**CO1:** Execute SQL queries using single-line functions and group functions for data retrieval.

**CO2:** Create, alter, and manage database objects using DDL commands and perform data manipulation using DML commands.

**CO3:** Apply DCL and TCL commands to manage user privileges and database transactions.

**CO4:** Implement advanced SQL concepts such as nested queries, joins, views, and locking mechanisms.

**CO5:** Demonstrate understanding of concurrency control and locking mechanisms in DBMS.

### Text Book(s)

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database Systems Concepts, 7th Edition, McGraw Hill, 2019
2. Carlos Coronel, Steven Morris, Database Systems: Design, Implementation, and Management, Cengage Learning, 13th Edition, 2019.
3. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002.

### Reference Books

1. Database System Concepts, 7th Edition, published by McGraw-Hill Education. 2019
2. SQL, PL/SQL: The Programming Language of Oracle, 6th Edition, published by BPB Publications 2010.
3. Oracle Database 11g PL/SQL Programming, 1st Edition, published by McGraw-Hill Osborne Media 2010.

**Mode of Evaluation:** Continuous Internal Evaluation and End Semester Examination.

BCA I Year II Semester

26BGBASC02 PC HARDWARE AND NETWORKING

L T P C  
1 0 2 2

Pre-requisite Nil

**Course Description:**

This course provides comprehensive knowledge of computer hardware, peripheral devices, operating systems, and networking concepts. It focuses on assembling, configuring, troubleshooting, and maintaining computer systems and networks. Students gain practical exposure to hardware installation, operating system management, network configuration, and network security using modern tools and techniques.

**Course Objectives:**

This course enables students to

1. Understand the architecture and components of computer hardware systems.
2. Design and configure computer systems and peripheral devices.
3. Develop practical skills in operating system installation and troubleshooting.
4. Understand networking concepts, protocols, and network configuration techniques.
5. Configure and manage wired and wireless computer networks securely

**UNIT I INTRODUCTION TO COMPUTER HARDWARE**

**6 hours**

Introduction to Computer Systems – Functional Units of Computer – Motherboard Architecture – Processor Types and Functions – Memory Devices: RAM, ROM, Cache Memory – Storage Devices: HDD, SSD, Optical Drives – Input and Output Devices.

1. Create a basic hardware setup by identifying and connecting computer components.
2. Assemble and disassemble a desktop computer system.

**UNIT II PERIPHERAL DEVICES AND TROUBLESHOOTING**

**6 hours**

BIOS and CMOS Setup – Device Drivers and Utilities – Printers and Scanners – Preventive Maintenance – Hardware Installation Procedures – Common Hardware Problems and Troubleshooting Techniques.

1. Configure BIOS settings and install device drivers.
2. Install and configure printer and scanner devices.

**UNIT III OPERATING SYSTEM INSTALLATION AND MAINTENANCE**

**6 hours**

Introduction to Operating Systems – Windows and Linux Installation – Disk Partitioning and Formatting – File Systems – Booting Process – System Backup and Recovery – Antivirus and Security Utilities.

1. Install Windows/Linux operating system on a computer system.
2. Create disk partitions, format drives, and perform system backup.

**UNIT IV NETWORKING FUNDAMENTALS**

**6 hours**

Introduction to Computer Networks – Types of Networks: LAN, MAN, WAN – Network Topologies – Transmission Media – Networking Devices: Hub, Switch, Router, Modem – OSI and TCP/IP Models – IP Addressing and Subnetting.

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1. Configure IP addresses and test network connectivity using networking commands.
2. Configure a small LAN using switch and router devices.

### UNIT V NETWORK ADMINISTRATION AND SECURITY

**6 hours**

Internet Concepts and Services – Wireless Networking and Wi-Fi Configuration – Network Security Basics – Firewalls and Access Control – File and Printer Sharing – Network Troubleshooting – Emerging Trends in Networking.

1. Perform basic network troubleshooting and firewall configuration.
2. Monitor network connectivity and troubleshoot internet access issues.

#### Course Outcomes:

After completing this unit students will be able to

**CO1:** Understand the architecture and components of computer hardware systems.

**CO2:** Assemble, configure, and troubleshoot computer hardware and peripherals.

**CO3:** Install and maintain operating systems and utilities.

**CO4:** Configure and manage computer networks using networking devices and protocols.

**CO5:** Implement network security measures and troubleshoot networking issues

#### Text Book(s)

1. Behrouz A. Forouzan, Data Communications and Networking, 6th Edition, McGraw Hill Education, 2022.
2. B. Govindarajalu, IBM PC and Clones Hardware, Troubleshooting and Maintenance, Tata McGraw Hill Education, Latest Revised Edition, 2021.
3. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 6th Edition, Pearson Education, 2021.

#### Reference Books

1. Jean Andrews, CompTIA A+ Guide to IT Technical Support, 11th Edition, Cengage Learning, 2023.
2. Cisco Networking Academy, Networking Fundamentals, Cisco Press, Latest Edition, 2023.
3. Smruti R. Stephen J. Bigelow, Troubleshooting, Maintaining and Repairing PCs, 6th Edition, McGraw Hill Education, 2021

**Mode of Evaluation:** Continuous Internal Evaluation, Assignments, Mid Term Tests, End Semester Examination.

## **VALUE-ADDED COURSES**

Value Added Course – I

26BGHUMVC01 YOGA AND PHYSICAL FITNESS

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Pre-requisite:**

**Course Description:**

Yoga course is designed to provide students with a comprehensive understanding of physical fitness, wellness, and nutrition. This course explores the meaning and importance of yoga in the modern era, the role of sports in maintaining physical fitness, and the various components of physical wellness. Students will also learn about the significance of nutrition and weight management, equipping them with the knowledge to promote a healthy and balanced lifestyle. Through this course, students will gain insights into the holistic approach to health and well-being.

**Course Objectives:**

This course enables the student to –

1. Understand yoga's significance and its practical applications for holistic well-being.
2. Explore subtle energy systems and their role in enhancing health through yogic practices.
3. Examine various paths of yoga to foster self-realization and spiritual growth.
4. Master the Eight Limbs of Yoga for physical, mental, and spiritual harmony.
5. Apply yogic principles to manage psycho-somatic ailments and promote resilience.

**UNIT I**

**6 hours**

- Yoga: Meaning and definition
- Importance of yoga in 21st century
- Introduction to Yogic Anatomy and Physiology
- Yoga & sports, Yoga for healthy lifestyle
- Types of Yoga: - Hatha yoga, laya yoga, mantra yoga,
- Bhakti yoga, karma yoga, jnana yoga, raj yoga
- Study of Chakras, Koshas, Pranas, Nadis, Gunas, Vayus and its application in Yogic practices.
- Ashtanga Yoga: - Yama, niyama, asana, pranayama, Pratyahara, dharna, Dhyana, Samadhi: Benefits, Utilities & their psychological impact on body and mind. According to yoga concept of normality in modern psychology, concept of personality & its development, yogic management of psycho-somatic ailments: frustration, anxiety, depression

**UNIT II**

**6 hours**

- Sports for Physical Fitness: Meaning and definition
- Physical Activity – Concept, Benefits of Participation in Physical Activities
- Components and Significance of Physical Fitness -Health, Skill and Cosmetic Fitness
- Types of Physical Activities – Walking, Jogging, Running, Calisthenics, Rope Skipping, Cycling, Swimming, Circuit Training, Weight training, Adventure Sports
- Principles of Physical Fitness, Warming Up, Conditioning, Cooling Down, Methods to Develop and Measure Health and Skill related components of Physical Fitness
- Measurement of Health-Related Physical Fitness (HRPF)

**UNIT III**

**6 hours**

**Nutrition and Weight Management**

- Concept of Nutrients, Nutrition, Balanced Diet, Dietary Aids and Gimmicks
- Energy and Activity- Calorie Intake, Energy Balance Equation
- Obesity - Concept, Causes, Obesity Related Health Problems
- Weight Management through Behavioral Modifications

**UNIT IV**

**6 hours**

**Introduction to Sports Management**

- Definition and scope of sports management
- Significance of sports management in society and its evolution over time
- Organizational structure of sports: amateur, professional, and non-profit entities
- Roles and responsibilities of key personnel: managers, coaches, and agents
- Governance bodies in sports: FIFA, IOC, and NCAA
- Legal issues: contracts, negotiations, intellectual property rights
- Ethical considerations: fair play and doping

**UNIT V**

**6 hours**

**Sports Analytics and Technology**

- Introduction to sports analytics
- Evaluating player performance
- Devising game strategies
- Fan engagement through technology
- Analytical techniques: statistical analysis, data visualization, predictive modeling
- Key performance indicators (KPIs) in sports
- Applications of analytics: talent scouting, injury prevention, performance optimization.

**Course Outcomes:**

At the end of the course, students will be able to:

- CO1:** Demonstrate a comprehensive understanding of sports management principles, including organizational structures, legal issues, and ethical considerations.
- CO2:** Evaluate marketing strategies and sponsorship opportunities in the sports industry, devising effective branding and promotional campaigns.
- CO3:** Apply financial management techniques to analyze revenue streams, control costs, and make informed investment decisions in sports organizations.
- CO4:** Utilize sports analytics tools and technology to enhance performance evaluation, strategic planning, and fan engagement initiatives.
- CO5:** Synthesize course concepts through practical applications, demonstrating the ability to address real-world challenges in sports management scenarios.

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### Text Books:

1. Anand O P. Yog Dawra Kaya Kalp. Sewasth Sahitya Perakashan. Kanpur.
2. Brown, J.E. Nutrition Now Thomson-Wadsworth.
3. Corbin et.al. Fitness & Wellness-Concepts. McGraw Hill. Publishers. New York.U.S.A
4. Corbin, C. B., G. J. Welk, W. R Corbin, K. A. Welk, Concepts of Physical Fitness: Active Lifestyle for Wellness. McGraw Hill, New York, USA.
5. Hoeger, W W K and S.A. Hoeger. Principles and Labs for Fitness and Wellness, Thomson Wadsworth, California, USA.
6. Hoeger, W.W. & S. Hoeger Fitness and Wellness. 7th Ed. Thomson Wadsworth, Boston, USA.
7. Kamlesh, M. L. & Singh, M. K.) Physical Education (Naveen Publications).  
Kansal, D.K. Text book of Applied Measurement, Evaluation & Sports Selection. Sports & Spiritual Science Publications, New Delhi.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination

Value Added Course – I

26BGHUMVC02 SPORTS AND YOGA

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

Pre-requisite: Nil

**Course Description:**

Yoga course is designed to provide students with a comprehensive understanding of physical fitness, wellness, and nutrition. This course explores the meaning and importance of yoga in the modern era, the role of sports in maintaining physical fitness, and the various components of physical wellness. Students will also learn about the significance of nutrition and weight management, equipping them with the knowledge to promote a healthy and balanced lifestyle. Through this course, students will gain insights into the holistic approach to health and well-being.

**Course Objectives:**

This course enables the student to –

1. Understand yoga's significance and its practical applications for holistic well-being.
2. Explore subtle energy systems and their role in enhancing health through yogic practices.
3. Examine various paths of yoga to foster self-realization and spiritual growth.
4. Master the Eight Limbs of Yoga for physical, mental, and spiritual harmony.
5. Apply yogic principles to manage psycho-somatic ailments and promote resilience.

**UNIT I**

**6 hours**

- Yoga: Meaning and definition
- Importance of yoga in 21st century
- Introduction to Yogic Anatomy and Physiology
- Yoga & sports, Yoga for healthy lifestyle
- Types of Yoga: - Hatha yoga, laya yoga, mantra yoga,
- Bhakti yoga, karma yoga, jnana yoga, raj yoga
- Study of Chakras, Koshas, Pranas, Nadis, Gunas, Vayus and its application in Yogic practices.
- Ashtanga Yoga: - Yama, niyama, asana, pranayama, Pratyahara, dharna, Dhyana, Samadhi: Benefits, Utilities & their psychological impact on body and mind. According to yoga concept of normality in modern psychology, concept of personality & its development, yogic management of psycho-somatic ailments: frustration, anxiety, depression

**UNIT II**

**6 hours**

- Sports for Physical Fitness: Meaning and definition
- Physical Activity – Concept, Benefits of Participation in Physical Activities
- Components and Significance of Physical Fitness -Health, Skill and Cosmetic Fitness
- Types of Physical Activities – Walking, Jogging, Running, Calisthenics, Rope Skipping, Cycling, Swimming, Circuit Training, Weight training, Adventure Sports
- Principles of Physical Fitness, Warming Up, Conditioning, Cooling Down, Methods to Develop and Measure Health and Skill related components of Physical Fitness
- Measurement of Health-Related Physical Fitness (HRPF)

**UNIT III**

**6 hours**

**Nutrition and Weight Management**

- Concept of Nutrients, Nutrition, Balanced Diet, Dietary Aids and Gimmicks
- Energy and Activity- Calorie Intake, Energy Balance Equation
- Obesity - Concept, Causes, Obesity Related Health Problems
- Weight Management through Behavioral Modifications

**UNIT IV**

**6 hours**

**Media and Careers in Physical Education**

- Organize an event / intramural / tournament in your college.
- Prepare a News Report of an observed Sports competition.
- Create a presentation on any topic from Physical Education using an audio-visual aid.  
Demonstrate Warming-up
- Conditioning
- Cooling-down exercises.

**UNIT V**

**6 hours**

**Management of Aerobics & Group Training**

Measurement of Fitness Components – Leg-raise for Minimal Strength (Muscular Strength); Sit-ups (Muscular Endurance); Harvard Step Test or Run and Walk Test (Cardiovascular Endurance); Sit and Reach Test (Flexibility) Measurement of Pulse Rate / Heart Rate at Radial Artery and Carotid Artery, Calculation of Target Heart Rate Developing a 5-10-minute routine of aerobics with appropriate music for each component of health-related physical fitness

**Course Outcomes:**

At the end of the course, students will be able to:

- CO1:** Demonstrate a comprehensive understanding of sports management principles, including organizational structures, legal issues, and ethical considerations.
- CO2:** Evaluate marketing strategies and sponsorship opportunities in the sports industry, devising effective branding and promotional campaigns.
- CO3:** Synthesize course concepts through practical applications, demonstrating the ability to address real-world challenges in sports management scenarios and Integrate yoga principles into sports and physical fitness activities to enhance performance and prevent injuries.
- CO4:** Utilize sports analytics tools and technology to enhance performance evaluation, strategic planning, and fan engagement initiatives and develop skills in wellness management
- CO5:** Apply financial management techniques to analyze revenue streams, control costs, and make informed investment decisions in sports organizations.

**Text Books:**

1. Anand O P. Yog Dawra Kaya Kalp. Sewasth Sahitya Perakashan. Kanpur.
2. Brown, J.E. Nutrition Now Thomson-Wadsworth.

## Department of Computer Applications

3. Corbin et.al. Fitness & Wellness-Concepts. McGraw Hill. Publishers. New York.U.S.A
4. Corbin, C. B., G. J. Welk, W. R Corbin, K. A. Welk, Concepts of Physical Fitness: Active Lifestyle for Wellness. McGraw Hill, New York, USA.
5. Hoeger, W W K and S.A. Hoeger. Principles and Labs for Fitness and Wellness, Thomson Wadsworth, California, USA.
6. Hoeger, W.W. & S. Hoeger Fitness and Wellness. 7th Ed. Thomson Wadsworth, Boston, USA.
7. Kamlesh, M. L. & Singh, M. K.) Physical Education (Naveen Publications).  
Kansal, D.K. Text book of Applied Measurement, Evaluation & Sports Selection. Sports & Spiritual Science Publications, New Delhi.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination

Value Added Course – I

26BGHUMVC03 NCC AND NSS

L T P C  
2 0 0 2

**Pre-requisite:** NCC B-Certificate

**Course Description:**

The main aim of this course is to mould the youth into responsible citizens of the nation. It helps to improve character and leadership qualities towards nation building. This course also motivates the youth to offer Selfless service to the society and nation. The course comprises Common subjects, Service subjects of NCC, societal aspects and basic organization of Indian Armed Forces.

**Course Objectives:**

This course enables the student to –

6. Get aware of NCC organization and general structure of Defence Forces.
7. Learn leadership and national integration.
8. Motivate towards to maintain Health and hygiene, personality development.
9. Learn elementary characteristics of disaster management, Field craft and Battle craft.
10. Acknowledge the Social activities, Communication and Military History.

**UNIT I INTRODUCTION TO NCC**

**6 hours**

Introduction, History of NCC , NCC Motto, NCC Flag, Aims of NCC, Cardinal points of NCC, Organization of defence forces in general, Organizational structure of Indian Army(Armed forces), Organizational structure of NCC, NCC Song, Incentives of NCC, Ranks in Army, Navy and Air Force, current representatives – Certificate Examination in NCC– Honours and Awards.

**UNIT II LEADERSHIP & NATIONAL INTEGRATION**

**6 hours**

Meaning, Leadership Traits, Types of Leadership, Discipline & Duty of an Indian Citizen, Motivation, Code of Ethics, Perception, Communication, Customs of Services, Importance of Team Work, leaders( swami Vivekananda ).

Meaning and Importance, Unity in Diversity, Indian History and Culture, Religion and Customs of India, India and its Neighbours, Contribution of Youth in Nation Building, Contribution of leaders in nation unification .

**UNIT III PERSONALITY DEVELOPMENT & DEFENCE AND DISASTER MANAGEMENT**

**6 hours**

Introduction to personality development, Physical and social factors influencing / shaping personality, psychological and philosophical factors influencing / shaping personality, Self-awareness, SWOT analysis, mindset, interpersonal relationship and communication, effective communication, barriers of communication.

Civil Defence: Meaning, Organization and its Duties, Civil Defence Services, Fire Fighting : Meaning, Mode of Fire, Fire Fighting Parties, Fire Fighting Equipment. Introduction, Classification of Disaster: Natural Disaster & Man Made Disaster, Disaster Management During Flood, Cyclone and Earth Quake, Assistance in Removal of Debris, Collection and Distribution of Aid Material, Message Services.

**UNIT IV INTRODUCTION TO NSS**

**6 hours**

Meaning, concept and philosophy of National Service Scheme, Need and significance of NSS in higher education, History and evolution of NSS in India, Motto of NSS: “Not Me But You”, NSS as a voluntary student-community service programme, Concept of “Education through Service”

**SOCIAL SERVICE ACTIVITIES (Social Service And Community Development)**

Basics of Social Service, Weaker Sections in the Society and its Identification, Contribution of Youth towards Social Welfare, NGOs and their Role and Contribution, Social Evils, Drug Abuse, Family Planning, Corruption, Counter Terrorism, Eradication of Illiteracy – Aids Awareness programme – Cancer Awareness Programme.

**UNIT V HEALTH AND HYGIENE & ENVIRONMENT AND ECOLOGY**

**6 hours**

Structure and Function of Human Body, Hygiene and Sanitation, Preventable Diseases, First Aid, Yoga: Introduction and Exercises, Physical and Mental Health, Fractures: Types and Treatment..

Environment: Meaning, Global Warming, Acid Rain, Depletion of Ozone Layer, Conservation of Environment. Ecology: Introduction, Component of Ecological System, Forest Ecology, Wild Life, Pollution Control.

**Course Outcomes:**

At the end of the course, students will be able to:

**CO1:** Analyse the NCC structure and different ranks in Indian Armed Forces along with foot drill.

**CO2:** Notify the leadership traits and the need of national integrity towards nation building.

**CO3:** Instill respect and responsibility towards personal health and hygiene, develop dynamic personality with adequate qualities.

**CO4:** Identify different disasters and judging measurements on the ground.

**CO5:** Recognise various communication devices, analyse the Military Organization.

**Text Books:**

1. HAND BOOK OF NCC – “SANJAY KUMAR MISHRA, MAJOR RC MISHRA”, published by Kanti prakashan-2020.
2. NCC HAND BOOK - “SHASHI RANJAN & ASHISH KUMAR”, published by Goodwin Publications-2021.

**Reference Books:**

1. NCC Hand book – “R.Gupta’s”, Ramesh Publishing House-2021.
2. NCC (ARMY WING)- “R.Guptas’s”, RPH Editorial Board-2021
3. Hand Book Of N.C.C. – “Ashok Pandey”, Kanti Publications-2017

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination

**Pre-requisite:** Nil

**Course Description:**

This course provides a comprehensive understanding of natural and human-induced disasters, their causes, characteristics, and consequences. It examines the social, economic, environmental, and life-safety impacts of disasters with emphasis on disaster-prone regions in India. The course introduces disaster preparedness and management through monitoring, risk evaluation, remote sensing, meteorological information, and community participation. It develops knowledge of disaster risk assessment, disaster risk reduction, early warning, and national and global cooperation. The course also focuses on structural and non-structural mitigation strategies and emerging approaches for reducing disaster vulnerability and impacts.

**Course Objectives:**

Upon the completion of subject student will be able to-

1. Develop fundamental knowledge of different natural and man-made disasters, their characteristics, causes, and associated hazards.
2. Examine the economic, environmental, ecological, and human consequences of disasters and identify disaster-prone regions in India.
3. Develop an understanding of disaster preparedness and management using monitoring systems, remote sensing, meteorological information, and community-based approaches.
4. Introduce the concepts, elements, and techniques of disaster risk assessment, risk reduction, early warning, and national and global cooperation.
5. Develop knowledge of structural and non-structural disaster mitigation strategies, emerging mitigation practices, and disaster mitigation programmes in India.

**UNIT I DISASTER CLASSIFICATION**

**6 hours**

Disaster: definition, factors and significance; difference between hazard and Disaster; natural disaster: earthquakes, volcanisms, cyclones, tsunamis, floods, droughts and famines, landslides and avalanches; man-made disasters: nuclear reactor meltdown, industrial accidents, oil slicks and spills, outbreaks of disease and epidemics, war and conflicts

**UNIT II REPERCUSSIONS OF DISASTERS**

**6 hours**

Economic damage, loss of human and animal life, destruction of ecosystem. Disaster Prone Areas in India: Study of seismic zones; areas prone to floods and droughts, landslides and Avalanches; areas prone to cyclonic and coastal hazards with special reference to tsunami.

**UNIT III DISASTER PREPAREDNESS AND MANAGEMENT**

**6 hours**

Preparedness: monitoring of phenomena triggering a disaster or hazard; Evaluation of risk: application of remote sensing, data from meteorological and Other agencies, media reports: governmental and community preparedness.

**UNIT IV RISK ASSESSMENT**

**6 hours**

Disaster risk: concept and elements, disaster risk reduction, global and national disaster risk situation. Techniques of risk assessment, global co-operation in risk assessment and warning.

**UNIT V DISASTER MITIGATION**

**6 hours**

Meaning, concept and strategies of disaster mitigation, emerging trends in Mitigation. Structural mitigation and non-structural mitigation, programs of Disaster mitigation in India.

### Course outcomes:

After the completion of the subject following outcomes can be achieved-

- CO1:** Classify natural and man-made disasters and explain their causes, characteristics, and associated hazards.
- CO2:** Assess the major economic, environmental, ecological, and human impacts of disasters and identify disaster-prone regions in India.
- CO3:** Explain disaster preparedness and management practices using hazard monitoring, remote sensing, meteorological data, and community preparedness mechanisms.
- CO4:** Apply appropriate techniques for disaster risk assessment and explain disaster risk reduction, early warning systems, and national and global cooperation mechanisms.
- CO5:** Evaluate and recommend suitable structural and non-structural mitigation measures for reducing disaster risk and impacts.

### Reference Books:

1. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
2. R. Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “New Royal book Company.
3. Sahni, PardeepEt.Al. (Eds.),” Disaster Mitigation Experiences and Reflections”, Prentice Hall Of India, New Delhi.
4. Goel S. L., Disaster Administration And Management Text and Case Studies” ,Deep&Deep Publication Pvt. Ltd., New Delhi

**Mode of Evaluation:** Assignments, Mid Term Tests

**Value Added Course - II**

**26BGCIVVC02 ENVIRONMENTAL SCIENCE AND SUSTAINABILITY**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Pre-Requisites:** None

**Course Description:**

This course provides foundational knowledge of environmental systems, biodiversity, and sustainability. It addresses major environmental challenges like pollution and climate change, and introduces students to key policies, global sustainability frameworks, and sustainable engineering practices.

**Course Objectives:**

1. Understand the interdependence between environmental system and human well-being.
2. Analyze key environmental issues including pollution, climate change, and resource degradation.
3. Interpret environmental laws, standards, and global sustainability agreements.
4. Evaluate sustainability frameworks and the role of engineering in achieving development goals.
5. Apply sustainable engineering principles to address real-world environmental challenges.

**UNIT I ENVIRONMENTAL SYSTEMS**

**6 hours**

Definition, scope, and importance of environment - Components of ecosystem: biotic and abiotic - Energy flow in ecosystems (food chains, food webs) - Biogeochemical cycles: Water, Carbon, Nitrogen - Biodiversity: definition, values, and threats - Overview of natural resources: renewable vs. non-renewable

**UNIT II ENVIRONMENTAL CHALLENGES**

**6 hours**

Pollution: definition, types (Air, Water, Soil, Noise) - Causes, effects, and basic control measures - Urbanization – Land degradation - Solid and E-waste management – Climate change, global warming, greenhouse effect - Ozone depletion and carbon footprint

**UNIT III ENVIRONMENTAL POLICIES**

**6 hours**

Overview of ISO 14001:2015 - Roles of CPCB, SPCBs, and NGT - Key environmental acts (Air, Water, Forest, Wildlife) - International agreements: Montreal, Kyoto, Paris Agreement - Basics of Environmental Impact Assessment (EIA) - Introduction to carbon credit and energy auditing

**UNIT IV SUSTAINABILITY GOALS**

**6 hours**

Foundations of Sustainability- Definition, Concept, needs and challenges- principles of sustainability - Evolution of Global Sustainability Frameworks - Agenda 21, millennium development goals, and protocols - Sustainable Development Goals - targets, indicators – Role of engineering and technology in achieving SDGs

**UNIT V SUSTAINABLE ENGINEERING APPROACHES**

**6 hours**

Introduction to Sustainability in Engineering - Guiding principles and Frameworks for sustainable engineering – Sustainability approaches - Triple bottom Line, Cradle to Cradle concept - Life cycle assessment - Zero waste and R concept - Circular economy - ISO 14000 Series

### Course Outcomes:

At the end of this course students will demonstrate the ability to

**CO1:** Recommend ecofriendly solution to protect ecosystem.

**CO2:** Identify appropriate pollution control methods for specific situations.

**CO3:** Demonstrate the use of renewable energy for sustainable development.

**CO4:** Apply techniques to reduce environmental impact from climate change.

**CO5:** Utilize environmental laws and policies to promote sustainable practices.

### Text Books:

1. R. L. Rag and Lekshmi Dinachandran Remesh. Introduction to Sustainable Engineering. 2nd Edition, PHI Learning Pvt. Ltd., 2016.
2. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
3. **Masters, Gilbert M. & Ela, Wendell P.** – *Introduction to Environmental Engineering and Science*, Pearson Education, 3rd Edition, 2013
4. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
5. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall
6. Richard T. Wright, Dorothy F. Boorse (2017) Environmental Science: Toward A Sustainable Future, Pearson, 13th Edition

### Reference Books:

1. R.C. Sohal & S.K. Agrawal – *Environmental Studies*, University Science Press, 2018.
2. Erach Bharucha – *Textbook of Environmental Studies for Undergraduate Courses*, University Grants Commission, 2nd Edition, 2013.
3. Peavy, H.S., Rowe, D.R. & Tchobanoglous, G. – *Environmental Engineering*, McGraw Hill Education, 2017.
4. R.K. Trivedi & P.K. Goel – *An Introduction to Air Pollution*, B.S. Publications, 2015.
5. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley-Blackwell
6. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
7. Leelakrishnan, P. (2022). *Environmental law in India* (Vol. 1). LexisNexis.
8. Ghosh, S. (Ed.). (2019). *Indian environmental law: Key concepts and principles*. Orient BlackSwan.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

Value added Course - II

**26BGHUMVC04 INDIAN CONSTITUTION**

**L T P C**  
**2 0 0 2**

**Pre-requisite**            **NIL**

**Course Description:**

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state.

**Course Objectives:**

The course is intended to:

1. To know about Indian constitution;
2. To know about central and state government functionalities in India; and
3. To know about Indian society.

**UNIT I            INTRODUCTION**

**6 hours**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

**UNIT II            STRUCTURE AND FUNCTION OF CENTRAL  
GOVERNMENT**

**6 hours**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

**UNIT III            STRUCTURE AND FUNCTION OF STATE GOVERNMENT**

**6 hours**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

**UNIT IV            CONSTITUTION FUNCTIONS**

**6 hours**

Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

**UNIT V            INDIAN SOCIETY**

**6 hours**

Society: Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

### Course Outcomes:

Upon completion of the course, students will be able to:

**CO1:** Understand the functions of the Indian government; and

**CO2:** Understand and abide the rules of the Indian constitution.

### Text Books:

1. Durga Das Basu, “Introduction to the Constitution of India “, Prentice Hall of India, New Delhi..
2. R.C.Agarwal, (1997) “Indian Political System”, S.Chand and Company, New Delhi.
3. Maciver and Page, “ Society: An Introduction Analysis “, Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, (1997) “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi.

### Reference Books:

1. Sharma, Brij Kishore, “ Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, “Indian Political System “, New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, “Indian Social Problems “, Media Promoters and Publishers Pvt. Ltd.

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

Value added Course - II

26BGMBAVC01 BUSINESS ETHICS

L T P C  
2 0 0 2

Pre-requisite NIL

**Course Description:**

This course explores ethical issues in business and corporate environments with special emphasis on the responsibilities of IT professionals and organizations. It equips students with tools to navigate ethical challenges in the corporate world, including governance, CSR, and digital business ethics.

**Course Objectives:**

1. To understand ethical principles in business decision-making
2. To analyse ethical dilemmas in corporate settings
3. To develop awareness of corporate social responsibility and governance
4. To foster integrity in technology-driven business environments

**UNIT I INTRODUCTION TO BUSINESS ETHICS 6 Hours**

Meaning, scope, and importance of business ethics - Myths about business ethics - Ethical decision-making models - Factors influencing business ethics

**UNIT II ETHICAL ISSUES IN BUSINESS FUNCTIONS 6 Hours**

Ethics in marketing, finance, and HRM - Ethical issues in supply chain and operations - Whistleblowing and employee rights - Intellectual property and data ethics in IT

**UNIT III CORPORATE GOVERNANCE AND ACCOUNTABILITY 6 Hours**

Corporate governance: Principles and practices - Role of board and shareholders - Corporate scandals and lessons learned - Ethical leadership and organizational culture – BRSR and SEBI guidelines

**UNIT IV CORPORATE SOCIAL RESPONSIBILITY (CSR) 6 Hours**

Concept and evolution of CSR - CSR models and strategies - Sustainability and triple bottom line. CSR in Indian context and Companies Act provisions

**UNIT V ETHICS IN DIGITAL BUSINESS & EMERGING TECHNOLOGIES 6 Hours**

Ethics in e-commerce, AI, and big data - Privacy, security, and surveillance issues. - Global ethical challenges and cross-cultural ethics - Future of business ethics in the digital economy

**Course Outcomes:**

Upon successful completion of the course, students will be able to:

**CO1:** Understand core concepts and theories of business ethics - L2

**CO2:** Identify and analyze ethical issues in various business functions - L4

**CO3:** Evaluate corporate governance and CSR practices.

**CO4:** Apply ethical frameworks to technology and digital business contexts

**CO5:** Develop strategies for ethical leadership and responsible business practices

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### Text Books

1. Manuel G. Velasquez, *Business Ethics: Concepts and Cases*, Pearson.
2. S. K. Chakraborty, *Ethics in Management: Vedantic Perspectives*, Oxford University Press.
3. L. M. Prasad, *Business Ethics*, Sultan Chand & Sons.

### Reference Books

1. Andrew Crane & Dirk Matten, *Business Ethics*, Oxford University Press.
2. P. S. Bajaj & Raj Agarwal, *Business Ethics: An Indian Perspective*, Biztantra.
3. John R. Boatright, *Ethics and the Conduct of Business*, Pearson

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

Value added Course - II

26BGMBAVC02 INNOVATION AND DESIGN THINKING

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

Pre-requisite Nil

**Course Description:**

This course introduces students to the principles and practices of design thinking and innovation as tools for problem-solving and product development. Students will explore the human-centered design process — from empathizing with users to ideating, prototyping, and testing solutions — with a focus on applying these strategies in IT and business contexts

**Course Objectives:**

This course enables students to

1. Explain the concept of design thinking for product and service development
2. Explain the fundamental concept of innovation and design thinking
3. Apply design thinking tools and techniques for IT-based problem solving
4. Develop strategic innovation mind set through storytelling, prototyping, and business model design

**UNIT I PROCESS OF DESIGN**

**6 hours**

Understanding Design thinking Shared model in team-based design – Theory and practice in Design thinking - MVP or Prototyping; Design Thinking stages: Empathize, Define, Ideate, Prototype, Test Overview of each stage; Double Diamond model of design; Divergent vs. Convergent thinking

**UNIT II TOOLS FOR DESIGN THINKING**

**6 hours**

Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design -Mind Mapping, Affinity Diagrams, Journey Maps, Personas, How-Might-We (HMW) statements, Brainstorming techniques, SCAMPER method, Storyboarding.

**UNIT III DESIGN THINKING IN IT**

**6 hours**

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping - Application of Design Thinking in software development lifecycle (SDLC); UX/UI design principles; Design Thinking vs. Agile methodology — integration strategies; User Story mapping

**UNIT IV DESIGN THINKING FOR STRATEGIC INNOVATIONS**

**6 hours**

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design - Blue Ocean Strategy; Disruptive Innovation (Clayton Christensen model); Open Innovation model.

**UNIT V DESIGN THINKING WORKSHOP**

**6 hours**

**Workshop activities:** Problem identification from real-world scenarios; Team-based empathy interviews; Define problem statements using POV (Point of View) method; Rapid ideation sessions; Low-fidelity paper prototyping; Peer testing and feedback

**Course Outcomes:**

After completing this unit students will be able to

CO1: Explain the stages of the Design Thinking process and apply them to real problems

CO2: Generate and develop design ideas through different technique

CO3: Apply design thinking tools such as personas, journey maps, and prototypes in IT contexts

## **Department of Computer Applications**

CO4: Evaluate and implement strategic innovation frameworks in organizational and business scenarios

CO5: Demonstrate the ability to empathize with users and conduct design thinking workshops independently

### **Text Book(s)**

1. Tim Brown, 'Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation', Harper Business, 2009
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

### **Reference Books**

1. Yousef Haik and Tamer M.Shahin, “Engineering Design Process”, Cengage Learning, Second Edition, 2011.
2. Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

**Mode of Evaluation:** Assignments, Mid Term Tests, End Semester Examination.

## **ADDITIONAL LANGUAGE COURSES**

Additional Language Courses

26BGENGJC02 GERMAN

L T P C  
2 0 0 0

**Pre-requisite** Nil

**Course Description:**

This course introduces students to basic German language skills for everyday communication. It develops fundamental listening, speaking, reading, and writing skills through essential vocabulary, pronunciation, grammar, and simple conversations, while also providing an introduction to German culture and everyday life.

**Course Objectives:**

This course enables students to

1. Introduce basic German greetings, alphabet, numbers, and self-introduction.
2. Familiarize students with personal pronouns and basic verb conjugation.
3. Introduce basic vocabulary related to family, professions, places, and directions.
4. Develop simple communication skills related to food, shopping, time, and daily activities.
5. Enable students to use basic German expressions in simple everyday conversations.

**UNIT I      Guten Tag!**

**6 hours**

Begrüßungen und Verabschiedungen; sich vorstellen; Alphabet und Buchstabieren; Zahlen bis 100; Länder und Sprachen; Wohnort; Berufe und Hobbys; Telefonnummer und E-Mail-Adresse; W-Fragen: Wer? Wie? Was? Wo? Woher?; grundlegende Redewendungen.

**UNIT II      Freunde, Kollegen und ich**

**6 hours**

Personalpronomen im Nominativ; sein und haben; regelmäßige und wichtige unregelmäßige Verben; Verbkonjugation; Aussagesatz; W-Frage; Ja-/Nein-Frage; Wochentage, Monate und Jahreszeiten; einfache Gespräche.

**UNIT III      In der Stadt**

**6 hours**

Plätze und Gebäude; Verkehrsmittel; bestimmter Artikel der, die, das; unbestimmter Artikel ein, eine; Negationsartikel kein, keine; Nominativ; nach dem Weg fragen; Wegbeschreibung: links, rechts, geradeaus; einfache Texte verstehen.

**UNIT IV      Guten Appetit! / Tag für Tag**

**6 hours**

Lebensmittel und Getränke; Mahlzeiten; Einkaufen; Preise; Akkusativ; den, einen, keinen; Verben mit Akkusativ; Uhrzeiten; Tagesablauf; Zeitangaben mit am, um, von ... bis; einfache Gespräche im Restaurant und beim Einkaufen.

**UNIT V      Familie, Freizeit und Alltag**

**6 hours**

Familie; Possessivartikel mein, dein, sein, ihr; Modalverben können, müssen, wollen, möchten, dürfen; trennbare Verben; Freizeitaktivitäten; Einladungen; kurze Alltagsgespräche; Wiederholung; schriftliche und mündliche Übungen.

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### Course Outcomes:

After completing this unit students will be able to

**CO1:** Recall basic German greetings, alphabet, numbers, and vocabulary.

**CO2:** Explain basic personal pronouns, verbs, and simple sentence structures.

**CO3:** Use simple German expressions related to family, professions, places, and directions.

**CO4:** Apply basic vocabulary and grammar in situations related to food, shopping, time, and daily activities.

**CO5:** Demonstrate simple spoken and written communication in everyday situations.

### Text Book(s)

1. Dengler, Stefanie, et al. *Netzwerk: Deutsch als Fremdsprache A1. Kursbuch A1*. Goyal Publishers. Langenscheidt Verlag, 2015.
2. Dengler, Stefanie, Paul Rusch, Helen Schmitz, and Tanja Sieber. *Netzwerk: Deutsch als Fremdsprache A1. Arbeitsbuch A1*. Langenscheidt Verlag, 2015.

### Reference Books

1. Kalender, Susanne, Daniela Niebisch, Sabine Pohlmann, and Monika Reimann. *Menschen: Deutsch als Fremdsprache A1.2 Kursbuch*. Hueber Verlag GmbH & Co. KG, 2012.
2. Schulz-Griesbach: Deutsch als Fremdsprache. Grundstufe in einem Band (for Grammar)

### Web Resources:

1. Facts About Germany <https://Www.Tatsachen-Ueber-Deutschland.De/En>
2. Online German-English Dictionary [Www.Leo.Org](http://www.Leo.Org)

### Practice Material:

1. <https://www.goethe.de/en/spr/kup/prf/prf/sd1/ueb.html>
2. [http://www.deutschkurse-passau.de/JM/images/stories/SKRIPTEN/a1\\_skript\\_gr.pdf](http://www.deutschkurse-passau.de/JM/images/stories/SKRIPTEN/a1_skript_gr.pdf)
3. [https://www.schubert-verlag.de/aufgaben/arbeitsblaetter\\_a1\\_z/a1\\_arbeitsblaetter\\_index\\_z.htm](https://www.schubert-verlag.de/aufgaben/arbeitsblaetter_a1_z/a1_arbeitsblaetter_index_z.htm)

**Mode of Evaluation:** Assignments and Mid Term Tests.

Additional Language Courses

26BGENGJC03 JAPANESE

L T P C  
2 0 0 0

Pre-requisite Nil

**Course Description:**

This course is an introductory-level Japanese language and culture course designed for absolute beginners. It equips students with foundational communicative competence in Japanese through a structured progression from script literacy and basic grammar to real-world language use. Cultural insights into Japanese values of cleanliness, punctuality, and social etiquette are woven throughout, enabling students to engage respectfully and effectively in Japanese-speaking environments.

**Course Objectives:**

This course enables students

1. To familiarize students with Japanese cultural values and enable them to read Hiragana and Katakana scripts along with basic greetings and social expressions.
2. To develop students' ability to give a simple introduction about themselves, construct simple sentences using 'desu', Japanese numerals, pointing and spatial words, and grammatical particles.
3. To enable students to form affirmative and negative sentences in non-past and past tenses, use existence verbs, and describe nouns using *i*- and *na*-adjectives.
4. To build students' vocabulary in time expressions, family terms, food, objects, locations, kanji, nationalities, and calendar reading for everyday communication.
5. To equip students with practical communication skills using *-tai* and *-te* verb forms for real-life contexts including travel and shopping.

**UNIT I FOUNDATIONS OF JAPANESE WRITING**

**6 hours**

Introduction to Japanese Culture: cleanliness, punctuality, and discipline; Japanese writing system - Hiragana characters; Writing one's name in Katakana script and frequently used Katakana words; Romaji script; Classroom and everyday greetings and social expressions - Introductory phrases and polite conversational responses.

**UNIT II BASIC VOCABULARY AND GRAMMAR**

**6 hours**

Basic sentences using the subject-predicate pattern with *desu*; Construction of negative sentence construction (*ja arimasen*); Basic self-introduction (*jiko shoukai*); Japanese numerals up to 100; Pointing words for objects — (this, that, that over there); Spatial reference words — here, there, over there; Grammatical particles and their role in sentences (*wa, mo, no, ka, kara, and made*).

**UNIT III VERBS, ADJECTIVES, AND EXPANDED SENTENCE PATTERNS**

**6 hours**

Affirmative and negative sentences in non-past (*-masu, -masen*) and past tense (*mashita, masen deshita*); Existence (be) verbs for animate (*imasu*) and inanimate subjects (*arimasu*); Describing nouns using *i*-adjectives and *na*-adjectives; Connecting nouns in a list using conjunctions; Polite phrases to express incomprehension and requesting repetition or asking the speaker to talk slowly.

**UNIT IV VOCABULARY FOR EVERYDAY CONTEXTS**

**6 hours**

Days of the week and months of the year; Family relationship terms; Nouns related to food, household objects, and public places; Japanese question words and their usage; Basic kanji characters (30 kanjis); Vocabulary for countries, nationalities, and languages; Expressing time — hours, minutes, and duration.

**UNIT V SURVIVAL PHRASES FOR TRAVEL**

**6 hours**

-*tai* and -*te* forms of verbs for polite requests; Expressing desires; Describing a past event; Japanese values of social and business etiquette (e.g. bowing (*o-jigi*), exchange of business cards, tea ceremony, *matsuri*-s (festivals) etc.); Language for travelling - shopping-asking item prices (\_\_\_\_ *wa ikura desu ka* and numbers up to 100 million), train stations, taxis, and restaurants (e.g. *mizu o kudasai*).

**Course Outcomes:**

After completing this unit students will be able to

**CO1:** Recognize Japanese characters and use appropriate greetings and polite expressions in basic social interactions

**CO2:** Introduce themselves and construct simple Japanese sentences using the subject-predicate pattern with *desu*, form negative statements, count to one hundred, and apply demonstrative and spatial reference words correctly

**CO3:** Produce affirmative and negative sentences in non-past and past tenses, use animate and inanimate existence verbs and describe people and objects using *i*- and *na*-adjectives.

**CO4:** Use vocabulary for days, months, family, food, household objects, locations, nationalities, and time expressions to read a calendar and discuss daily schedules.

**CO5:** Apply practical conversation skills in the context of travel, restaurant visits, medical appointments, university navigation, and shopping.

**Text Book(s)**

1. Banno, E., Ohno, Y., Sakane, Y., & Shinagawa, C. (2011). Genki I: An Integrated Course in Elementary Japanese (2nd ed.). The Japan Times.

**Reference Books**

1. Banno, E., Ohno, Y., Sakane, Y., & Shinagawa, C. (2011). Genki I Workbook (2nd ed.). The Japan Times. (Practice exercises complementing the primary textbook.)
2. Takamizawa, H. (Ed.). (2004). Japanese for Busy People I (Revised 3rd ed.). Kodansha International. (Practical, communicative approach suitable for everyday language use covered in Units 4 and 5.)
3. Hormuth, S. (2008). Hiragana and Katakana: Workbook and Flash Cards. Tuttle Publishing. (Focused script acquisition resource for Unit 1.)

**Mode of Evaluation:** Assignments and Mid Term Tests.

Additional Language Courses

26BGENGJC04 हिंदी

L T P C  
2 0 0 0

Pre-requisite Nil

**Course Description:**

यह पाठ्यक्रम छात्रों के हिंदी भाषा कौशल को विकसित करता है। इसमें चयनित हिंदी कहानियों और व्याकरण का अध्ययन शामिल है। यह छात्रों को सही शब्दावली और व्याकरण का प्रयोग करने में सहायता करता है। साथ ही, यह साहित्यिक, सामाजिक और सांस्कृतिक समझ को बढ़ाता है।

**Course Objectives:**

1. हिंदी में सुनने, बोलने, पढ़ने और लिखने के कौशल विकसित करने में सक्षम बनाना।
2. दैनिक जीवन, शैक्षणिक और व्यावसायिक परिस्थितियों में हिंदी भाषा के प्रभावी प्रयोग से परिचित कराना।
3. हिंदी कहानियों के माध्यम से साहित्य, संस्कृति, सामाजिक मूल्यों और मानवीय संवेदनाओं की समझ विकसित करना।
4. हिंदी व्याकरण, शब्दावली और वाक्य संरचना का बुनियादी ज्ञान प्रदान करना।
5. विभिन्न परिस्थितियों में सही, सरल और प्रभावी हिंदी संचार के लिए विद्यार्थियों को तैयार करना।

**UNIT I**

**6 hours**

**कफ़न - मुंशी प्रेमचंद**

व्याकरण: विकारी और अविकारी शब्द, संज्ञा और उसके भेद, विलोम शब्द, हिंदी से अंग्रेज़ी में अनुवाद

**UNIT II**

**6 hours**

**गिल्लू - महादेवी वर्मा**

व्याकरण: सर्वनाम और उसके भेद, क्रिया और उसके भेद, पद-परिचय

**UNIT III**

**6 hours**

**चीफ़ की दावत - भीष्म साहनी**

व्याकरण: विशेषण और उसके भेद, क्रिया-विशेषण और उसके भेद, वाक्य-शुद्धि, मुहावरे

**UNIT IV**

**6 hours**

**उसने कहा था – चंद्रधर शर्मा गुलेरी**

व्याकरण: संबंधबोधक अव्यय, समुच्चयबोधक अव्यय, विस्मयादिबोधक अव्यय

UNIT V

6 hours

**पुरस्कार - जयशंकर प्रसाद**

व्याकरण: लिंग, वचन, काल और उसके भेद, वाच्य और उसके, भेद 'ने' का प्रयोग

**Course Outcomes:**

**CO1:** सामान्य हिंदी को समझ सकेंगे तथा दैनिक विषयों पर सरल बातचीत कर सकेंगे।

**CO2:** विभिन्न सामाजिक और व्यावसायिक परिस्थितियों में हिंदी भाषा का प्रयोग कर सकेंगे।

**CO3:** चयनित हिंदी कहानियों के विषय, पात्र, सामाजिक मूल्यों और संदेशों का विश्लेषण कर सकेंगे।

**CO4:** हिंदी व्याकरण की मूल अवधारणाओं को समझकर उनका सही प्रयोग कर सकेंगे।

**CO5:** उपयुक्त शब्दावली और व्याकरण का प्रयोग करते हुए सरल मौखिक एवं लिखित हिंदी में अभिव्यक्त कर सकेंगे।

**Text Book(s)**

1. कहानी संग्रह: *मानसरोवर*— मुंशी प्रेमचंद, विभिन्न संस्करण।
2. हिंदी कहानी संग्रह: चयनित कहानियाँ — महादेवी वर्मा, भीष्म साहनी, चंद्रधर शर्मा गुलेरी एवं जयशंकर प्रसाद।
3. व्याकरण: *सरल हिंदी व्याकरण और पत्र लेखन*— डॉ. मंजुनाथ, वाणी प्रकाशन, नई दिल्ली।

**Reference Books**

1. मानक हिंदी व्याकरण — हिंदी व्याकरण एवं भाषा-प्रयोग के लिए।
2. आधुनिक हिंदी कहानी संग्रह — चयनित हिंदी कहानियों के अध्ययन के लिए।

**Mode of Evaluation:** Assignments and Mid Term Tests.