

2. BCA-AIML Semester-I Syllabus

BCA-AIML Semester-I (First Year)

Subject Title : Programming Fundamentals
Subject Code : CAM211-1C
Subject Type : Major

Rationale:

This syllabus introduces students to the fundamentals of programming using C, including basic syntax, data types, operators, and control structures. It emphasizes practical skills through hands-on exercises with arrays, strings, math functions, and user-defined functions. Advanced topics like structures and unions prepare students to organize and manage complex data efficiently in real-world applications.

Learning Outcomes:

After completing this course, students will be able to:

- Understand and explain the structure of a C program, compiler, interpreter, and assembler.
- Apply variables, constants, operators, and expressions in solving programming problems.
- Use decision-making statements and loops to control program flow.
- Implement arrays, strings, and standard math functions for data manipulation.
- Write and invoke user-defined functions for modular programming.
- Define and use structures and unions to organize and manage complex data effectively.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I [Weightage=25% approx., Lectures=7, Practicals=14]

Basics of Programming: Programming concepts and problem solving using computers, steps of problem solving, definition and characteristics of an algorithm, algorithms for basic problems, flowcharts, flowcharts Standard symbols and rules, flowchart example.

Overview of C: Introduction to C language, structure of a simple C program, compilation and execution process, Role of compiler and linker.

C Tokens: keywords, identifiers, constants and variables, Data type, types of data type, Basic data types.

Unit II [Weightage=25% approx., Lectures=8, Practicals=16]

Basic input and output functions: printf(), scanf(), getchar(), putchar(), clrscr(), gets(), puts(), getch().

Operators: arithmetic, relational, logical, assignment, increment and decrement operators. Expressions and simple type casting.

Decision making statements: if, if-else, switch case statements, ternary operator.

Looping statements: while loop, do while loop, for loop, break and continue, nested loop.


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Unit III

[Weightage=25% approx., Lectures=7, Practicals=14]

Arrays: Concept, types of array one-dimensional, two-dimensional array, arrays and basic operations, application, String operation.

Functions: Concept, types of Function: Inbuilt and User Defined Functions, declaration of function, definition of function, calling of function, nested calling of function, inbuilt mathematical function, inbuilt string function.

Unit IV

[Weightage=25% approx., Lectures=8, Practicals=16]

Structures: definition, declaration and initialization, accessing structure members, nested structure.

Union: definition, declaration and accessing union members, differentiate structure and union.

Introduction to file handling: basic concepts, simple reading and writing operations. Basic of pointers.

Text Book:

Programming in ANSI C, E Balagurusamy, 9th edition, McGraw Hill.

Reference Books:

- Let us C, Yashavant Kanetkar, 20th Edition, BPB publication.
- Programming in C, by Pradip Dey & Manas Ghosh, Publisher–Oxford.
- The Complete Reference, Herbert schildt Fourth Edition.
- Programming in C, by Reenathareja Publisher–Oxford.

Reference Links:

- <https://www.w3schools.com/c/>
- <https://www.tutorialspoint.com/cprogramming/>
- <https://www.geeksforgeeks.org/c/c-programming-language/>

Practical List:

- Write a C program to print “Hello World” and demonstrate the structure of a C program.
- Write a C program to demonstrate use of variables and constants and display their values.
- Write a C program to perform basic arithmetic operations (addition, subtraction, multiplication, division) using operators.
- Write a C program to demonstrate relational and logical operators.
- Write a C program to find the largest of two numbers using if statement.
- Write a C program to find the largest of three numbers using if-else or else-if ladder.
- Write a C program to check whether a given number is even or odd using if-else.
- Write a C program to implement a menu-driven calculator using switch-case.
- Write a C program to generate the multiplication table of a given number using for loop.
- Write a C program to find the factorial of a number using while or for loop.
- Write a C program to check whether a given number is a prime number.
- Write a C program to generate the Fibonacci series up to n terms using loops.
- Write a C program to read and display elements of a one-dimensional array.
- Write a C program to find the sum and average of array elements.
- Write a C program to read and display a two-dimensional matrix.
- Write a C program to perform string operations such as length, copy, and comparison using library functions.
- Write a C program to check whether a given string is a palindrome.


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- Write a C program to draw a right-angled triangle pattern using * with for loop.
- Write a C program to draw a pyramid/triangle pattern using * with for loop.
- Write a C program to define a structure for student information (roll number, name, and marks) and display the details.
- Write a C program to demonstrate the difference between structure and union using a simple example.
- Write a C program of Structure.
- Write a C program of pointer program.
- Write a C program of pointer to access memory location using array.
- Write a C program of buffer overflow problem.
- Write a C program of file read and write with different mode.


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BCA-AIML Semester-I (First Year)

Subject Title : Programming Fundamentals

Subject Code : CAM211-1C

Subject Type : Major

Course Outcomes (COs)

- **CO1:** Understand programming fundamentals, algorithms, flowcharts, and structure of C programs.
- **CO2:** Apply data types, variables, constants, operators, and expressions to solve problems.
- **CO3:** Implement decision-making and looping constructs for program control.
- **CO4:** Develop programs using arrays and strings for data handling.
- **CO5:** Design modular programs using user-defined and inbuilt functions and present solutions effectively.
- **CO6:** Analyze and implement structures, unions, pointers, and file handling with basic secure coding practices.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand programming fundamentals, algorithms, flowcharts, and structure of C programs.	PO1, PO2, PO5, PSO2	U	C	5	10
CO2	Apply data types, variables, constants, operators, and expressions to solve problems.	PO1, PO2, PO3, PSO2	Ap	P	5	10
CO3	Implement decision-making and looping constructs for program control.	PO2, PO3, PO7, PSO2	Ap	P	5	10
CO4	Develop programs using arrays and strings for data handling.	PO2, PO3, PO4, PO7, PSO1, PSO2	Ap	P	5	10
CO5	Design modular programs using user-defined and inbuilt functions and present solutions effectively.	PO2, PO3, PO6, PO9, PSO1, PSO2, PSO3	C	P	5	10
CO6	Analyze and implement structures, unions, pointers, and file handling with basic secure coding practices.	PO1, PO2, PO3, PO7, PO8, PO9, PO10, PSO1, PSO2, PSO3	An	P	5	10
Total hour of Instruction					30	60

Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	0	0	1	0	0	0	0	0	0	3	0
CO2	2	2	3	0	0	0	0	0	0	0	0	3	0
CO3	0	2	3	0	0	0	2	0	0	0	0	3	0
CO4	0	2	3	2	0	0	2	0	0	0	3	3	0
CO5	0	2	3	0	0	2	0	0	2	0	3	3	3
CO6	2	2	3	0	0	0	2	2	2	2	3	3	3

3: High, 2: Medium, 1: Low

BCA-AIML Semester-I (First Year)

Subject Title : Data Fundamentals for AI Data Analytics
Subject Code : CAM212-1C
Subject Type : Major

Rationale:

The course focuses on understanding data, its structure, usage, quality, and ethical considerations, enabling students to make data-informed decisions in business and IT environments.

Learning Outcomes:

After completing this course, students will be able to:

- Understand the concept of data, information, and data literacy.
- Identify different types, structures, modalities, and sources of data.
- Explain data labeling, data usage, and data lifecycle in organizations.
- Recognize data quality issues, bias, and ethical responsibilities in data usage.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I [Weightage = 25% approx., Lectures = 7, Practicals=14]

Introduction to Data Literacy: Concept of Data, Definition and types of data – Qualitative and Quantitative, meaning of Data Literacy and its importance in Business, IT and everyday life. Data Life Cycle – Collection, Processing, Storage, Analysis, Visualization and Use. Basic data concepts – Variables, Datasets and Metadata. Data Sources – Primary and Secondary.

Unit II [Weightage = 25% approx., Lectures = 8, Practicals=16]

Data Structure, Modality and Sources: Data Structure – Structured, Semi-Structured and Unstructured data with examples such as tables, JSON, XML, text, images and social media posts. Data Modality – Text, Image, Audio, Video, Time-Series and Graph data. Data Sources – Human-generated data, Machine-generated data and Synthetic data.

Unit III [Weightage = 25% approx., Lectures = 7, Practicals=14]

Data Labeling, Usage and Lifecycle: Concept of data labeling – Labeled, Unlabeled and Semi/Self-Supervised data. Data usage – Training data, Validation data, Testing data and Inference data. Data lifecycle in organizations – Data collection, storage, processing, analysis and data usage for decision making.

Unit IV [Weightage = 25% approx., Lectures = 8, Practicals=16]

Data Quality, Bias and Responsible Data Use: Data quality dimensions – Clean, Noisy, Incomplete and Imbalanced data. Meaning and types of data bias such as sampling bias and human bias, and their impact on AI and business decisions. Responsible data usage – Ethical use of data, privacy and confidentiality.

Text Book:

Data Literacy: A User's Guide – David Herzog, 1st Edition, O'Reilly Media.

Reference Books:

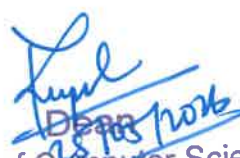
- Storytelling with Data – Cole Nussbaumer Knafllic, 1st Edition, Wiley.
- Database System Concepts – Abraham Silberschatz, Henry F. Korth & S. Sudarshan, 7th Edition, McGraw-Hill Education.
- The Data Warehouse Toolkit – Ralph Kimball & Margy Ross, 3rd Edition, Wiley.
- Big Data – Viktor Mayer-Schönberger & Kenneth Cukier, 1st Edition, Houghton Mifflin Harcourt.

Reference Links:

- <https://www.qlik.com/us/data-literacy>
- <https://www.ibm.com/topics/data-lifecycle>
- <https://www.geeksforgeeks.org/types-of-data-structured-semi-structured-unstructured/>
- <https://www.ibm.com/topics/data-labeling>
- <https://www.ibm.com/topics/data-quality>

Practical List:

- Identification and classification of qualitative and quantitative data using a simple dataset in spreadsheets.
- Creation of a small dataset in spreadsheets and identification of variables and records.
- Collection of primary data using Google Forms and exporting the responses as a CSV file.
- Importing a CSV file into spreadsheets and Google Sheets for data viewing.
- Identification of structured data using tables created in spreadsheets and Google Sheets.
- Understanding the data life cycle using data collected through Google Forms.
- Preparation of basic metadata for a dataset created in spreadsheets.
- Identification of primary and secondary data using simple CSV datasets.
- Manual data labeling of a small dataset using spreadsheets or Google Sheets.
- Detection of missing values and duplicate records in spreadsheets.
- Cleaning a dataset by correcting errors and removing duplicates using spreadsheets or Google Sheets.
- Preparation of a basic data summary using simple spreadsheet functions (COUNT, SUM, AVERAGE).
- Creation of bar charts and pie charts using spreadsheets or Google Sheets.
- Interpretation of charts generated from spreadsheet data.
- Comparison of two small CSV datasets based on size, source, and structure.
- Identification of clean and incomplete data using spreadsheet tools.
- Demonstration of data imbalance using frequency counts in spreadsheets.
- Identification of simple data bias using sample survey data from Google Forms.
- Exporting data from spreadsheets or Google Sheets into CSV format.
- Preparation of a short report based on spreadsheet analysis and charts.


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BCA-AIML Semester-I (First Year)

Subject Title : Data Fundamentals for AI Data Analytics
Subject Code : CAM212-1C
Subject Type : Major

Course Outcomes (COs)

- **CO1:** Understand concepts of data, information, data literacy, and data lifecycle in real-world contexts.
- **CO2:** Identify and classify types, structures, modalities, and sources of data in computing and analytics environments.
- **CO3:** Explain data labeling techniques, data usage, and lifecycle processes in organizational decision-making.
- **CO4:** Apply techniques to detect and handle data quality issues such as missing, noisy, and imbalanced data using basic tools.
- **CO5:** Analyze data bias, ethical concerns, and responsible data usage in AI and business applications.
- **CO6:** Demonstrate practical skills in data handling, visualization, and reporting using spreadsheets and basic analytical tools.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand concepts of data, information, data literacy, and data lifecycle in real-world contexts.	PO1,PO5,PSO1, PSO2	U	C	5	10
CO2	Identify and classify types, structures, modalities, and sources of data in computing and analytics environments.	PO1, PO2, PO3,PSO1, PSO2	U	C	5	10
CO3	Explain data labeling techniques, data usage, and lifecycle processes in organizational decision-making.	PO1, PO2, PO3,PSO1, PSO2	U	C	5	10
CO4	Apply techniques to detect and handle data quality issues such as missing, noisy, and imbalanced data using basic tools.	PO2, PO3, PO5, PO7,PSO1, PSO2, PSO3	Ap	P	5	10
CO5	Analyze data bias, ethical concerns, and responsible data usage in AI and business applications.	PO5, PO8, PO9 ,PSO2, PSO3	An	A	5	10
CO6	Demonstrate practical skills in data handling, visualization, and reporting using spreadsheets and basic analytical tools.	PO2,PO3, PO6, PO7, PO10,PSO1, PSO2, PSO3	Ap	P	5	10
Total hour of Instruction					30	60

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Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	0	0	0	2	0	0	0	0	0	3	3	0
CO2	3	2	2	0	0	0	0	0	0	0	3	3	0
CO3	3	2	2	0	0	0	0	0	0	0	3	3	0
CO4	0	2	2	0	2	0	2	0	0	0	3	3	3
CO5	0	0	0	0	2	0	0	2	3	0	0	3	3
CO6	0	2	2	0	0	3	2	0	0	3	3	3	3

3: High, 2: Medium, 1: Low
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BCA-AIML Semester-I (First Year)

Subject Title : Web Applications Technologies

Subject Code : CAE204-1C

Subject Type : Minor

Rationale:

This course introduces students to the fundamentals of Internet technologies and web development. It aims to develop basic skills in designing and styling web pages using HTML, CSS and JavaScript forming a foundation for advanced web technologies.

Learning Outcomes:

After completing this course, students will be able to:

- Remember & Understand basic concepts of Internet, WWW, web browsers, servers, and URLs.
- Apply HTML tags to create structured web pages with text, lists, tables, forms, and Multimedia.
- Apply CSS and CSS3 to style web pages using colors, fonts, layouts, and backgrounds.
- Analyze webpage layouts using CSS box model, positioning, and visibility properties.
- Create simple, visually appealing, and responsive web pages using HTML, CSS and JavaScript.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

[Weightage=25% approx., Lectures=7, Practicals= 14]

Introduction to Web Design, Types of Websites (Static and Dynamic Websites), Basic Structure of a Web Page, Introduction to Web Page Layout (Header, Footer, Navigation, Content), Principles of Good Web Design (Simple design, readability, user-friendly interface), Introduction to Responsive Design (concept only), Basic idea of Client Side and Server Side, Overview of Web Development Tools (Text Editor, Browser, Simple Developer Tools).

Unit II

[Weightage=25% approx., Lectures=7, Practicals= 14]

HTML: Introduction to HTML, HTML Documents Structure tags, text formatting tags (Block Formatting, Character Formatting), Font Tag, Marquee Tag, Anchor Tag for linking the webpages, List Tag, Image, Audio and Video Tag, BG SOUND Tag., Div Tag HTML Tables – Operations, Spanning on rows and columns, HTML Forms: input, text area, selection list, fields.

Unit III

[Weightage=25% approx., Lectures=8, Practicals= 16]

Introduction to Cascading Style Sheet (CSS): Overview, Need of CSS, CSS Syntax, CSS Inclusion, CSS Measurement units, CSS Colors, CSS Background, CSS Font and Text, CSS – working with images, CSS Links, CSS Tables and Borders, CSS Margins, CSS List, CSS Padding, CSS Scrollbar, ID and Class Selector, Inline, Internal and External stylesheet.

Unit IV

[Weightage=25% approx., Lectures=8, Practicals= 16]

Introduction to Java Script: Introduction to JavaScript, purpose of JavaScript in web pages, difference between HTML, CSS and JavaScript, basic JavaScript syntax, variables and simple data types, inclusion of JavaScript in HTML – inline , internal and external script, display of output – alert() and document.write(), basic conditional statement – if, introduction to events – onclick, introduction to Document Object Model (DOM), access of HTML elements – getElementById(), UDF- Dynamic changes of text content.

Text Books:

- Introduction to Internet and HTML Scripting by Bhaumik Shroff, Books India Pvt. Ltd.
- JavaScript and JQuery: Interactive Front-End Web Development by Jon Duckett, Wiley India.

Reference Book:

Web Technology and design – C Xavier, New Age International publication.

Reference Links:

- www.w3schools.com
- www.tutorialspoint.com

Practical List:

- Programs demonstrating the structure of HTML.
- Programs with the use of different basic tags and formatting tags.
- Programs based on link, list tag, images, audio-video tag and marquee tag.
- Programs based on the table using TD, TR, TH, colspan and rowspan.
- Programs based on creating the inline frame, frame set, horizontal and vertical frameset.
- Programs based on HTML forms.
- Create a webpage demonstrating CSS syntax with inline, internal, and external styles, and apply colors, fonts, and text formatting.
- Design a webpage using CSS backgrounds, images, and link styles with pseudo-classes like :hover and :active.
- Build a webpage to demonstrate the CSS box model, including margin, padding, border, and style lists and tables.
- Create a webpage using CSS positioning, visibility, layers, and multi-column layouts for structured design.
- Design a webpage showcasing CSS3 features like rounded corners, gradients, shadows, 2D/3D transforms, text effects, and media queries.
- Create a simple HTML page with JavaScript code to display a welcome message using alert().
- Design a webpage to display text on the browser window using document.write().
- Create a webpage to demonstrate declaration of variables and display their values.
- Design a webpage to demonstrate a basic conditional statement using if.
- Create a webpage to perform a simple action on button click using the onclick event.
- Design a webpage to change text content of an HTML element using getElementById().
- Create a webpage that changes text content dynamically using a user-defined JavaScript function.

BCA-AIML Semester-I (First Year)

Subject Title : Web Applications Technologies

Subject Code : CAE204-1C

Subject Type : Minor

Course Outcomes (COs)

- **CO1:** Understand Internet concepts and web technologies.
- **CO2:** Apply HTML to design structured web pages.
- **CO3:** Apply CSS/CSS3 for styling and layout design.
- **CO4:** Analyze webpage layouts using CSS properties.
- **CO5:** Develop interactive web pages using JavaScript and DOM.
- **CO6:** Design responsive and user-friendly web applications with basic security awareness.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand Internet concepts and web technologies.	PO1, PO2, PO5, PSO2	U	C	5	10
CO2	Apply HTML to design structured web pages.	PO2, PO3, PO4, PSO2	Ap	P	5	10
CO3	Apply CSS/CSS3 for styling and layout design.	PO2, PO3, PO4, PO7, PSO2	Ap	P	5	10
CO4	Analyze webpage layouts using CSS properties.	PO2, PO3, PO5, PSO1, PSO2, PSO3	An	P	5	10
CO5	Develop interactive web pages using JavaScript and DOM.	PO2, PO3, PO7, PO9, PSO1, PSO2, PSO3	Ap	P	5	10
CO6	Design responsive and user-friendly web applications with basic security awareness.	PO1, PO2, PO6, PO7, PO8, PO10, PSO1, PSO2, PSO3	An	P	5	10
Total hour of Instruction					30	60

Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	0	0	1	0	0	0	0	0	2	0	0
CO2	0	2	3	2	0	0	0	0	0	0	2	0	2
CO3	0	2	3	2	0	0	2	0	0	0	2	0	2
CO4	0	2	3	0	1	0	0	0	0	0	0	3	0
CO5	0	2	3	0	0	0	2	0	2	0	2	3	2
CO6	3	2	0	0	0	2	2	2	0	2	2	3	2

3: High, 2: Medium, 1: Low

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BCA-AIML Semester-I (First Year)

Subject Title : Mathematics for Computer Science

Subject Code : MDC201-1C

Subject Type : MDC

Rationale:

To enhance logic by using basic concepts of mathematics such as Set-Theory, Matrix Operation. Graph, Functions.

Learning Outcomes:

The student will be able to:

- Develop analytical and problem solving skills.
- Compare the relevance between the introduced terminology and abstract ideas.
- Understand the practical applications of mathematics in solving problems of commerce, management, engineering & economics.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

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

Set Theory: Introduction, Definition and Concepts, Representation of Sets, Different types of Sets (Null Set, Singleton set, Finite set, Infinite set, Power set, Subset, Universal set, Equal set), Set Operations using Venn diagram and examples : Union, Intersection, Difference, Symmetric Difference, Complement of Set, Laws of algebra of Set (Distributive, De Morgan's), Cartesian Product of Set, Cardinality of Set.

Unit II

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

Matrices: Introduction, Types of Matrices (Null matrix, Equal matrix, Row matrix, Column matrix, Square matrix, Transpose of matrix, Diagonal matrix, Scalar matrix, Unit matrix, Symmetric matrix, Skew Symmetric matrix, Orthogonal matrix), Operations on Matrices (Addition, Subtraction, Scalar, Multiplication), Computations of: Determinant, Adjoint and Inverse of a Matrix.

Solution of System of Linear Equations: Cramer's Rule, Gauss Elimination Method (2x2), Matrix Inverse Method.

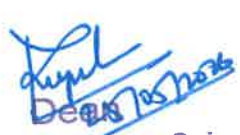
Unit III

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

Graph: Introduction to Graphs (Nodes, vertices, edges), Types of Graphs (Null Graph, Trivial Graph, Directed Graph, Non - Directed Graph, connected Graph, Disconnected Graph, Regular Graph, complete Graph, cycle Graph, cyclic Graph, acyclic Graph, Finite Graph, Infinite Graph, bipartite Graph, planar Graph, simple Graph, Multi Graph, Pseudo Graph, Euler Graph, Hamiltonian Graph)

Representation of Graphs: Adjacency Matrix, Incidence Matrix, Adjacency List

Graph Traversals: BFS- Breadth – first –search, DFS- Depth – first –search


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Template of a graph using one Application: The vertex coloring algorithm to find a proper coloring of the map with four colors using basic examples.

Application of Graph: Different types application in computer science (Social Networks, Web Graphs, Biological Networks) and Djakarta's algorithm for shortest path with basic example.

Unit IV

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

Functions: Relation, No. of relations, Domain of a relation, Range of a relation, Co-Domain of a relation, Relation on a set, Inverse of a relation, Function, Domain, Co-domain, Range, Types of Functions (One-one Function (Injective Function, Many-one Function, Onto Function (Surjective Function), Into Function etc.)

Algebra of real functions: Addition of two real functions, Subtraction of a real function from another and Multiplication by a Scalar.

Text Books:

- Advanced Mathematics, Authors(s): Heena Timani, Publication: Books India.
- Business Mathematics: Author(s): Prof. H. R. Vyas, Dr. C. J. Trivedi, Prof. A. B. Savjani, Publication: B. S. Shah Prakashan.

Reference Books:

- Discrete Mathematical Structure [3rd Ed.]: Author(s): Bernard Kolman, Robert C. Busby, Sharon Roass, Publication: Prentice Hall of India.
- The Essence Of Mathematics For Business Author(s): H. A. Spooner, D. A .L. Wilson, Publication: Prentice Hall of India.
- Business Mathematics, Author(s): J.K Singh, Publication: Himalaya Publications.
- Financial Mathematics, Author(s): A. Lenin Jothi, Publication: Himalaya Publications.

Reference Links:

- <https://www.geeksforgeeks.org/>
- <https://www.mathsisfun.com//>


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BCA-AIML Semester-I (First Year)

Subject Title : Mathematics for Computer Science

Subject Code : MDC201-1C

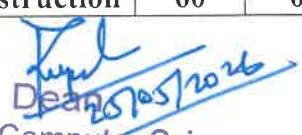
Subject Type : MDC

Course Outcomes (COs)

- **CO1:** Explain Understand and explain the fundamental concepts of Set Theory, types of sets, and set operations using Venn diagrams and algebraic laws.
- **CO2:** Apply matrix operations and solve systems of linear equations using Cramer's Rule, Gauss Elimination, and Matrix Inverse method.
- **CO3:** Analyze and interpret graph theory concepts, represent graphs using matrices and lists, and perform graph traversal techniques like BFS and DFS.
- **CO4:** Use the concept of vertex coloring and shortest path algorithms like Dijkstra's algorithm to solve real-world problems in computer science.
- **CO5:** Describe and classify different types of relations and functions, including domain, range, co-domain, and identify function types like one-one, onto, into, etc.
- **CO6:** Perform algebraic operations on real functions and demonstrate understanding of relation and function properties with practical examples.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand and explain the fundamental concepts of Set Theory, types of sets, and set operations using Venn diagrams and algebraic laws.	PO1, PO2, PO5, PSO1, PSO3	U	F, C	10	0
CO2	Apply matrix operations and solve systems of linear equations using Cramer's Rule, Gauss Elimination, and Matrix Inverse method.	PO2, PO3, PO7, PSO1, PSO2, PSO3	Ap	C, P	15	0
CO3	Analyze and interpret graph theory concepts, represent graphs using matrices and lists, and perform graph traversal techniques like BFS and DFS.	PO1, PO3, PO5, PSO1, PSO2, PSO3	Ap	C, P	10	0
CO4	Use the concept of vertex coloring and shortest path algorithms like Dijkstra's algorithm to solve real-world problems in computer science.	PO2, PO3, PO9, PSO1, PSO2, PSO3	Ap	P, M	5	0
CO5	Describe and classify different types of relations and functions, including domain, range, co-domain, and identify function types like one-one, onto, into, etc.	PO1, PO4, PO5, PSO1, PSO3	U	F, C	10	0
CO6	Perform algebraic operations on real functions and demonstrate understanding of relation and function properties with practical examples.	PO2, PO3, PO7, PSO1, PSO2, PSO3	Ap	C, P	10	0
Total Hours of Instruction					60	00


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Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	0	0	3	0	0	0	0	0	3	0	0
CO2	0	3	3	0	0	0	2	0	0	0	3	3	0
CO3	3	0	3	0	3	0	0	0	0	0	3	3	3
CO4	0	3	3	0	0	0	0	0	1	0	3	3	3
CO5	3	0	0	2	3	0	0	0	0	0	3	0	3
CO6	0	3	3	0	0	0	2	0	0	0	3	3	3

3: High, 2: Medium, 1: Low


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BCA-AIML Semester-I (First Year)

Subject Title : Communication Skills
Subject Code : AEC202-1C
Subject Type : AEC

Rationale:

The course has been designed in order to focus the conceptual clarity into the process of communication as well usage-oriented learning of those concepts.

Learning Outcomes:

The student will be able to learn:

- Basic concepts of the communication process.
- Elements enhancing effective communication.
- Various skills involved during communication.
- Oral and written communication in practice.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

[Weightage=30% approx., Lectures=07]

Fundamentals of Communication : Meaning of communication, Process of Communication, 7 C's of Communication, Barriers to Effective Communication: interpersonal, intrapersonal and organizational barriers, Listening: difference between hearing and listening, importance of listening in communication, reasons for poor listening, active VS passive listening, types and barriers to listening.

Unit II

[Weightage=30% approx., Lectures=11]

Types of Communication: Verbal Communication–Oral and written communication, its advantages and disadvantages, Forms of Non-verbal Communication: Kinesics, Proxemics, Chronemics and paralanguage.

Speaking skills: Telephonic Skills, Do's and Don'ts of Telephonic skills, etiquettes.

Conversations: purposes of general conversation, features of a good conversation, tips for improvement, 3 samples and points to observe.

Reading comprehension: Purpose, reasons for poor comprehension, ways to improve them, techniques for good comprehension.

Unit III

[Weightage=40% approx., Lectures=12]

Professional Communication in Practice

Presentation skills: Defining Purpose, analyzing audience and locale, organizing content, preparing outline, visual aids, mode of delivery, body language.

Group discussion: organizational (three techniques) as a part of selection process (Characteristics,

evaluation components, tips).

Email writing: reasons for popularity, common pitfalls, guiding principles, common etiquettes.

Meetings: purpose, preparation, notices, agenda and minutes.

Reference Books:

- Business Communication by: Meenakshi Raman & Sangeeta Sharma, Oxford University Press Publication.
- Effective Technical Communication by: M Ashraf Rizvi, MC Graw Hill Publication.
- Communicative English by: Prakash Khuman, Bhupesh Gupta (Books India Publications).
- Communication Skills by: Sanjay Kumar and Pushpa Lata, Oxford University Press Publication.


Dean 25/05/2026

Faculty of Computer Science
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BCA-AIML Semester-I (First Year)

Subject Title : Communication Skills

Subject Code : AEC202-1C

Subject Type : AEC

Course Outcomes (COs)

- CO1: Discuss the major aspects of the process of communication, its importance and types of effective listening.
- CO2: Describe the input skills (Listening & Reading) in terms of their importance, types and improvement strategies.
- CO3: Distinguish between various forms of verbal and non-verbal communication, and implement their principles in diverse social and professional context.
- CO4: Paraphrase the major aspects of professional communication.

Course Outcome Mapping Table

COs	Course Outcome (CO)	POs/PSOs	Cognitive Level CL	Knowledge Category KC	Class Sessions
CO1	Discuss the major aspects of the process of communication, its importance and types of effective listening.	PO5, PO6, PSO3	U	C	5
CO2	Describe the input skills (Listening & Reading) in terms of their importance, types and improvement strategies.	PO6, PO7, PSO3	U, Ap	C, P	5
CO3	Distinguish between various forms of verbal and non-verbal communication, and implement their principles in diverse social and professional context.	PO5, PO6, PO7, PSO3	U, Ap, An	C, P	8
CO4	Paraphrase the major aspects of professional communication.	PO5, PO6, PO7, PSO3	U, Ap, C	C, P	12

Mapping of COs with POs & PSO

Course AEC202-1C	POs										PSOs		
	1	2	3	4	5	6	7	8	9	10	1	2	3
CO1	-	-	-	-	3	3	-	-	-	-	-	-	3
CO2	-	-	-	-	-	3	3	-	-	-	-	-	3
CO3	-	-	-	-	3	3	3	-	-	-	-	-	3
CO4	-	-	-	-	3	3	3	-	-	-	-	-	3

3: High, 2: Medium, 1: Low


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BCA-AIML Semester-I (First Year)

Subject Title : Project Work – I

Subject Code : SEC201-1C

Subject Type : SEC

Rationale:

The core objective of the subject is to provide Project and Practical based deep learning, concept understanding, its analysis, deriving inferences and documenting it towards productive outcome of the subject Programming Fundamentals, Data Fundamentals for AI Data Analytics, Web Applications Technologies that is an integral part of the BCA-AIML curriculum.

Learning Outcomes:

In reference to the subject Programming Fundamentals, Data Fundamentals for AI Data Analytics, Web Applications Technologies the student will be able to:

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

Teaching and Evaluation Scheme:

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

Course Content:

Project Work – I

[Weightage=100%, Practicals=60]

Project Work – I based on the areas pertaining to Programming Fundamentals, Data Fundamentals for AI Data Analytics, Web Applications Technologies shall be executed based on choice based domain and Project titles will be selected in groups with specific count of members. The entire project work will be studied, analysed, implemented inference learning will be derived and documented as well as presented in the three phases given below.


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Phase I: Preliminary Learning

- 1.1 Group Details
- 1.2 Project Title
- 1.3 Project Domain
- 1.4 Project Definition

Phase II: Core Learning

- 2.1 Project Overview
- 2.2 Detail Explanation
- 2.3 Advantages
- 2.4 Challenges

Phase III: Inference Learning

- 3.1 Real Life Applications
- 3.2 Conclusion
- 3.3 Future Enhancement
- 3.4 References

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


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BCA-AIML Semester-I (First Year)

Subject Title : Project Work – I

Subject Code : SEC201-1C

Subject Type : SEC

Course Outcomes (COs)

- **CO1:** Identify and define problem statement, project domain, and objectives.
- **CO2:** Analyze fundamental concepts and technologies of selected domain.
- **CO3:** Design and develop project solution using appropriate tools and techniques.
- **CO4:** Evaluate project results, challenges and derive inferences.
- **CO5:** Demonstrate teamwork, documentation and communication skills.
- **CO6:** Propose real-life applications, future enhancements and ethical aspects.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Identify and define problem statement, project domain, and objectives	PO1, PO2, PO3, PO4, PO5, PO8, PO9, PSO1, PSO2, PSO3	U, A	C	0	8
CO2	Analyze fundamental concepts and technologies of selected domain	PO1, PO2, PO3, PO9, PSO1, PSO2, PSO3	A	C	0	10
CO3	Design and develop project solution using appropriate tools and techniques	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO10, PSO1, PSO2, PSO3	Ap, C	P	0	16
CO4	Evaluate project results, challenges and derive inferences	PO2, PO5, PO9, PO10, PSO1, PSO2, PSO3	E	A	0	10
CO5	Demonstrate teamwork, documentation and communication skills	PO6, PO7, PO10, PSO1, PSO2, PSO3	Ap	P	0	8
CO6	Propose real-life applications, future enhancements and ethical aspects	PO5, PO8, PO9, PSO1, PSO2, PSO3	C, E	M	0	8
Total Hours of Instruction					00	60

Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	0	0	1	3	0	3	3	3
CO2	3	3	3	0	0	0	0	0	3	0	3	3	3
CO3	3	3	3	1	3	0	2	0	3	3	3	3	3
CO4	0	3	0	0	3	0	0	0	3	3	3	3	3
CO5	0	0	0	0	0	1	2	0	0	3	3	3	3
CO6	0	0	0	0	3	0	0	2	3	0	3	3	3

3: High, 2: Medium, 1: Low

BCA-AIML Semester-I (First Year)

Subject Title : Introduction to IKS

Subject Code : IKS201-1C

Subject Type : IKS

Rationale:

To identify concepts of Indian knowledge systems have a strong foundation in Indian culture, philosophy, and spirituality and have evolved through thousands of years. These knowledge systems including Ayurveda, Yoga, Vedanta and Vedic sciences are still applicable in the modern world in several ways.

Learning Outcomes:

The student will be able to learn:

- Historicity of Indian Knowledge System.
- About four Vedas.
- Broad classification of Indian philosophical systems.
- About the Indian Education System.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

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

Indian Knowledge System: An Overview, the Vedic Corpus Importance of Ancient Knowledge Definition, The IKS Corpus – A Classification Framework, Historicity of IKS, Some Unique Aspects of IKS, Introduction to Vedas, The Four Vedas, The Four Divisions of Each Veda, Vedic Life: Distinctive Features.

Unit II

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

Indian Education System: Preservation of culture, tradition and Dharma through education. Svadhyaya, Pravachana. Continuity of the family and the Vamsha, who are the carriers of Knowledge, Tradition and Dharma.

Reference Book:

Introduction to Indian Knowledge System Concepts and Applications B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana, PHI Learning Private Limited, New Delhi.


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BCA-AIML Semester-I (First Year)

Subject Title : Introduction to IKS

Subject Code : IKS201-1C

Subject Type : IKS

Course Outcomes (COs)

- **CO1:** Understand the meaning, origin, and importance of the Indian Knowledge System (IKS).
- **CO2:** Identify and explain the structure and significance of the four Vedas and their divisions.
- **CO3:** Analyze the historical context and classification of IKS and its unique features.
- **CO4:** Explore the core components and philosophical ideas of the Indian Knowledge Corpus.
- **CO5:** Understand the traditional Indian Education System and its role in preserving culture, tradition, and Dharma.
- **CO6:** Explain the concepts of Svadhyaya, Pravachana, and the role of family (Vamsha) in transmitting knowledge across generations.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand the meaning, origin, and importance of the Indian Knowledge System (IKS).	PO1, PO5, PO8, PSO3	U	F,C	5	0
CO2	Identify and explain the structure and significance of the four Vedas and their divisions.	PO1, PO4, PO8, PSO3	R,U	F,C	5	0
CO3	Analyze the historical context and classification of IKS and its unique features.	PO5, PO8, PSO3	AN	C,P	5	0
CO4	Explore the core components and philosophical ideas of the Indian Knowledge Corpus.	PO1, PO3, PO5, PO8, PSO3	AN, AP	C,P	5	0
CO5	Understand the traditional Indian Education System and its role in preserving culture, tradition, and Dharma.	PO1, PO6, PO7, PO8, PSO3	U	C	5	0
CO6	Explain the concepts of Svadhyaya, Pravachana, and the role of family (Vamsha) in transmitting knowledge across generations.	PO1, PO6, PO8, PSO3	U	C, F	5	0
Total Hours of Instruction					30	00


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Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	0	0	0	2	0	0	3	0	0	0	0	3
CO2	3	0	0	1	0	0	0	3	0	0	0	0	3
CO3	0	0	0	0	2	0	0	3	0	0	0	0	3
CO4	3	0	1	0	2	0	0	3	0	0	0	0	3
CO5	3	0	0	0	0	2	1	3	0	0	0	0	3
CO6	3	0	0	0	0	2	0	3	0	0	0	0	3

3: High, 2: Medium, 1: Low


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BCA-AIML Semester-I (First Year)

Subject Title : Indian Astronomy-I
Subject Code : IKS202-1C
Subject Type : IKS

Learning Outcomes:

- Understanding the universe explained in the Upanishads by ancient scholars like Aryabhata and Brahmagupta.
- Be acquainted with the Indian knowledge system that weaves together threads of ancient wisdom and scientific discovery.
- Inspirational drive to know and understand through the treasure trove of Indian knowledge systems, where science and spirituality converge to illuminate the path to enlightenment with potential applications in our daily lives.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

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

Historical Introduction & Celestial Sphere : Introduction, Ancient Indian Astronomy, The Vedic Period and Vedāṅgajyotiṣa, Siddhanta, Aryabhaṭa I (476 AD), Astronomers after Aryabhata, Contents of the Siddhantas, Continuity in Astronomical Tradition, Diurnal Motion of Celestial Bodies, Motion of Celestial Bodies Relative to Stars, Celestial Horizon, Meridian, Pole Star and Directions, Zodiac and Constellations, Equator and Poles (Viśuvadvṛtta and Dhruva), Latitude of a Place and Altitude of Pole Star, Ecliptic and the Equinoxes.

Unit II

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

Co-ordinate Systems & Rāsi and Nakṣatra Systems: Introduction, Celestial Longitude and Latitude (Ecliptic System), Right Ascension and Declination (Equatorial System), Azimuth and Altitude (Horizontal System), Hour Angle and Declination (Meridian System), Phenomenon of Precession of Equinoxes, Ancient Indian References to the Precession, Effects of Precession on Celestial Longitude, Tropical (Sayana) and Sidereal (Nirayana) Longitudes, Zodiac and Rāsis, Nakṣatra System.

Text Book:

Indian Astronomy- An introduction by S. Balachandra Rao, Orient Longman Ltd (2000).

Reference Books:

- The Aryabhati of Aryabhata an Ancient Indian Work on Mathematics and Astronomy, Walter Eugene Clark.
- Indian Astronomy - A Source Book (Based Primarily On Sanskrit Texts), Compiled By B. V. Subbarayappa & K. V. Sharma, Nehru Center, Bombay.

BCA-AIML Semester-I (First Year)

Subject Title : Indian Astronomy-I
Subject Code : IKS202-1C
Subject Type : IKS

Course Outcomes (COs)

- **CO1:** Describe the contributions of ancient Indian astronomers and identify key concepts from Vedic and Siddhanta traditions in the development of astronomy.
- **CO2:** Explain the apparent motion of celestial bodies and determine astronomical directions and positions using concepts like celestial horizon, meridian, and equinoxes.
- **CO3:** Compare different celestial coordinate systems and analyze the impact of precession on celestial measurements and traditional systems like Rāsi and Nakṣatra.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Describe the contributions of ancient Indian astronomers and identify key concepts from Vedic and Siddhanta traditions in the development of astronomy.	PO1, PO2, PO4, PO5, PO8, PSO1	U	C	11	0
CO2	Explain the apparent motion of celestial bodies and determine astronomical directions and positions using concepts like celestial horizon, meridian, and equinoxes.	PO1, PO2, PO3, PO5, PO6, PSO1, PSO2	U	C	9	0
CO3	Compare different celestial coordinate systems and analyze the impact of precession on celestial measurements and traditional systems like Rāsi and Nakṣatra.	PO1, PO2, PO3, PO6, PSO1, PSO2	An	C	10	0
Total Hours of Instruction					30	00

Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	0	2	3	0	0	2	0	0	3	0	3
CO2	3	3	3	0	3	3	0	0	0	0	3	3	3
CO3	3	3	3	0	0	3	0	0	0	0	3	3	3

3: High, 2: Medium, 1: Low


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BCA-AIML Semester-I (First Year)

Subject Title : Indian Ethos for Professional Excellence
Subject Code : IKS208-1C
Subject Type : IKS

Rationale:

The course introduces students to the Indian value system and ethical foundations rooted in Indian Knowledge Systems (IKS), which guide professional behavior. It integrates traditional Indian wisdom, philosophy, and value traditions to develop discipline, integrity, responsibility, and ethical decision-making in professional environments.

Learning Outcomes:

The Students will be able to learn:

- Understand Indian ethos and its connection with Indian Knowledge Systems (IKS).
- Develop ethical and responsible professional behavior based on Indian wisdom.
- Apply value-based decision-making in workplace situations.
- Build discipline, integrity, and teamwork attitude inspired by Indian philosophical traditions.

Teaching and Evaluation Scheme:

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

Course Content:

Unit I

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

Foundations of Indian Ethos & Indian Knowledge System (IKS): Introduction to Indian Ethos and its relationship with Indian Knowledge System (IKS), Meaning and scope of Indian Knowledge System in value education, Core principles of Indian tradition: Dharma, Karma, Rta, Satya, Value-based living in Indian philosophical traditions, Ethical foundations derived from Indian wisdom literature, Work ethics and professional responsibility in Indian knowledge traditions, Self-discipline, character building, and holistic personality development in IKS context

Unit II

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

Indian Ethos in Professional & Modern Context: Application of Indian value systems in modern professional life, Ethical practices in IT, business, and organizational environment, Leadership, teamwork, and cooperation through Indian ethical perspective, Decision making using value-based and ethical frameworks, Case studies inspired by Indian Knowledge System principles, Professional excellence through integration of Indian ethos in workplace behavior

Text Book:

Indian Ethos and Values in Management, B. P. Banerjee, S. Chand Publishing.

Reference Books:

- Indian Ethos in Management, A. C. Fernando, Pearson Education.
- Ethics in Management, S. K. Chakraborty, Oxford University Press.


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- Introduction to Indian Knowledge System: Concepts and Applications, B. Mahadevan et al., PHI Learning.

Reference Links:

- <https://www.education.gov.in>
- <https://iksindia.org>
- <https://ugc.gov.in>
- <https://nptel.ac.in>


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Kadi Sarva Vishwavidyalaya
Gandhinagar

BCA-AIML Semester-I (First Year)

Subject Title : Indian Ethos for Professional Excellence
Subject Code : IKS208-1C
Subject Type : IKS

Course Outcomes (COs)

- **CO1:** Understand Indian Ethos and IKS concepts.
- **CO2:** Explain Indian values and ethical principle
- **CO3:** Apply ethical principles in professional behavior.
- **CO4:** Analyze situations using ethical frameworks.
- **CO5:** Develop teamwork, leadership, and integrity based on Indian ethos.

Course Outcome Mapping Table

CO No.	Course Outcome (CO)	PO(s) / PSO(s)	CL Cognitive Level	KC Knowledge Category	Class Sessions	Practical Sessions
CO1	Understand Indian Ethos and IKS concepts.	PO1, PO5, PO8, PSO2, PSO3	U	C	6	0
CO2	Explain Indian values and ethical principles.	PO5, PO8, PSO2, PSO3	U	C	6	0
CO3	Apply ethical principles in professional behavior.	PO2, PO6, PO8, PSO2, PSO3	Ap	P	6	0
CO4	Analyze situations using ethical frameworks.	PO2, PO5, PO8, PO9, PSO2, PSO3	An	A	6	0
CO5	Develop teamwork, leadership, and integrity based on Indian ethos.	PO6, PO7, PO8, PO10, PSO2, PSO3	C	M	6	0
Total Hours of Instruction					30	00

Mapping of COs with POs and PSO

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	0	0	0	3	0	0	3	0	0	0	3	3
CO2	0	0	0	0	3	0	0	3	0	0	0	3	3
CO3	0	2	0	0	0	2	0	3	0	0	0	3	3
CO4	0	2	0	0	3	0	0	3	2	0	0	3	3
CO5	0	0	0	0	0	2	2	3	0	2	0	3	3

3: High, 2: Medium, 1: Low


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