NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Computer Applications

First Year

(Effective from the Session: 2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Bachelor of Computer Applications
Evaluation Scheme
SEMESTER-I

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	CBCA0103	Introduction to Matrices and Calculus	Mandatory	3	0	0	30	20	50		100		150	3
2	CBCA0104	Design Thinking I	Mandatory	3	0	0	30	20	50		100		150	3
3	CBCA0101	Basics of Data Analytics using Spreadsheet	Mandatory	3	0	0	30	20	50		100		150	3
4	CBCA0102	C Programming	Mandatory	3	0	0	30	20	50		100		150	3
5	CBCA0106	Environmental Science and Sustainability	Mandatory	2	0	0	30	20	50		50		100	2
6	CBCA0105	Essence of Indian Tradition Knowledge	Mandatory	2	0	0	30	20	50				50	1
7	CBCA0155	Workplace Communication Lab 1	Mandatory	0	0	4				50		50	100	2
8	CBCA0151	Basics of Data Analytics using Spreadsheet Lab	Mandatory	0	0	2				50		50	100	1
9	CBCA0152	C Programming Lab	Mandatory	0	0	4				50		50	100	2
10	CBCA0159	Yoga	Mandatory	0	0	2				50			50	-
		*Massive Open Online Courses	*MOOCs											
		TOTAL							**300**	**150**	**450**	**150**	**1050**	**20**

*** List of MOOCs (Infosys Springboard) Based Recommended Courses for First Year (Semester-I)BCA**

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	CMC0021	C Programming Course	Infosys Wingspan (Infosys Springboard)	8h 49m	
2	CMC0019	Design Thinking	Infosys Wingspan (Infosys Springboard)	3h 31m	

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.,
CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
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Bachelor of Computer Applications
Evaluation Scheme
SEMESTER-II

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	CBCA0201	Data Structures	Mandatory	3	0	0	30	20	50		100		150	3
2	CBCA0204	Digital logic & Design	Mandatory	3	0	0	30	20	50		100		150	3
3	CBCA0202	Business Intelligence & Analytics	Mandatory	3	0	0	30	20	50		100		150	3
4	CBCA0203	Statistics for Computer Applications	Mandatory	3	0	0	30	20	50		100		150	3
5	CBCA0205	Constitution of India	Mandatory	1	0	0	30	20	50				50	1
6	CBCA0256	Problem Solving using python Lab	Mandatory	0	0	6				50		100	150	3
7	CBCA0251	Data Structures Lab	Mandatory	0	0	2				50		50	100	1
8	CBCA0255	Workplace Communication Lab 2	Mandatory	0	0	4				50		50	100	2
9	CBCA0252	Business Intelligence & Analytics Lab	Mandatory	0	0	2				50		50	100	1
10	CBCA0257	Field Activities for Community Engagement	Mandatory	0	0	2				50			50	-
		*Massive Open Online Courses	*MOOCs											
		TOTAL							**250**	**200**	**400**	**250**	**1100**	**20**

*** List of MOOCs (Infosys Springboard) Based Recommended Courses for First Year (Semester-II)BCA**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	CMC0022	Power BI: Software for Data Visualization	Infosys Wingspan (Infosys Springboard)	3h 40m	
2	CMC0023	Python Hacking - Advanced	Infosys Wingspan (Infosys Springboard)	6h 7m	

Abbreviation Used:

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Course Code: CBCA0103	**Course Name: Introduction to Matrices and Calculus**	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Knowledge of Mathematics up to 10th standard.

Course Objectives:

- Enable the students to understand the basic concept of matrix and determinants and their applications.
- Enable the students to understand the basic concept of sets relations and functions and their applications.
- Enable the students to understand the basic concept of limit and continuity and differentiation of functions and their applications.
- Enable the students to understand the basic concept of integration and their applications.
- Enhance the basic aptitude skills of the students.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply the concept of matrix and determinants to find the solution of system of linear equation	K3
CO2	Apply the concept of sets relations and functions to solve problems based on sets and functions.	K3
CO3	Apply the concept of limit and continuity and differentiation for various functions.	K3
CO4	Apply the concept of Integration.	K3
CO5	Solve the problems of Profit, Loss, Number & Series, Coding & decoding.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	1	1	-	-	1
CO2	3	1	1	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-
CO4	3	2	2	-	-	-	-	1
CO5	3	2	2	-	-	-	-	1

Course Contents / Syllabus

Module 1	**MATRIX AND DETERMINANTS**	**10 hours**

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices. Determinants: Definition, Minors, Cofactors, Properties of Determinants. Adjoint, Inverse and solution of system of linear equations.

Module 2	**SETS, RELATIONS AND FUNCTIONS**	**10 hours**

Set: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications. Relation: Properties of Relations, Equivalence Relation, Partial Order and Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite, and Inverse Functions.

Module 3	**LIMITS, CONTINUITY, DIFFERENTIATION**	**10 hours**

Limit: Limit at a Point, Properties of Limit, Basic concept of continuity, Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions. Logarithmic Differentiation, L' Hospitals Rule, Maxima & Minima of Single Variable Function.

Module 4	**INTEGRATION**	**10 hours**

The basic concept of Integral, Indefinite integral, Methods of Integration Substitution, By Parts, Partial Fractions, definite Integral, Fundamental Theorem of Calculus (without proof), and Basic properties of definite integral.

Module 5	**APTITUDE-I**	**8 hours**

Simplification, Percentage, Profit, loss &discount, Average, Number& Series, Coding & decoding, Time and Work.

	Total Lecture Hours	**48 hours**

Textbook:

S. No.	**Book Title:**	**Author**
1	"BCA Mathematics Volume -1&2", Krishna Publications	J. P. Chauhan, Sharad Kumar
2	NCERT, "Mathematics Part I - Textbook for Class XII"	NCERT Publication, Jan 2019
3	NCERT, "Mathematics Part II - Textbook for	NCERT Publication, Jan 2019

	Class XII"	
Reference Books:		
S. No.	**Book Title:**	**Author**
1	"Elementary Engineering Mathematics"	B.S. Grewal
2	NCERT, "Mathematics - Textbook for Class XI	NCERT Publication, Jan 2019
3	"Differential Equations"	G.F. Simmons
4	"Quantitative Aptitude" NCERT, "Mathematics - Textbook for Class XI	R.S. Aggarwal
NPTEL/ Youtube/ Faculty Video Link:		
Module 1	https://youtu.be/VRZWYl24ggU?si=LcQdsV7i2ZyhaYqf https://youtu.be/W9Sg4YGAqp8?si=VgmyIxb6vy-xgeGH https://youtu.be/nm6rAUOXZ6E?si=tvrXU_Imf1bskfRr https://youtu.be/OPSqnhSCJ4U?si=c8azShG7m_FpFD1m https://youtu.be/Qw4mDt92S6g?si=0HGJ_2aaTW8w51zG	
Module 2	https://www.youtube.com/watch?v=md5UCR7mcIY&list=PLbMVogVj5nJSxFihV-ec4A3z_FOGPRCo-&index=1&pp=iAQB https://www.youtube.com/watch?v=jZXHzpq-vmM&list=PLbMVogVj5nJSxFihV-ec4A3z_FOGPRCo-&index=2&pp=iAQB https://www.youtube.com/watch?v=V_xMloDlD4o&list=PLbMVogVj5nJSxFihV-ec4A3z_FOGPRCo-&index=3&pp=iAQB https://www.youtube.com/watch?v=Xx7ULr79fy0&list=PLbMVogVj5nJSxFihV-ec4A3z_FOGPRCo-&index=4&pp=iAQB https://www.youtube.com/watch?v=4sTWVBmY0Xc&list=PLbMVogVj5nJSxFihV-ec4A3z_FOGPRCo-&index=5&pp=iAQB	
Module 3	https://youtu.be/E6BJWGYHEOA?si=Dt9pFLHqR3Qj4idk https://www.youtube.com/watch?v=EcoOBgGjXpw&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&index=10&pp=iAQB https://www.youtube.com/watch?v=18FANeSc0eA&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&index=16&pp=iAQB https://www.youtube.com/watch?v=0loRcGXAux8&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&index=26&pp=iAQB https://www.youtube.com/watch?v=0diuaf1zWCc&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&index=31&pp=iAQB	
Module 4	https://www.youtube.com/watch?v=ovKqObcXJ4Y&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL&index=15&pp=iAQB https://www.youtube.com/watch?v=_EvfFc3ySYY&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL&index=16&pp=iAQB https://www.youtube.com/watch?v=JDfPbRrp4WE&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL&index=18&pp=iAQB https://www.youtube.com/watch?v=kDrERE17VyE&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL&index=19&pp=iAQB https://www.youtube.com/watch?v=-5q5l-XajBA&list=PLEAYkSg4uSQ0q9CDkHkJGdUTQOgH1DLDj&index=26&pp=iAQB	
Module 5	https://www.youtube.com/watch?v=2IU6Z7snwFg&pp=ygUYc2ltcGxpZmljYXRpb24gdW5hY2FkZW15 https://www.youtube.com/watch?v=cvA9rLsOb90&list=PLLtQdEJkug7uNcEFgM6fhbT1IUcT3tPNk&index=1&pp=iAQB	

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Course Code: CBCA0104	**Course Name:** Design Thinking-I	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: None.

Course Objectives: The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Develop a strong understanding of the design process and apply it in a variety of business settings.	K1
CO2	Analyze self, culture, and teamwork to work in a multidisciplinary environment and exhibit empathetic behavior.	K3
CO3	Formulate specific problem statements of real time issues and generate innovative ideas using design tools.	K4
CO4	Apply critical thinking skills to arrive at the root cause from a set of likely causes.	K4
CO5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	1	2
CO2	1	2	2	1	3	1	2	3
CO3	2	3	3	2	2	1	1	2
CO4	2	3	2	2	1	1	1	2
CO5	2	3	3	2	1	1	1	3

Course Contents / Syllabus

Module 1	**INTRODUCTION**	**6 hours**

An overview of future skills, introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Examples of Great Design, Design Approaches across the world.

Case Studies: Mumbai Dabbawallas, Gillette, Singapore, Bengaluru, Bahubali, Google, Embrace Incubator

Activity: Observation, Wicked Problem

Module 2	**ETHICAL VALUES AND EMPATHY**	**6 hours**

Understanding humans as a combination of I (self) and body, basic physical needs up to actualization, prosperity, the gap between desires and actualization. Understanding culture in family, society, institution, startup, socialization process. Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character.

Understanding stakeholders, techniques to empathize with, identify key user problems. Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, Emotional Intelligence, customer journey maps, classifying insights after Observations, Classifying Stakeholders.

Case Studies: Pure-it, Royal Enfield, Big Basket, Air-bnb

Activity: Moccasin Walk, Persona, Empathy map, Journey Map

Module 3	**PROBLEM STATEMENT AND IDEATION**	**6 hours**

Defining the problem statement, creating personas, Point of View (POV) statements. Research identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We", Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map, ideation activity games - six thinking hats, million-dollar idea, introduction to visual collaboration and brainstorming tools - Mural, JamBoard.

Case Studies: The Good Kitchen, Flipkart, Uber, Redbus, Big Bazaar

Activity: 5 Why, HMW, Brainstorming, Six Thinking Hats, 30 Circles, paper prototype

Module 4	**CRITICAL THINKING**	**6 hours**

Fundamental concepts of critical thinking, the difference between critical and ordinary thinking, characteristics of critical thinkers, critical thinking skills- linking ideas, structuring arguments, recognizing incongruences, five pillars of critical thinking, argumentation versus rhetoric, cognitive bias, tribalism, and politics. Case study on applying critical thinking on different scenarios.
Case Studies: Byju's, Maggi noodles, Tata Nano
Activity: debate, role play

Module 5	**LOGIC AND ARGUMENTATION**	**6 hours**

The argument, claim, and statement, identifying premises and conclusion, truth and logic conditions, valid/invalid arguments, strong/weak arguments, deductive argument, argument diagrams, logical reasoning, scientific reasoning, logical fallacies, propositional logic, probability, and judgment, obstacles to critical thinking. Group activity/role plays on evaluating arguments.
Case Studies: Aadhaar Card, Demonetization, Odd-Even Policy, Jio
Activity: Logical Fallacy Detective, Fact-Checking Challenge

	Total Lecture Hours	**30 hours**

Textbook:

S. No	**Book Title**	**Author**
1	UnMukt : Science & Art of Design Thinking	Arun Jain
2	Solving Problems with Design Thinking – Ten Stories of What Works	Jeanne Liedta
3	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Sangal, G P Bagaria,
4	Critical Thinking: An Introduction	Alec Fisher

Reference Books:

S. No	**Book Title**	**Author**
1	101 Design Methods	Vijay Kumar
2	Change by Design	Tim Brown
3	How to improve your critical thinking & reflective skills	McMillan
4	Design of Business	Roger L. Martin

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://youtu.be/rUUuhnLkJ2s?si=_XCHnDbt_U1z0Frx https://www.youtube.com/watch?v=ldYzbV0NDp8 https://www.youtube.com/watch?v=0Fi83BHQsMA
Module 2	https://www.youtube.com/watch?v=q654-kmF3Pc http://www.uhv.org.in/ https://swayam.gov.in/nd1_noc19_mg60/preview
Module 3	https://www.udemy.com/course/design-thinking-for-beginners/ https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
Module 4	https://www.forbes.com/sites/sap/2016/08/25/innovation-with-design-thinking-demands-critical-thinking/#340511486908 https://www.criticalthinking.org/pages/defining-critical-thinking/766
Module 5	https://www.udemy.com/course/critical-thinker-academy/ https://swayam.gov.in/nd2_aic19_ma06/preview

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Course Code: CBCA0101	**Course Name:** Basics of Data Analytics using Spreadsheet	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Basic knowledge of computer terminology.

Course Objectives: The objective of this course is to supervise students with a comprehensive understanding of Microsoft Excel from basic operations to advanced data analysis and visualization techniques.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply operation of Excel's interface, data entry and formatting to create and manage spreadsheets effectively.	K3
CO2	Apply essential formulas and functions to perform calculations and data analysis efficiently.	K3
CO3	Develop skills in sorting, filtering and using tables to organize and analyze large datasets.	K5
CO4	Apply advanced functions, Pivot tables, and what-if analysis tools to enhance data insights and decision-making.	K3
CO5	Create and customize charts and dashboards to visualize data and present information clearly and effectively.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	2	1	1	3	2	1	1	2
CO2	2	2	2	3	2	1	1	2
CO3	2	3	2	3	2	1	1	2
CO4	2	3	3	3	2	2	1	3
CO5	1	2	3	2	3	2	1	3

Course Contents / Syllabus

Module 1	**INTRODUCTION TO EXCEL**	**6 hours**

Overview of Excel Interface: Ribbon, Tabs, and Quick Access Toolbar, Workbook and Worksheet Navigation, Understanding Cells, Rows, and Columns, Basic Operations: Workbook and Worksheet Navigation, Creating, Saving, and Opening Workbooks, Entering and Editing Data, Using Autofill and Flash Fill, Basic Formatting: Formatting Cells (Font, Color, Alignment), Number Formatting (Currency, Date, Percentage), Adjusting Row Height and Column Width.

Module 2	**WORKING WITH FORMULAS AND FUNCTIONS**	**10 hours**

Basic Formulas: Understanding Formulas and Calculation Operators, Creating Simple Formulas (Addition, Subtraction, Multiplication, Division), Common Functions: Using SUM, AVERAGE, MIN, MAX, and COUNT, Understanding and Using Absolute and Relative References, Logical and Lookup Functions: IF Statements, VLOOKUP and HLOOKUP, Using the AND, OR, and NOT Functions.

Module 3	**DATA MANAGEMENT AND ANALYSIS**	**10 hours**

Data Sorting and Filtering: Sorting Data (Ascending, Descending, Custom), Applying Filters and Creating Filtered Views, Data Validation and Conditional Formatting: Setting Up Data Validation Rules, Using Conditional Formatting for Data Highlights, Working with Tables: Creating and Formatting Tables, Table Features (Total Row, Slicers, Structured References).

Module 4	**ADVANCED FORMULAS AND DATA ANALYSIS TOOLS**	**6 hours**

Advanced Functions: TEXT Functions (LEFT, RIGHT, MID, CONCATENATE), DATE Functions (TODAY, NOW, DATE, DATEDIF), Array Formulas, PivotTables and Pivot Charts: Creating and Modifying PivotTables, Using Pivot Charts for Data Visualization, What-If Analysis Tools: Scenario Manager, Goal Seek, Data Tables.

Module 5	**DATA VISUALIZATION AND REPORTING**	**8 hours**

Chart Creation and Customization: Creating Basic Charts (Column, Bar, Line, Pie), Customizing Charts (Titles, Labels, Colors), Advanced Chart Techniques: Combination Charts, Sparklines and Data Bars, Creating Dashboards: Designing Interactive Dashboards, Linking Data with Interactive Elements (Buttons, Drop-downs), Best Practices for Dashboard Design.

	Total Lecture Hours	**40 hours**

Textbook:

S. No	**Book Title**	**Author**

1	"Microsoft Excel Formulas and Functions (Office 2021 and Microsoft 365)", 1st Edition, Pearson, 2023	Paul McFedries
2	"Mastering Advanced Excel", 1st Edition, BPB, 2023	Ritu Arora
3	"Mastering Advanced Excel", 1st Edition, Penman Book, 2019	Naveen Mishra

Reference Books:

S. No	Book Title	Author
1	"200+ Excel Formulas and Functions", 1st Edition, BPB Publications, 2023	Prof. Michael McDonald
2	"Microsoft Excel Professional 2021 Guide",1st Edition, BPB Publications, 2022.	CA Manmeet Singh Mehta

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=Vl0H-qTclOg
Module 2	https://www.youtube.com/watch?v=8okA22yMwTs
Module 3	https://www.youtube.com/watch?v=I1G84Wm7lns
Module 4	https://www.youtube.com/watch?v=5tSIAwJBCP8
Module 5	https://www.youtube.com/watch?v=c4eWDpQiasM

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Course Code: CBCA0102	**Course Name:** C Programming	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Basic knowledge of Computers.

Course Objectives: The objective of a C programming course is to provide students with a solid foundation in the C programming language. The course aims to familiarize students with the syntax, concepts, and principles of C programming, as well as develop their ability to write efficient and effective C code.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Understand algorithm concepts, flowcharts, and C programming basics including syntax, data types, I/O, memory, and error handling.	K2
CO2	Demonstrate structured C program using operators, control structures and loops to solve basic computational problems.	K3
CO3	Apply arrays, strings, structures, unions, and pointers to develop modular C programs	K3
CO4	Develop C programs using functions, recursion, variable scope, and dynamic memory management with library functions like malloc and free.	K5
CO5	Apply storage classes, file handling functions and command-line arguments to manage data and modularize C programs effectively.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	2	-	-	-	2
CO2	3	3	2	2	1	-	-	2
CO3	3	3	3	2	1	-	-	2
CO4	3	3	3	3	-	-	-	2
CO5	3	2	2	3	1	-	-	2

Course Contents / Syllabus

Module 1	**BASIC CONCEPTS OF C PROGRAMMING**	**8 hours**

Concept of Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo Code with Examples, From Algorithms to Programs, Source Code.

Programming Basics: Structure of C Program, Writing and Executing the First C Program, Syntax and Logical Errors in Compilation, Object and Executable Code.

Components of C Language. Standard I/O in C, Keywords, Identifiers, Tokens, Fundamental Data types, Constant, Variables and Memory Locations.

Module 2	**OPERATORS, CONTROL BRANCHING, LOOPS**	**8 hours**

Arithmetic Expressions and Precedence: Operators and Expression Using Numeric and Relational Operators, Arithmetic Operator, Logical Operators, Bit Operations, Assignment Operator, Mixed Operands, Type Conversion.

Conditional Branching: if, else-if, nested if - else, switch statements, use of break, and default with switch

Iteration and loops: Concept of loops, for, while and do- while, multiple loop variables, use of break and continue statements, nested loop**.**

Module 3	**ARRAYS AND POINTER**	**10 hours**

Arrays and Strings: Array Notation and Representation, Manipulating Array Elements, using Multi-Dimensional Arrays. Character Arrays, String and String functions.

Structure and Union: Declaration of Structure and Union**,** Difference between Structure and Union, Enumerated Data types, Array of Structures.

Pointers: Pointer's basics and Declaration, Applications, Use of Pointers in Self-Referential Structures.

Module 4	**FUNCTIONS AND MEMORY MANAGEMENT**	**10 hours**

Functions: Concept of Sub-programming, Function, different types of functions, passing parameters to functions calling: call by value, Call by Reference, Recursion.

Scope of variable: Local and Global variables,

Memory Management: Static Memory and Dynamic Memory **(**Library functions– malloc, calloc, realloc and free).

Module 5	**STORAGE CLASSES & FILE OPERATIONS AND ADVANCED APPLICATIONS**	**12 hours**

Storage classes: Auto, Register, Static and Extern.

File Handling: Types of Files, File I/O Functions, Standard C Preprocessors, Defining and Calling Macros and Command-Line Arguments.

Total Lecture Hours	**48 hours**

Textbook:

S.No	Book Title	Author
1	"C: The Complete Reference", McGraw Hill Education,4th Edition 2022	Herbert Scheldt
2	"Computing Fundamentals and C Programming", , McGraw-Hill ,2nd Edition, 2018	E Balagurusamy
3	"Let Us C", BPB publication, 16th Edition, 2018	Yashwant P. Kanetkar,

Reference Books:

S.No	Book Title	Author
1	Modern C, Third Edition" , ,: Manning Publications,3rd Edition ,2023.	Jens Gustedt
2	Head First C: A Brain-Friendly Guide"	David Griffiths, Shroff/O'Reilly, 1st Edition ,2022.
3	C Programming in Easy Steps"	Mike McGrath, In Easy Steps Limited, 5th Edition ,2022.

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=KnvbUiSxvbM&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&ab_channel=Programiz
Module 2	https://www.youtube.com/watch?v=JYHpD9huNR4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&index=25&ab_channel=Programiz
Module 3	https://www.youtube.com/watch?v=MOeGnamlUP4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&index=19&ab_channel=Programiz
Module 4	https://www.youtube.com/watch?v=zmRxC7gYw-g&list=PLBlnK6fEyqRiteqwlMLXYtZ16xXDR7MO0&ab_channel=NesoAcademy
Module 5	https://www.youtube.com/watch?v=UxifZwjd5xU&ab_channel=GateSmashers https://www.youtube.com/watch?v=VM7s1k0s7kk&list=PLzx1ARJOmyed-PYHMduhZDQ4eKXmWJj_T&ab_channel=SmartLogicAcademy

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Applications

Course Code: CBCA0106	**Course Name:** Environmental Science and sustainability	**L**	**T**	**P**	**C**
Course Offered in: BCA		**2**	**0**	**0**	**2**

Pre-requisite: Basic knowledge of biology, chemistry, ecology, geology, mathematics, and understanding of human impacts on natural systems.

Course Outcome: After completion of the course, the student will be able to To understand ecosystems, promote sustainability, address environmental issues, conserve biodiversity, and ensure responsible use of natural resources for future generations.		**Bloom's Knowledge Level (KL)**
CO1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids, biodiversity.	K1, K2
CO2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation.	K1, K2
CO3	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K1, K2
CO4	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K1, K2

CO-PO Mapping

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	1	3	3	2
CO2	3	3	2	2	1	3	3	2
CO3	3	3	2	2	1	3	3	3
CO4	3	3	2	2	1	3	3	2

Course Contents / Syllabus

Module 1	**BASIC PRINCIPLE OF ECOLOGY AND BIODIVERSITY**	**4 hours**

Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food. Webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance.

Module 2	**NATURAL RESOURCES AND ECOLOGICAL SUCCESSION**	**4 hours**

Natural resources and associated problems. Forest resources: Use and over- exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over- grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles.

Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages. Ecological succession-Types, stages, examples of ecological succession

Module 3	**POLLUTION AND WASTE MANAGEMENT**	**4 hours**

Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox, CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment, Introduction to E- Waste, Types and classification of E- Waste, Impacts of E- Waste on environment and human health, E-Waste management and recycling., Climate change, global warming, acid rain, ozone layer depletion.

Module 4	**ENVIRONMENTAL ASSESSMENT, LEGISLATION AND SUSTAINABILITY**	**4 hours**

Women education, Role of NGOs regarding environmental protection, Bio indicators and their role, Natural disasters and disasters management, Aims and objectives of Environmental Impact Assessment (EIA). Salient features of following Acts: Environmental

Protection Act, 1986, Wildlife (Protection) Act, 1972.Water (Prevention and control of pollution) Act, 1974. Forest (Conserving) Act, 1980.
Definition and concept of sustainability, impacted areas of sustainable development, Global initiative and issues on sustainable development UNSDsGs, System Thinking and Sustainability.

Total Lecture Hours	**20 hours**

Textbook:

S.No	Book Title	Author
1	Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York	Brady, N.C
2	Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.	Sodhi G.S
3	Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.	Dash, M.C

Reference Books:

S.No		
1	Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi	Rao M.N. and H.V.N. Rao
2	A Text Book of environmental Science By Shashi Chawla	Shashi Chawla

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=T21OO0sBBfc, https://www.youtube.com/watch?v=qt8AMjKKPDo
Module 2	https://www.youtube.com/watch?v=mOwyPENHhbc, https://www.youtube.com/watch?v=yqev1G2iy2 https://www.youtube.com/watch?v=_74S3z3IO_I, https://www.youtube.com/watch?v=jXVw6M6m2
Module 3	https://www.youtube.com/watch?v=7qkaz8ChelI, https://www.youtube.com/watch?v=NuQE5fKmfME https://www.youtube.com/watch?v=9CpAjOVLHII https://www.youtube.com/watch?v=yEci6iDkXYw
Module 4	https://www.youtube.com/watch?v=ad9KhgGw5iA https://www.youtube.com/watch?v=nW5g83NSH9M https://www.youtube.com/watch?v=xqSZL4Ka8xo

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Course Code: CBCA0105	**Course Name:** Essence of Indian Traditional Knowledge	**L**	**T**	**P**	**C**
Course Offered in: BCA		2	0	0	2

Pre-requisite: Philosophical Systems, Spiritual Practices, Cultural Heritage, Ayurveda and Traditional Medicine, Architecture.

Course Objectives: To enable the students to understand the importance of our surroundings and encourage them to contribute towards sustainable development.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Understand the basics of past Indian politics and state polity.	K2
CO2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO3	Know the different religions and religious movements in India.	K2
CO4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K2
CO5	Identify Indian dances, fairs & festivals, and cinema.	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	2	1	3	2
CO2	2	3	2	2	1	1	3	3
CO3	2	2	3	1	2	1	3	3
CO4	2	2	2	3	3	2	2	3
CO5	1	2	2	1	3	1	2	3

Course Contents / Syllabus

Module 1	**SOCIETY STATE AND POLITY IN INDIA**	**8 hours**

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.

Module 2	**INDIAN LITERATURE, CULTURE TRADITION, AND PRACTICES**	**8 hours**

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, **Sikh Literature**, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature, Sangama Literature Northern Indian Languages & Literature, Persian and Urdu, Hindi Literature.

Module 3	**INDIAN RELIGION, PHILOSOPHY, AND PRACTICES**	**8 hours**

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

Module 4	**SCIENCE, MANAGEMENT AND INDIAN KNOWLEDGE SYSTEM**	**8 hours**

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India, Writing Technology in India Pyrotechnics in India Trade in Ancient India/, India's Dominance up to Pre-colonial Times.

Module 5	**CULTURAL HERITAGE AND PERFORMING ARTS**	**8 hours**

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.

	Total Lecture Hours	**40 hours**

Textbook:

S.No	Book Title	Author
1	Indian Art and Culture: for civil services and other competitive Examinations,3rd Edition,Mc Graw Hill	Nitin Singhania
2	Aspects of Political Ideas and Institutions in Ancient India (fourth edition), Delhi, Motilal Banarsidass	R.S. Sharma

Reference Books:

S.No	Book Title	Author
1	The Wonder that was India (34th impression), New Delhi, Rupa & co.	Basham, A.L.

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=wjepzXnEqYo
Module 2	https://www.youtube.com/watch?v=AnGJ7zwyCAk
Module 3	https://www.youtube.com/watch?v=5xpJeO_syN4&t=832s
Module 4	https://youtu.be/WGi0GgbnXYU
Module 5	https://youtu.be/gOWUjTnL0iM

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LAB Course Code: CBCA0155	**LAB Course Name:** Workplace communication Lab 1	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**4**	**2**

Pre-requisite: Comprehension of basic English language

Course Objectives:

- To improve proficiency in the English language to the Intermediate level of CEFR (Common European Framework of Languages).
- To motivate students to look within and create a better version of 'self.'
- To introduce the key concepts of ethics, etiquette, and life skills.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Identify key concepts of life-skills.	K2
CO2	Apply effective listening skills.	K3
CO3	Demonstrate fluency and spontaneity while speaking.	K3
CO4	Understand and analyze simple written texts.	K4
CO5	Compose clear and concise texts on a wide range of subjects.	K6

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	-	1	-	-	2	-	-	3
CO2	-	-	-	-	3	-	-	2
CO3	-	1	-	-	3	-	-	2
CO4	-	2	-	-	3	-	-	2
CO5	-	1	-	-	3	-	-	2

List Of Practical's (Indicative & Not Limited To)

1	**Introduction to the course and the evaluation scheme** Students will gain knowledge about Examination Pattern.
2	**Importance of Communication Skills and motivation to improve** Students will watch Video Clips of famous personalities who have learnt to communicate well e.g., Kapil Dev, Jahnvi Panwar, APJ Abdul Kalam, and others.
3	**Anubhav Activity** Students will share their expectations from the course.
4	**Showcasing the talents** Participants will gain confidence in expressing themselves through song/dance, overcome inhibitions, and develop a sense of freedom and creativity.
5	**Developing active listening and accurate communication skills** Participants will enhance their listening skills, practice conveying information accurately, and understand the importance of clear communication and active listening.
6	**Language Toolbox: Vocabulary enrichment** Participants will be exposed to General Service List (GSL) by West and Academic Word List (AWL); the students will be asked to keep a journal of new words learnt every day.
7	**Introducing others and oneself** Participants will improve their speaking skills and develop clarity in listening and retaining information.

8	**Think-Pair-Share for Reading Comprehension** Students will actively interact with the reading material by engaging in this activity, collaborating with their peers, and refining their comprehension skills.
9	**Basics of Writing** The students will practice basic writing skills through sentence construction by understanding the requisites of a good sentence.
10	**Listen and write** The students will practice writing exactly what they hear.
11	**Reading aloud** The students will improve their reading ability and vocabulary. Students will read Economic Times, Readers Digest, Fiction, National Geographic, Technology magazines etc.
12	**Art of Listening** Participants will listen to their peers reading aloud and write down the gist; and will repeat verbatim what is read.
13	**Language Toolbox 2: Word association & word formation** The students will be able to improve their language proficiency.
14	**Writing through prompts** The students will practice writing skills through visual or verbal prompts.
15	**Listening to directions and instructions** Participants will improve their listening comprehension and enhance their ability to follow instructions & directions.
16	**Analysing Caselets** The students will improve their analytical and speaking skills by analysing & providing solutions to the issues in the caselets.
17	**Decoding infographics** Participants will improve their ability to interpret and analyse information presented in diagrams, graphs, and pie charts.
18	**Language Toolbox 3: Vocabulary Building – Homophones, homonyms, synonyms, antonyms, phrases & idioms** The students will be able to bring in variety in the usage of words.
19	**Filling forms** Participants will improve their ability to understand and follow instructions and develop ability in filling out forms accurately.
20	**Writing Captions and Identifying Topic Sentences** The students will be provided with paragraphs on a variety of topics to develop their concise & precise writing skills.
21	**Sharing your views in a group discussion** Participants will enhance their ability to express their opinions, actively listen to others, and engage in constructive discussions to develop well-rounded perspectives.
22	**Language Toolbox 4: Vocabulary Enrichment – Abbreviations and Acronyms** The exercises and activities will enhance language proficiency of the students by helping them bring in variety in their usage of words.
23	**Basics of Email Writing** Students will be able to write letters/applications on familiar topics and will gain knowledge to apply in real life scenarios.
24	**Situation-based Role Play** The students will write and present role plays to practice effective communication strategies, develop empathy and understanding, and improve their writing skills and ability to handle real-life situations through role-playing exercises.
25	**Language Toolbox 5: Developing concise and clear communication** The students will be able to remove verbosity from their language.
26	**Project Presentations** The students will be presenting their Projects

Required Software and Tools

- British Council English Score Mobile App

Textbooks

Sr No	Book Details
1	ABC Workbook, NIET Publishing House, Meerut, 2023

Reference Books	
Sr No	**Book Details**
1	Cambridge English Business Benchmark (Pre-intermediate to Intermediate), 2nd edition, Norman Whitby, Cambridge University Press, 2013, UK.
2	Listening in the Language Classroom by John Field, Cambridge University Press, 2021, UK.
3	Speaking: Second Language Acquisition, from Theory to Practice by William Littlewood, **Cambridge University Press, 2022, UK.**
4	Second Language Writing in Transitional Spaces: Teaching and Learning Across Languages and Cultures edited by Viniti Vaish and Guangwei Hu, Routledge, 2019, UK.
5	The Writing Revolution: A Guide to Advancing Thinking Through Writing in All Subjects and Grades by Judith C. Hochman and Natalie Wexler, Jossey-Bass, 2022, USA.
6	The Cambridge Handbook of Corrective Feedback in Second Language Learning and Teaching edited by Hossein Nassaji and Eva Kartchava, **Cambridge University Press, 2021, UK**
7	IELTS 11: General Training with answers. Cambridge English, 2018

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LAB Course Code: CBCA0151	**LAB Course Name:** Basics of Data Analytics using Spreadsheet Lab	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**2**	**1**

Pre-requisite: Basic knowledge of computer system.

Course Objectives:
The objective of this course is to supervise students with a comprehensive understanding of Microsoft Excel from basic operations to advanced data analysis and visualization techniques.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply operation of Excel's interface, data entry and formatting to create and manage spreadsheets effectively.	K3
CO2	Apply essential formulas and functions to perform calculations and data analysis efficiently.	K4
CO3	Develop skills in sorting, filtering and using tables to organize and analyze large datasets.	K5
CO4	Apply advanced functions, Pivot tables, and what-if analysis tools to enhance data insights and decision-making.	K4
CO5	Create and customize charts and dashboards to visualize data and present information clearly and effectively.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	3	2	1	1	2
CO2	3	3	2	3	1	1	1	2
CO3	3	3	2	3	2	1	1	2
CO4	3	3	3	3	2	1	1	3
CO5	3	2	2	3	3	2	1	3

List Of Practical's (Indicative & Not Limited To)

	Data entry and editing in MS Excel
1	Create a new workbook and save it as "Budget.xlsx".
2	Enter data into cells A1 to D5 with headers "Item", "Quantity", "Price", and "Total".
3	Use AutoFill to fill the months of January to December in a row.
4	Change the font of the headers to bold and size 14.
5	Format cells B2 to B5 to display currency.
6	Adjust the width of column A to fit the content.
7	Apply a border around the range A1.
8	Merge and center the title "Monthly Budget" across columns A to D.
9	Apply a background color to the header row (A1).
10	Insert a new worksheet and rename it "Summary".
	General Formulas in Excel
11	Write a formula in cell D2 to calculate the total price (Quantity * Price).
12	Copy the formula in D2 down to D5 using AutoFill.
13	Use the SUM function to calculate the total expenditure in cell D6

14	In cell E2, use an IF function to check if the total is greater than 100, returning "Yes" or "No".
15	Apply the AVERAGE function to find the average price in column C.
16	Use the MIN function to find the minimum quantity in column B.
17	Write a formula in F2 to look up the price of an item using VLOOKUP.
18	Use the COUNT function to count the number of items in column A.
19	Create a formula in G2 to concatenate the item name and quantity.
20	Write a formula using the AND function to check if both conditions are met in cell H2.
Data Analysis	
21	Sort the data in the range A2 by the Item name alphabetically.
22	Apply a filter to the data in the range A1.
23	Use a filter to display only items with a price greater than 50.
24	Apply conditional formatting to highlight cells in column D that are greater than 200.
25	Set up data validation in cell E2 to allow only whole numbers between 1 and 100.
26	Create a table from the range A1 and apply a table style.
27	Add a total row to the table to sum the values in the "Total" column.
28	Insert a slicer for the "Item" column in the table.
29	Use structured references to sum the total prices in the table.
30	Remove duplicates from a list of items in column A.
Pivot tables and specific formulas in MS Excel	
31	Create a Pivot Table from the data in the range A1.
32	Add "Item" to the Rows area and "Total" to the Values area in the PivotTable.
33	Create a PivotChart based on the PivotTable.
34	Use the TEXT function to format a date in cell B2 as "Month Day, Year".
35	Write an array formula to multiply the quantities and prices in columns B and C.
36	Use the DATE function to create a date from year, month, and day in separate cells.
37	Implement the Goal Seek tool to find the necessary quantity to reach a total of 500.
38	Set up a Scenario Manager to compare different budget scenarios.
39	Create a data table to show the effect of varying prices on total expenditure.
40	Use the INDEX and MATCH functions to retrieve data from a table.
Charts creation in Excel	
41	Create a column chart from the data in the range A1.
42	Add a title to the chart "Monthly Expenditure".
43	Customize the chart colors to match a specific theme.
44	Add data labels to the chart.
45	Create a pie chart to show the distribution of total expenditure by item.
46	Use sparklines to show trends in monthly sales data.
47	Insert a bar chart and change the axis titles.
48	Create a combination chart with both line and column series.
49	Design an interactive dashboard using slicers and Pivot Charts.
50	Link a chart to a different worksheet for a consolidated view.
51	Apply a custom chart template to a new chart.
52	Add a secondary axis to a chart to display dual metrics.

53	Format a chart with gradients and 3D effects.
54	Create a waterfall chart to show changes in values over time.
55	Insert a bubble chart to display data with three dimensions.
56	Use a gauge chart to represent a KPI (Key Performance Indicator).
57	Develop a sales dashboard with interactive elements.
58	Add a timeline slicer to a Pivot Table.
59	Create a heat map using conditional formatting to highlight data ranges.
60	Publish a dashboard to Power BI for broader sharing and collaboration.

Total Hours: 48 hrs.

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LAB Course Code: CBCA0152	**LAB Course Name:** C Programming Lab	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**2**	**1**

Pre-requisite: Basic knowledge of Computer.

Course Objectives:

The objective of a C programming course is to provide students with a solid foundation in the C programming language. The course aims to familiarize students with the syntax, concepts, and principles of C programming, as well as develop their ability to write efficient and effective C code.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Implement and trace the execution of conditional and iteration programs.	K3
CO2	Implement Pointers, Functions, Recursion and Memory allocation concepts.	K3
CO3	Acquire the knowledge of memory allocation and binding, array, structure to solve complex problems	K3
CO4	Compare and contrast between Structure and union along with concepts of DMA	K4
CO5	Understand and apply the concepts of File Handling and Embedded Programming	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	2	1	-	-	1
CO2	3	3	3	2	1	-	-	2
CO3	3	3	3	2	1	-	-	2
CO4	3	2	2	2	1	-	1	1
CO5	3	2	2	3	2	2	2	3

List of Practical's (Indicative & Not Limited To)

S. No	**Title of Program**
1	WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2	WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3	WAP to calculate the area and circumference of a circle.
4	WAP to Calculate the Sum of Natural Numbers.
5	WAP to Find the Roots of a Quadratic Equation.
6	WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula C/5=(F-32)/9.
7	WAP to design a Calculator which performs Number system conversion
8	WAP that swaps values of two variables using a third variable.
9	WAP that swaps values of two variables without using a third variable.
10	WAP that checks whether the two numbers entered by the user are equal or not.
11	WAP to find the greatest of three numbers.
12	WAP that finds whether a given number is even or odd.
13	WAP that tells whether a given year is a leap year or not.
14	WAP to Calculate Pow (x,n)

15	WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria: Between 90-100%-----Print 'A' 80-90%----------Print 'B' 60-80%----------Print 'C' Below 60%----------Print 'D'
16	WAP that takes two operands and one operator from the user, perform the operation, and prints the result by using Switch statement.
17	WAP to print the sum of all numbers up to a given number.
18	WAP to find the factorial of a given number.
19	WAP to print sum of even and odd numbers from 1 to N numbers.
20	WAP to print the Fibonacci series.
21	WAP to print half pyramid of *
22	WAP to print half pyramid of alphabet
23	WAP to print Full pyramid of *
24	WAP to print full pyramid of numbers
25	WAP to print full pyramid of alphabet
26	WAP to print Inverted full pyramid of *
27	WAP to print Pascal's triangle
28	WAP to check whether the entered number is prime or not.
29	C Program to Check Whether a Character is Vowel or Consonant
30	WAP to find the sum of digits of the entered number.
31	WAP to find the reverse of a number.
32	WAP to print Armstrong numbers from 1 to 100.

33	WAP to convert binary number into decimal number and vice versa.
34	WAP that simply takes elements of the array from the user and finds the sum of these elements.
35	WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
36	WAP to find the duplicate value in an array.
37	WAP to Find the Maximum and Minimum in an Array
38	WAP to Find Sum of Series 1^2 + 2^2 + …. + n^2
39	WAP to Find LCM of Two Numbers
40	WAP to Display Factors of a Number
41	WAP to Find GCD of two Numbers
42	WAP to find the duplicate value in an array.
43	WAP to Find the Maximum and Minimum in an Array
44	WAP to Find Sum of Series 1^2 + 2^2 + …. + n^2
45	WAP to Find LCM of Two Numbers
46	WAP to Display Factors of a Number
47	Declare and initialize a structure to store and display student details (name, age, marks).
48	Define a structure data type TRAIN_INFO. The type contains Train No.: integer type Train name: string Departure Time: aggregate type TIME Arrival Time: aggregate type TIME Start station: string End station: string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations: a. List all the trains (sorted according to train number) that depart from a particular section. b. List all the trains that depart from a particular station at a particular time. c. List all he trains that depart from a particular station within the next one hour of a given time. d. List all the trains between a pair of start station and end station.

49	WAP to swap two elements using the concept of pointers.
50	WAP to compare the contents of two files and determine whether they are same or not.
51	WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.
52	WAP to allocating memory for an array of integers.
53	WAP allocating memory for an array of integers using malloc().
54	WAP allocating memory for an array of integers using calloc().

Total Hours: 48 hrs.

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Course Code: CBCA0159	**Course Name:** Yoga	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**0**	**2**

Pre-requisite: Basic physical fitness, interest in wellness.

Course Objectives: This course aims to help students achieve overall well-being by exploring yoga's physical, mental, and spiritual benefits, while learning practical tools to manage stress, build resilience, and grow through self-awareness.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Gain a comprehensive understanding of yoga and its modern applications for holistic well-being and its role in promoting a healthy lifestyle.	K2
CO2	Identify and differentiate various types of yoga, and applying different concepts like chakras, pranas for balance development.	K4
CO3	Managing mental health by applying various yoga techniques and promoting emotional resilience and self-awareness.	K3
CO4	Demonstrate and understanding of physical fitness principles and incorporate appropriate sports and exercise to build and measure fitness effectively.	K3
CO5	Developed an approach to wellness through knowledge of balanced diet, nutrition, and wellness programs for better quality of life.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	-	-	-	-	-	-	3	3
CO2	3	-	-	-	-	-	-	2
CO3	-	2	-	-	-	-	3	2
CO4	3	2	3	-	2	-	-	-
CO5	-	2	2	-	-	2	2	2

Course Contents / Syllabus

Module 1	**YOGA**	**4 hours**

Meaning and definition, Importance of yoga in 21st century, Introduction to Yogic Anatomy and Physiology, Yoga & sports, Yoga for healthy lifestyle, Yoga & Sports.

Module 2	**PATHS AND SYSTEMS OF YOGA**	**4 hours**

Types of Yoga: - Hatha yaga, 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. **Ashtang Yoga:** - Yama, niyama, asana, pranayama, Pratyahar, dharna, dhyan, Samadhi. Benefits, Utilities & their psychological impact on body and mind.

Module 3	**YOGA AND MENTAL WELL-BEING**	**4 hours**

According to yoga concept of normality in modern psychology, concept of personality & its development, yogic management of psycho-somatic ailments: frustration, anxiety, depression.

Module 4	**SPORTS FOR PHYSICAL FITNESS**	**4 hours**

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)

Module 5	**NUTRITION, WELLNESS AND WEIGHT MANAGEMENT**	**4 hours**

Concept, Components, Types of wellness: psychological, social, emotional, and spiritual, Significance with reference to Positive Lifestyle 2.2, Concepts of Quality of Life and Body Image Factors affecting Wellness, Wellness Programs. 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.

	Total Lecture Hours	**20 hours**

Textbook:

S. No	**Book Title**	**Author**
1.	The Complete Book of Yoga: Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga	Swami Vivekananda

2.	Patanjali's Yoga Sutras	Swami Vivekananda
3.	B.K.S. Iyengar Yoga The Path to Holistic	B.K.S. Iyengar

Reference Books:

S. No	Book Title	Author
1.	Principles and Labs for Fitness and Wellness, Thomson Wadsworth, California, USA.	Hoeger, W W K and S.A. Hoeger
2.	Fitness and Wellness. 7th Ed. Thomson Wadsworth, Boston, USA.	Hoeger, W.W. & S. Hoeger
3.	The Body Shape Solution to Weight Loss and Wellness: The Apples & Pears Approach to Losing Weight, Living Longer, and Feeling Healthier.	Savard, M. and C. Svec

NPTEL/ YouTube/ Faculty Video Link:

Module 1.	https://www.youtube.com/watch?v=O2Tgy3-XLqU&list=PLpyVOps2KnSFfTEVjK3lVVsK9s6SrRVB9
Module 2.	https://archive.nptel.ac.in/courses/110/101/110101165/#
Module 3.	https://onlinecourses.swayam2.ac.in/aic19_ed29/preview
Module 4.	https://www.youtube.com/watch?v=dX3LCBGqPnM
Module 5.	https://www.youtube.com/watch?v=5fD5pxzP3bo

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Course Code: CBCA0201	**Course Name:** Data Structures	**L**	**T**	**P**	**C**
Course Offered in: BCA		3	0	0	3

Pre-requisite of Subject: Knowledge of programming languages, basics of mathematics, organizing and problem-solving ability.

Course Objectives: Learn the basic concepts of algorithm analysis, along with implementation of linear and non- linear data structures.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Describe the need of data structure and algorithms in problem solving and Analyse Time space trade-off.	K4
CO2	Describe the real-world applications using stack and queue.	K2
CO3	Discuss different Linked list operations.	K2
CO4	Evaluate the real-world applications using non-linear data structures.	K4
CO5	Identify and analyse the computational efficiencies of searching and sorting algorithms in real world problems	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	2	1	1	3
CO2	3	3	3	3	2	2	1	3
CO3	3	2	3	3	2	1	1	3
CO4	3	3	3	3	2	2	1	3
CO5	3	3	3	3	2	2	1	3

Course Contents / Syllabus

Module 1	**INTRODUCTION TO DATA STRUCTURE**	**8 hours**

Types of Data Structures- Linear & Non-Linear Data Structures, List, Tuple, Set, Dictionary. Arrays: Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Time and Space **Complexity** of an algorithm, Asymptotic notations (Big Oh, Big Theta and Big Omega).

Module 2	**STACKS & QUEUES**	**8 hours**

Primitive Stack operations: Push & Pop, mutual conversion of Infix, Prefix, Postfix, Evaluation of postfix expression
Principles of recursion, Types of Recursions, Problem solving using iteration, Tower of Hanoi, Trade-offs between iteration and recursion. Operations on Queue: Create, Insert, Delete, Full and Empty, Circular queues, Dequeue and Priority Queue.

Module 3	**LINKED LISTS**	**8 hours**

Linked lists: Comparison of Array, List and Linked list Types of linked list: Singly Linked List, Doubly Linked List, Circular Linked List, Polynomial Representation and Addition of Polynomials.

Module 4	**TREES**	**8 hours**

Trees: Basic terminology, Binary Trees, Binary Tree Representation, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Extended Binary Tree, Tree Traversal algorithms: In-order, Pre-order and Post-order. Constructing Binary Tree from given Tree Traversal, Binary Heaps, Heap Operations, Threaded Binary trees, Traversing Threaded Binary trees, AVL Tree, B-Tree.

Module 5	**GRAPHS**	**8 hours**

Graphs: Terminology used with Graph, Graph Sorting Techniques: Representations: Adjacency matrices, Adjacency List. Connected Component, Spanning Trees, Prim's and Kruskal's algorithm, Shortest Path algorithms: Dijkstra Algorithm, Floyd Warshall's Algorithm Sorting Algorithms. Hashing: Hash Functions, Collision Resolution Techniques.

	Total Lecture Hours	**40 hours**

Textbook:

S. No	Book Title	Author
1.	"Data Structures and Algorithms in Python (An Indian Adaptation)", Wiley Publication	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser,
2.	"DATA STRUCTURES USING PYTHON" 12 March 2021, Oxford Higher Education, First Edition	Dr Shriram K. Vasudevan, Mr Abhishek S. Nagarajan, Prof Karthick Nanmaran
3.	"Problem Solving in Data Structures & Algorithms Using Python" 1 January 2022, Third Edition	Hemant Jain

Reference Books:

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S. No	Book Title	Author
1.	"Data Structure (Mumbai University), Himalaya Publishing House. Data Structures and Algorithms in Python", 1 May 2023, BPB Publication.	Kiran Gurbani, Krupa Kamdar
2.	"Data Structures with Python: Get familiar with the common	Dr. Harsh Bhasin
3.	Data Structures and Algorithms in Python", 1 May 2023, BPB Publication.	Dr. Harsh Bhasin
4.	"DATA STRUCTURES AND ALGORITHMS USING PYTHON "13 April 2023, Notion Press	Sanjay Patidar Upendra Singh Sumit Kumar Sharma

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F
Module 2	https://www.youtube.com/watch?v=4OxBvBXon5w&list=PLBF3763AF2E1C572F&index=22
Module 3	https://www.youtube.com/watch?v=cR4rxllyiCs&list=PLBF3763AF2E1C572F&index=23 https://nptel.ac.in/courses/106/106/106106127/
Module 4	https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24
Module 5	https://www.youtube.com/watch?v=hk5rQs7TQ7E&list=PLBF3763AF2E1C572F&index=25

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Course Code: CBCA0204	**Course Name:** Digital logic & Design	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Basic knowledge of mathematics, physics & basic electronics.

Course Objectives: This course is intended to provide the students with a comprehensive understanding of the fundamental of digital logic circuit. The design of circuits and systems whose input and outputs are represented as discrete variables. Industry runs the entire automatic system because of digital electronics. It plays a critical role in the success of businesses. It enhances communication, increases efficiency, enables remote work, and enhances security.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply concepts of Digital Binary System and implementation of Gates.	K3
CO2	Analyse and design of Combinational logic circuits.	K4
CO3	Analyse and design of Sequential logic circuits with their applications.	K4
CO4	Analyse the design of finite state machine.	K4
CO5	Implementation of IoT devices with sensors.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	1	3	1	-	1	2
CO2	3	3	2	3	1	-	1	2
CO3	3	3	2	3	1	-	1	2
CO4	3	3	2	3	1	-	1	2
CO5	2	3	3	3	2	1	2	3

Course Contents / Syllabus

Module 1	**DIGITAL SYSTEM AND BINARY NUMBERS**	**8 hours**

Number System and its arithmetic, signed binary numbers, compliments, Binary codes, Cyclic codes, Hamming Code, Simplification of Boolean Expression: K-map method up to five variables, SOP and POS Simplification Don't Care Conditions, Logic Gate, NAND and NOR Gate

Module 2	**COMBINATIONAL LOGIC**	**8 hours**

Combinational Circuits: Analysis Procedure, Design Procedure, Code Converter, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers

Module 3	**SEQUENTIAL LOGIC AND ITS APPLICATIONS**	**8 hours**

Sequential Circuits: Latches & Flip Flops, Characteristic Equations of Flip Flops, Excitation Table of Flip Flops, Flip Flop Conversion, Registers, Shift Registers, Synchronous and Asynchronous Counters, Other Counters: Johnson &Ring Counter

Module 4	**FINITE STATE MACHINE**	**8 hours**

Introduction to finite state machine: Pulse and fundamental mode of operation, realization of state table from verbal description, state diagram & Transition matrix, Mealy and Moore Hazards.

Module 5	**INTRODUCTION TO IOT**	**8 hours**

IoT network architecture & design: M2M. 'Things' in IoT: Sensors, Actuators, Smart objects, Basics of Sensor Networks. Communicating smart objects: Arduino Uno, Node mcu esp8266, interfacing with sensors.

	Total Lecture Hours	**40 hours**

Textbook:

S. No	**Book Title**	**Author**
1.	"Digital Design", Pearson Education5th Edition.	M. Morris Mano and M. D. Ciletti
2.	"Digital Logic & State Machine Design", Oxford University Press, 3rd Edition.	David J. Comer
3.	"Modern Digital Electronics", Tata McGraw Hill Publication, 3rd Edition.	R P Jain
4.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, 1st Edition, Pearson India Pvt. Ltd., 2018.	D. Hanes, G. Salgueiro, P. Grossetete, R. Barton, J. Henry;

Reference Books:

S.No	Book Title	Author
1.	"Digital Circuits and Design", Pearson Education.	D P Kothari and J.S. Dhillon
2.	"Fundamentals of Digital Circuits", PHI Learning Pvt. Ltd.	A. Anand Kumar

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=yKPD_UkbgXo&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrXx
Module 2	https://www.youtube.com/watch?v=FavBqeTTmO0 https://www.youtube.com/watch?v=p6yPvw88BJk
Module 3	https://www.youtube.com/watch?v=LTtuYeSmJ2g https://www.youtube.com/watch?v=iaIu5SYmWVM
Module 4	https://www.youtube.com/watch?v=kb-Ww8HaHuE
Module 5	https://www.youtube.com/watch?v=bVFfcYh6UBw https://www.youtube.com/watch?v=hIISiYs7lDo

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Course Code: CBCA0202	**Course Name:** Business Intelligence & Analytics	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Basic understanding of computers and familiarity with Microsoft Excel.

Course Objectives: Understand the basics of Business Analytics and how to track website data.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply advance formulas and functions to perform calculations and data analysis.	K3
CO2	Demonstrate advanced Excel skills which include data manipulation, analysis and visualization using formulas, functions and pivot tables.	K3
CO3	Create Power BI reports using various data sources, visualizations, interactions, and publish multi-page dashboards.	K5
CO4	Design interactive dashboard present reports and report visualization for effectively communicate insights and recommendations.	K5
CO5	Analyze setup and track website which include creating and managing goals tracking events and analyzing audience behavior.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	-	-	-	2
CO2	3	3	2	3	2	-	-	2
CO3	3	3	3	3	2	2	-	2
CO4	2	3	3	3	2	2	-	3
CO5	2	3	2	3	-	2	1	3

Course Contents / Syllabus

Module 1	**ADVANCED EXCEL SKILLS**	**8 hours**

Creating a Formula, Formula Auditing, Meaning and Advantages of functions, Insert function.
SUM, AUTOSUM, SUMIF, SUBTOTAL PRODUCT, POWER, SQRT, ROUND. Statistical Functions: AVERAGE, AVERAGEIF and AVERAGEIFS, COUNT, COUNTA, COUNTIF, COUNTIFS, MAX MIN, MEDIAN, MODE.
DATE, NOW, DAY, YEAR, MONTH, TIME, TODAY, WEEKDAY, DATEVALUE.
VLOOKUP & HLOOKUP Financial Functions: Rate, Type, PV, FV, NPER, PMT, IPMT, CUMIPMT, NPV, IRR.
Defining Names, Using and Managing Defined Names.

Module 2	**DATA ANALYSIS WITH EXCEL**	**8 hours**

Creating a PivotTable, Specifying PivotTable Data, Filtering and Sorting a PivotTable, working with Pivot Table Layout, Grouping PivotTable Items, updating a PivotTable, formatting a PivotTable using Slicers to manipulate PivotTables, Creating a PivotChart. What if Analysis: Scenario manager, Goal seek, Data table. Import external data: From Access, From Web, From text, from SQL Server, From SQL Query. Macros: View Macros, Record Macros, Use relative Reference.

Module 3	**INTRODUCTION TO POWER BI AND CREATING POWER BI REPORTS, AUTO FILTERS**	**8 hours**

Overview of Power BI, creating a new Power BI dashboard, connecting to data sources in Power BI, Understanding the different types of visualizations in Power BI Creating Power BI Reports.
Report Design with Legacy & .DAT Files, Report Design with Database Tables, Understanding Power BI Report Designer, Report Canvas. Creation, Renames, Report Visuals, Fields and UI Option, Experimenting Visual Interactions, Advantages, Reports with Multiple Pages and Advantages, Pages with Multiple Visualizations. Data Access, PUBLISH Options and Report Verification in Cloud.

Module 4	**CREATING INTERACTIVE DASHBOARDS IN POWER BI AND REPORT VISUALIZATIONS AND PROPERTIES**	**8 hours**

Creating tables and charts in Power BI, creating maps and geolocation visualizations in Power BI, Creating interactive dashboards with slicers and filters.
Report Visualizations and Properties: Power BI Design: Canvas, Visualizations and Fields, Import Data Options with Power BI Model, Advantages, Direct Query Options and Real-time (LIVE) Data Access, Data Fields and Filters with Visualizations, Visualization Filters, Page Filters, Report Filters, Conditional Filters and Clearing. Testing Sets, Creating Customized Tables with Power BI Editor, General Properties, Sizing, Dimensions, and Positions, Alternate Text and Tiles. Header (Column, Row) Properties, Grid Properties (Vertical, Horizontal) and Styles, Table Styles & Alternate Row Colors - Static, Dynamic, Sparse, Flashy Rows, Condensed Table Reports Focus Mode, Totals Computations, Background. Borders.

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Module 5	**INTRODUCTION TO GOOGLE ANALYTICS, REPORTS AND CUSTOM DASHBOARDS**	**8 hours**
Overview of Google Analytics, setting up and configuring Google Analytics for a website, Understanding the Google Analytics interface, tracking website data with Google Analytics, Different types of reports in Google Analytics, Audience report to analyze website traffic, Acquisition report to analyze website traffic sources, Behavior report to analyze website behavior, Create custom dashboards in Google Analytics, custom reports in Google Analytics, filters and segments in Google Analytics.		
	Total Lecture Hours	**40 hours**

Textbook:

S. No	**Book Title**	**Author**
1.	"Excel Data Analysis", "Kindle Publication", "20 February 2022"	Joe Webinar
2.	Mastering Microsoft Power BI", "Packet Publishing", "2nd Edition," June 30 2022"	Gerg Deckler and Brett Powell

Reference Books:

S. No	**Book Title**	**Author**
1.	Web Analytic An Hour a Day, Sybex publication","1st edition 2007"	Avinash Kaushik
2.	"Power BI 2019","2nd Edition" October 4, 2019"	Roger F. Silva

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=8Ob8Hre_SnI
Module 2	https://www.youtube.com/watch?v=OOWAk2aLEfk
Module 3	https://www.youtube.com/watch?v=cN8AO3_vmlY
Module 4	https://www.youtube.com/watch?v=KfxyzDjPz_4
Module 5	https://www.youtube.com/watch?v=nW7iSgmSaQ8

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Course Code: CBCA0203	**Course Name:** Statistics for Computer Applications	**L**	**T**	**P**	**C**
Course Offered in: BCA		**3**	**0**	**0**	**3**

Pre-requisite: Basic Knowledge of Statistics.

Course Objectives:

- Understand the concept of correlation, moments, skewness and kurtosis and curve fitting.
- Remember the concept of probability to evaluate probability distributions.
- Understand the concept of Mathematical Expectations and Probability Distribution.
- Apply the concept of hypothesis testing and statistical quality control to create control charts.
- Enhance the basic aptitude skills of the students.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply the concept of correlation, moments, skewness and kurtosis and curve fitting.	K3
CO2	Apply the concept of probability to evaluate probability distributions.	K3
CO3	Apply the concept of Mathematical Expectations and Probability Distribution.	K3
CO4	Apply the concept of hypothesis testing and statistical quality control to create control charts.	K3
CO5	Solve the problems of Ratio, Proportion & Partnership, Problem of ages, Allegation & Mixture, Direction, Blood relation, Simple & Compound interest, Permutation & Combination.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	2	-	1	-	-	1
CO2	3	3	3	-	-	-	-	1
CO3	3	2	1	-	1	-	-	1
CO4	3	2	2	-	1	-	-	1
CO5	3	2	2	-	-	-	-	1

Course Contents / Syllabus

Module 1	**DESCRIPTIVE STATISTICS**	**10 hours**

Introduction: Measures of central tendency: Mean, Median, Mode, Moment, Skewness, Kurtosis, Curve Fitting, Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Correlation and Rank correlation, Linear regression, nonlinear regression and multiple linear regression.

Module 2	**PROBABILITY AND RANDOM VARIABLES**	**10 hours**

Basic concept and Problems of Probability, Random Variable, Discrete Random Variable, Continuous Random Variable, Probability mass function, Probability Density Function, Distribution functions.

Module 3	**PROBABILITY DISTRIBUTIONS**	**10 hours**

Expectations (For single Variable): Introduction, Expected Value of a Random Variable, Mean, Variance, Moment Generating Function, Probability Distributions: Binomial, Poisson, Normal distribution.

Module 4	**TESTING OF HYPOTHESIS**	**10 hours**

Testing a Hypothesis, Null hypothesis, Alternative hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, Z-test, t-test and Chi-square test, F-test, ANOVA: One way.

Module 5	**APTITUDE-II**	**8 hours**

Ratio, Proportion & Partnership, Problem of ages, Allegation & Mixture, Direction, Blood relation, Simple & Compound interest, Permutation & Combination.

	Total Lecture Hours	**48 hours**

Textbook:

S.No	**Book Title**	**Author**
1	Statistical Methods, Sultan Chand & Sons.	S. P. Gupta
2	Business Statistics, Pearson Education, New Delhi.	Sharma, J. K.
3	Higher Engineering Mathematics, Khanna Publisher.	B. S. Grewal
4	Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.	J. N. Kapur

Reference Books:

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S. No.	Book Title:	Author
1	"Business Statistics and Applied Orientation", Pearson Education.	Vishwanathan, P. K.
2	"Quantitative Analysis for Management"	Pearson Education.
3	"Quantitative Aptitude"	R.S. Aggrawal

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://youtu.be/XaHFNhHfXwQ?si=OJKYu_BVt4n88ONp https://youtu.be/BsVtMnp3vks?si=orRM338vLgBE-hQS https://www.youtube.com/watch?v=OQV8WmUdeIo&list=PLbMVogVj5nJSpj5sl-8tdKARg1lw2wEa-&index=1&pp=iAQB https://www.youtube.com/watch?v=LhGFXO1NQLk&list=PLbMVogVj5nJSpj5sl-8tdKARg1lw2wEa-&index=6&pp=iAQB https://youtu.be/TWd42yUBZkk?si=PA4D8KQ-HgF65ebs
Module 2	https://www.youtube.com/watch?v=r1sLCDA-kNY&list=PL8AE5D5CCA85AE91D&index=1&pp=iAQB https://www.youtube.com/watch?v=bpKarwfDRIk&list=PL8AE5D5CCA85AE91D&index=4&pp=iAQB https://youtu.be/cp7_ZF2kNi4?si=AgRIQVjIZkRg4nbZ https://www.youtube.com/watch?v=p1Y4yJ1XnKY&list=PLbMVogVj5nJQWowhOG0-K-yI-bwRRmm3C&index=5&pp=iAQB https://www.youtube.com/watch?v=tD71garAJw&list=PLbMVogVj5nJQWowhOG0-K-yI-bwRRmm3C&index=8&pp=iAQB
Module 3	https://www.youtube.com/watch?v=hKsaduxYTwY&list=PLbMVogVj5nJQWowhOG0-K-yI-bwRRmm3C&index=11&pp=iAQB https://youtu.be/Hw8KHNgRaOE?si=JwNNKHla7rpHfyV
Module 4	https://youtu.be/8oNGkvuRP60?si=BHzOpDH-gUAHswqq https://www.youtube.com/watch?v=RmAPM83TKc&list=PLbMVogVj5nJQWowhOG0-K-yI-bwRRmm3C&index=14&pp=iAQB https://youtu.be/-l2Y3L7Rz-o?si=uEyngO_sV2_fZMJL https://www.youtube.com/watch?v=-l2Y3L7Rz-o&t=3s&pp=ygUdbmVwdGwgenRlc3QgdCB0ZXN0IGh5cG90aGVzaXM%3D
Module 5	https://www.youtube.com/watch?v=7pxyYDUgTEg&pp=ygUgdW5hY2FkZW15ICBQYXJ0bmVyc2hpcCwgYXB0aXR1ZGU%3D https://www.youtube.com/watch?v=SKQGxLRSuPA&list=PLhuxFrOdsq-uOv_vVNTr-1iCWDlTIlO6 https://www.youtube.com/watch?v=ekja4lipIbc&pp=ygUddW5hY2FkZW15ICBEaXJlY3Rpb24gYXB0aXR1ZGU%3D

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Applications

Course Code: CBCA0205	**Course Name:** Constitution of India	**L**	**T**	**P**	**C**
Course Offered in: BCA		**1**	**0**	**0**	**1**

Pre-requisite: None

Course Objectives: To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Identify and explore the basic features and modalities about Indian constitution.	K2
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K4
CO3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO4	Discover and apply different laws and regulations related to engineering practices.	K3
CO5	Correlate role of engineers with different organizations and governance models	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	1	2	2	1	2	1	3	2
CO2	1	2	2	1	2	1	3	2
CO3	1	2	2	1	2	1	3	2
CO4	2	3	3	2	2	2	3	3
CO5	2	2	3	2	3	2	3	3

Course Contents / Syllabus

Module 1	**INTRODUCTION AND BASIC INFORMATION ABOUT INDIAN CONSTITUTION**	**8 hours**

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

Module 2	**UNION EXECUTIVE AND STATE EXECUTIVE**	**8 hours**

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice- President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

Module 3	**INTRODUCTION AND BASIC INFORMATION ABOUT LEGAL SYSTEM**	**8 hours**

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

Module 4	**INTELLECTUAL PROPERTY LAWS AND REGULATION TO INFORMATION**	**8 hours**

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

Module 5	**BUSINESS ORGANIZATIONS AND E-GOVERNANCE**	**8 hours**

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association,

Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

Total Lecture Hours	**40 hours**

Textbook:

S. No	Book Title	Author
1	Indian Polity for civil services and other State Examination,6th Edition, Mc Graw Hill	M Laxmikanth
2	Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.	Brij Kishore Sharma
3	The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press	Granville Austin

Reference Books:

S.No	Book Title	Author
1	The Indian Constitution, Oxford University Press.	Madhav Khosla
2	The Constitution of India, Latest Edition, Universal Law Publishing.	PM Bakshi
3	Law Relating to Intellectual Property Rights (2007)	V.K. Ahuja

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://youtu.be/sDstf8ockUo
Module 2	https://youtu.be/b_OVBwru7OA
Module 3	https://youtu.be/e9XHg-AFB9c
Module 4	https://youtu.be/WvduZOWoft0
Module 5	https://youtu.be/Wdjte5A1wVw

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Applications

Course Code: CBCA0256	**Course Name:** Problem Solving using Python	**L**	**T**	**P**	**C**
Course Offered in: BCA		0	0	6	3

Pre-requisite: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Objectives: Objective of this course is to impart knowledge of basic building blocks of Python programming, provide skills to design algorithms for problem solving, implementation and debugging of programs in Python using modules & packages, disseminate the knowledge of basic data structures.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Identify python programming concepts, tools and real-world applications.	K1
CO2	Describe decision-making and iterative control statements in Python	K4
CO3	Illustrate user-defined function and modules in Python.	K4
CO4	Summarize Python data structures –lists, tuples, set, dictionaries.	K5
CO5	Acquire the skills to manage file operations and handling exceptions in Python.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	1	1	1	2
CO2	3	2	2	3	2	1	1	3
CO3	3	3	3	3	1	1	1	3
CO4	3	3	3	3	2	1	1	3
CO5	3	3	3	3	2	1	2	3

Course Contents / Syllabus

Module 1	**BASICS OF PYTHON PROGRAMMING, ELEMENTS OF PYTHON**	**8 hours**

Problem Solving, Techniques, Algorithm, Building blocks of algorithms (statements, state, control flow, functions), Notation, Flow chart, Pseudo code, programming language, Categories of programming languages. A Brief History of Python, Applications areas of python, The Programming Cycle for Python, Python IDE, Interacting with Python Programs.
Keywords and identifiers, variables, data types and type conversion, operators in python, expressions in python, strings.

Module 2	**CONDITIONALS, LOOPS**	**8 hours**

Conditional statement in Python (if-else statement, its working and execution). Nested-if statement and elseif statement in Python, Expression Evaluation & Float Representation.
Purpose and working of loops, while loop, For Loop, Nested Loops, Break and Continue, pass statement.

Module 3	**FUNCTION AND MODULES, MODULES AND PACKAGES**	**8 hours**

Introduction of Function, calling a function, Function arguments, built in function, scope rules. Passing function to a function, recursion, Lambda functions.
Importing Modules, writing own modules, Standard library modules, dir() Function, Packages in Python.

Module 4	**STRINGS, PYTHON BASIC DATA STRUCTURE**	**8 hours**

Basic operations, Indexing and Slicing of Strings, Comparing strings.
Regular expressions. Python Basic Data Structure: Sequence, Unpacking Sequences, Mutable Sequences, Lists, Looping in lists, Tuples, Sets, Dictionaries. Map, filter, Reduce, Comprehension.

Module 5	**FILES AND DIRECTORIES, EXCEPTION HANDLING**	**8 hours**

Introduction to File Handling in Python, Reading and Writing files, Additional file methods, Working with Directories.
Exception Handling, Errors, Run Time Errors, Handling IO Exception, Try-except statement, Raise.

	Total Lecture Hours	**40 hours**

Textbook:

S.No	**Book Title**	**Author**
1.	"Introduction to Computation and Programming Using Python" , Revised and expanded Edition, MITPress,2013.	John V Guttag
2.	Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.	Charles Dierbach
3.	Kevin Wayne, Robert Dondero: Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd, 2016.	Robert Sedgewick

Reference Books:

S.No	Book Title	Author
1.	"Python programming", Universities Press 2018.	Ch Satyanarayana M Radhika Mani, B N Jagadesh
2.	"Core Python Programming", Pearson Education, Second Edition, 2007.	Wesley J. Chun,
3.	"Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O 'Reilly Publishers, 2016	Allen B. Downey
4.	Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,2015.	Timothy A. Budd

NPTEL/ Youtube/ Faculty Video Link:

Module 1	https://www.youtube.com/watch?v=_uQrJ0TkZlc
Module 2	https://www.youtube.com/watch?v=PqFKRqpHrjw&list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3&index=23
Module 3	https://www.youtube.com/watch?v=0ZvaDa8eT5s&list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3&index=25
Module 4	nptel.ac.in/courses/106106145
Module 5	https://www.youtube.com/watch?v=Vy2l3lGAb2I

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Computer Applications

LAB Course Code: CBCA0256	**LAB Course Name:** Problem Solving using Python Lab	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**6**	**3**

Pre-requisite: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Objectives:

Objective of this course is to impart knowledge of basic building blocks of Python programming, provide skills to design algorithms for problem solving, implementation and debugging of programs in Python using modules & packages, disseminate the knowledge of basic data structures.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Implement python programming logic.	K3
CO2	Develop decision-making and iterative control statements in Python.	K4
CO3	Create user defined functions and modules in python.	K4
CO4	Demonstrate the use of python data structures–lists, tuples, set, dictionaries.	K5
CO5	Apply file operations and exceptional handlings in Python.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	1	1	1	2
CO2	3	2	2	3	2	1	1	3
CO3	3	3	3	3	1	1	1	3
CO4	3	3	3	3	2	1	1	3
CO5	3	3	3	3	2	1	2	3

List Of Practical's (Indicative & Not Limited To)

Basic Python (Syntax, Variable, Type Conversion)

1. Python Program to Print Statement.
2. Swap two variables without using a temporary variable.
3. Convert a string to an integer.
4. Convert an integer to a string.
5. WAP to demonstrate implicit and explicit type conversion.

Operators

6. Write a program to Calculate Sum of 5 Subjects and Find Percentage (Max Mark in each subject is 100).
7. Write a program to find gross salary.
8. Write a program to Calculate Area of Rectangle, Square.
9. Write a program to Calculate Area of Scalene Triangle and Right-angle Triangle.
10. Write a program to find the perimeter of a circle, rectangle and triangle.
11. Write a program to Compute Simple Interest.
12. Write a program to Convert Fahrenheit temperature in to Celsius.
13. Write a program to apply bitwise operations on a=8, b=3.
14. Write a program to apply identity operators.
15. Write a program to Swap the Contents of two Numbers using Bitwise XOR Operation
16. Write a program to Add two Complex Numbers.
17. Write a Program to find roots of a quadratic expression.

Logical Operator

18. Write a program to apply Logical AND operator on two operands.
19. Write a program to apply Logical OR operator on two operands.
20. Write a program to apply Logical NOT operator on an operand.

Bitwise Operator

21. Program to perform bitwise AND, OR, XOR, left shift, and right shift operations.

22. Program to check if a given number is odd or even using bitwise operators.

Conditional Statements

23. Write a program to Accept two Integers and Check if they are Equal.
24. Write a program to Check if a given Integer is Positive or Negative and Odd or Even.
25. Write a program to Check if a given integer is Divisible by 7 or not.
26. Write a program to find the greatest of three numbers using else if ladder.
27. Write a program to find the greatest of three numbers using Nested if.
28. Write a program to convert an Upper-case character into lower case and vice-versa.
29. Write a program to check weather an entered year is leap year or not.
30. Write a Program to check whether an alphabet entered by the user is a vowel or a constant.
31. Write a program to print day according to the day number entered by the user.
32. Write a program to print color name, if user enters the first letter of the color name.
33. WAP that accepts the marks of 5 subjects and finds the percentage marks obtained by the student. It also prints grades according to the following criteria: Between 90- 100% Print 'A', 80-90% Print 'B', 60-80% Print 'C', 50-60% Print 'D', 40-50% Print 'E', Below 40% Print 'F'.
34. WAP to enter a character and then determine whether it is a vowel, consonants, or a digit.

Loops

35. Write a program to display all even numbers from 1 to 20
36. Write a program to print all the Numbers Divisible by 7 from 1 to 100.
37. Write a program to print table of any number.
38. Write a program to Find the Sum of first 50 Natural Numbers using for Loop.
39. Write a program to calculate factorial of a given number using for loop and while loop.
40. Write a program to count the sum of digits in the entered number.
41. Write a program to find the reverse of a given number.
42. Write a program to Check whether a given Number is Perfect Number.
43. Write a program to Print Armstrong Number from 1 to 1000.
44. Write a program to Compute the Value of Xn.
45. Write a program to Calculate the value of nCr.
46. Write a program to generate the Fibonacci Series.
47. Write a program to check whether a given Number is Palindrome or Not.
48. Write a program to Check whether a given Number is an Armstrong Number.
49. Write a program to print all prime numbers from 1-500.
50. Write a program to display the following pattern:

```
*
* *
* * *
* * * *
* * * * *
```

51. Write a program to display the following pattern:

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

52. Write a program to display the following pattern:

A

B B

C C C

D D D D

E E E E E

53. Write a program to display the following pattern:

* * * * *
 * * * *
  * * *
   * *
    *

54. Write a program to display the following pattern:

1 2 3 4 5
1 2 3 4
1 2 3
1 2
1

55. Write a program to display the following pattern:

* * * * * * * * *
* * * * * * *
* * * * *
* * *
*

56. Write a program to display the following pattern (Pascal Triangle):

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

57. Write a program to display the following pattern:

1

2 3

4 5 6

7 8 9 10

58. Write a program to display the following pattern:

A B C D E F G F E D C B A
A B C D E F F E D C B A
A B C D E E D C B A
A B C D D C B A

59. Write a program to display the following pattern:

A
BAB

CBABC
DCBABCD
EDCBABCDE

60. Write a program to Find the Sum of A.P Series.
61. Write a program to find the Sum of following Series:
(1*1) + (2*2) + (3*3) + (4*4) + (5*5) + ... + (n*n)
62. Write a program to find the Sum of following Series: (1^1) + (2^2) + (3^3) + (4^4) + (5^5) + ... + (n^n)
63. Write a program to find the Sum of following Series:
(1!/1) + (2!/2) + (3!/3) + (4!/4) + (5!/5) + ... + (n!/n)
64. Write a program to print the following Series:
1, 2, 3, 6, 9, 18, 27, 54, ... up to n terms
65. Write a program to print the following Series:
2, 15, 41, 80, 132, 197, 275, 366, 470, 587
66. Write a program to print the following Series:1, 3, 4, 8, 15, 27, 50, 92, 169, 311
67. Write a program to Convert the given Binary Number into Decimal.
68. Write a program to find out L.C.M. of two numbers.
69. Write a program to find out H.C.F. of two numbers.
70. Python Program to Accept Three Digits and Print all Possible Combinations from the Digits.
71. Python Program to Count the Number of Digits in a Number.

Functions

72. Write a Python function to find the Max of three numbers.
73. Write a Python function to sum all the numbers in a list.

Sample List: (8, 2, 3, 0, 7)
Expected Output: 20

74. Write a Python program to reverse a string.
Sample String: "1234abcd" Expected Output: "dcba4321"
75. Write a Python function to check whether a number falls in a given range.
76. Write a Python function that accepts a string and calculates the number of upper-case letters and lower-case letters.
Sample String: 'The quick Brow Fox'
Expected Output: No. of Upper case characters: 3 No. of Lower case Characters: 1
77. Write a Python function that takes a number as a parameter and check the number is prime or not.
78. Write a Python function that checks whether a passed string is palindrome or not.
79. Write a Python function that prints out the first n rows of Pascal's triangle.
80. Write a Python function that accepts a hyphen-separated sequence of words as input and prints the words in a hyphen-separated sequence after sorting them alphabetically.
Sample Items: green-red-yellow-black-white
81. Python function to convert height (in feet and inches) to centimeters.
82. Python function to Convert Celsius to Fahrenheit.
83. Implement a function to check if two strings are anagrams of each other.
84. Python function to display all the Armstrong number from 1 to n.

Recursion

85. Write a program using recursion to compute factorial of a given number.
86. Write a program to print Fibonacci Series using recursion.
87. Write a program to calculate sum of numbers 1 to N using recursion.
88. Write a program to Find Sum of Digits of the Number using Recursive Function.
89. Write a program to print Tower of Hanoi using recursion.
90. Python Program to Determine How Many Times a Given Letter Occurs in a String recursively
91. Python Program to Find the Binary Equivalent of a Number Recursively.
Modules and Packages
92. Write a program to create a module and import the module in another python program.
93. Write a program to import all objects from a modules, specific objects from module and provide custom import name to the imported object from the module.
94. Create a python package having at least two modules in it.
95. Create a python package having at least one subpackage in it.
String
96. Python program to check whether the string is Symmetrical or Palindrome.
97. Ways to remove ith character from string in Python
98. Python program to Check if a Substring is Present in a Given String
99. Find length of a string in python (4 ways)
100. Python program to print even length words in a string
101. Python program to accept the strings which contains all vowels
102. Remove all duplicates from a given string in Python
103. Python program to Maximum frequency character in String
104. Python Program to Replace all Occurrences of ‘a’ with $ in a String
105. Python Program to Form a New String where the First Character and the Last Character have been Exchanged.
106. Python Program to Count the Number of Vowels in a String.
107. Python Program to Take in a String and Replace Every Blank Space with Hyphen
108. Python Program to Calculate the Length of a String Without Using a Library Function
109. Python Program to Remove the Characters of Odd Index Values in a String
110. Python Program to Calculate the Number of Words and the Number of Characters Present in a String
111. Python Program to Take in Two Strings and Display the Larger String without Using Built-in Functions.
112. Python Program to Check if a String is a Pangram or Not (A pangram is a sentence that uses all 26 letters of the English alphabet at least once. like” The quick brown fox jumps over the lazy dog”)
113. Python Program to Accept a Hyphen Separated Sequence of Words as Input and Print the Words in a Hyphen-Separated Sequence after Sorting them Alphabetically
114. Python Program to Form a New String Made of the First 2 and Last 2 characters From a Given String
115. Python Program to Count the Occurrences of Each character in a Given String Sentence
116. Python Program to Check if a Substring is Present in a Given String
117. Python Program to Find the Most Repeated Word in a String.
Regular Expression

118. Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:
    i) Contain at least 1 letter between a and z.
    ii) Contain at least 1 number between 0 and 9.
    iii) Contain at least 1 letter between A and Z.
    iv) Contain at least 1 character from $,#,@.
    v) Maximum length of password 6.
    vi) Maximum length of password:12.
119. Write a python program to validate mobile number.
120. Given an input file which contains a list of names and phone numbers separated by spaces in the following:
    i) Phone numbers contain a 3- or 2-digit area code and a hyphen followed by an 8-digit number.
    ii) Find all names having phone number with a 3digit area code using regular expression.

List

121. Program to interchange first and last elements in a list.
122. WAP to find min, max and average of elements of a list having numeric data.
123. Program to check if element exists in list.
124. Program for Reversing a List.
125. Program to Multiply all numbers in the list.
126. Program to find smallest and largest number in a list
127. Program to find second largest number in a list
128. Program to print all even numbers in a range
129. Program to print all negative numbers in a range
130. Program to Remove multiple elements from a list in Python
131. Program to Cloning or Copying a list
132. Program to Count occurrences of an element in a list
133. Program to find Cumulative sum of a list.
134. Program to Break a list into chunks of size N in Python.
135. Python Program to transpose of Matrix.
136. Python Program to Add Two Matrices.
137. Python Program to Multiply Two Matrices.
138. Program to get Kth Column of matrix.
139. WAP to print all even numbers of a list using list comprehension.
140. WAP that prompts user to enter an alphabet and then print all the words that starts with that alphabet from the list of words.
141. WAP to transpose a given matrix using list comprehension.
142. Print All the characters of a string using list Comprehension
143. Write a program to calculate square of numbers up to n using list comprehension.

Tuple

144. Python program to Find the size of a Tuple.

145. Python – Maximum and Minimum Kth elements in Tuple.
146. Create a list of tuples from given list having number and its cube in each tuple.
147. Python – Flatten tuple of List to tuple.
Set
148. Python Program to Count the Number of Vowels Present in a String using Sets.
149. Python Program to Check Common Letters in Two Input Strings
150. Python Program that Displays which Letters are in the First String but not in the Second
Dictionary
151. Python Program to Add a Key-Value Pair to the Dictionary
152. Python Program to Concatenate Two Dictionaries into One.
153. Python Program to Check if a Given Key Exists in a Dictionary or Not
154. Python Program to Generate a Dictionary that Contains Numbers (between 1 and n) in the Form (x,x*x).
155. Python program to create an instance of an Ordered dict using a given dictionary. Sort the dictionary during the creation and print the members of the dictionary in reverse order.
156. Python Program to Sum All the Items in a Dictionary
157. WAP to create dictionary which has characters of given string as keys and frequency of characters as values.
158. Python Program to Multiply All the Items in a Dictionary
159. Python Program to Remove the Given Key from a Dictionary
160. Python Program to Form a Dictionary from an Object of a Class
161. Python Program to Map Two Lists into a Dictionary
Comprehension
162. Write a program Filtering even numbers from a list using tuple comprehension
163. Creating a list of tuples from two lists using comprehension function
164. Extracting the first character from each word in a list of strings
165. Swapping keys and values in a dictionary.
166. Filtering even numbers from a dictionary.
167. Write a Program to calculate square of number using dictionary comprehension
File handling and Exceptional Handling
168. Python program to read file word by word
169. Python program to read character by character from a file
170. Python – Get number of characters, words, spaces and lines in a file
171. Program to Find ‘n’ Character Words in a Text File
172. Python Program to obtain the line number in which given word is present
173. Count number of lines in a text file in Python
174. Python Program to remove lines starting with any prefix
175. Python Program to Eliminate repeated lines from a file
176. Python Program to read List of Dictionaries from File

177. Python – Append content of one text file to another

178. Python program to copy odd lines of one file to other

179. Python Program to merge two files into a third file

180. Python program to Reverse a single line of a text file

181. Python program to reverse the content of a file and store it in another file

182. Python Program to handle divide by zero exception.

183. WAP to handle multiple exception.

184. Python program to combine each line from first file with the corresponding line in second file.

185. Write a program to copy the contents of one file to another.

186. Write a program to print First 5 lines in a file.

187. A). Write a program to catch the following exception:

i) Value error
ii) Index error
iii) Name error
iv) Type error
v) Divide zero error

B). Write a program to create user defined exceptions.

C). Write a program to understand the use of else and finally block with try block.

D). Write a python program that uses raise and exception class to throw an exception

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LAB Course Code: CBCA0251	**LAB Course Name:** Data Structure Lab	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**2**	**1**

Pre-requisite: Knowledge of programming languages, basics of mathematics, organizing & problem-solving ability.

Course Objectives:

Learn the basic concepts of algorithm analysis, along with implementation of linear and non-linear data structures.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Analyse systematic approach to organizing, writing and debugging Array programs.	K4
CO2	Implement Stack and Queue.	K3
CO3	Develop operations of linked list.	K5
CO4	Construct non-linear data structure operations.	K5
CO5	Implement sorting and searching algorithms using relevant data structures.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	1	1	1	2
CO2	3	3	2	2	2	1	1	1
CO3	3	3	3	2	2	1	1	2
CO4	3	3	3	3	2	1	2	2
CO5	3	3	3	3	2	1	1	2

List Of Practical's (Indicative & Not Limited To)

1. Create a program to find the maximum element in an array.
2. Design a Code to calculate the sum of all elements in an array.
3. Write a program to reverse the elements of an array.
4. Design a Code to check if an array is sorted in ascending order.
5. Design a Code to count the occurrence of a specific element in an array.
6. Write a program creation and traversal of 2D Array in row major and column major order.
7. Write a program to print the transpose of a given matrix using function.
8. Program to find if a given matrix is Sparse or Not and print Sparse Matrix.

Searching

9. Create a code to Implement Linear Search
10. Write a program to implement Binary Search

Stack

11. Implementation of stack using a list.
12. Construct a python code to Infix to postfix conversion using a stack.
13. Construct a code for Balanced parentheses checker using a stack
14. Implement Reverse a string using a stack.
15. Implement Binary Search using Recursion.
16. Construct a python program to print Fibonacci Series using Recursion.

Queue

17. Queue implementation using a list
18. Construct a code for Simulating a printer queue using a queue.
19. Construct a code for Implementing a circular queue.
20. Implement queue using stack.

Linked List

21. Create a single linked list and perform basic operations (insertion, deletion, traversal).
22. Create a double linked list and perform basic operations (insertion, deletion, traversal).
23. Create a circular linked list and perform basic operations (insertion, deletion, traversal).
24. Reverse a single linked list.
25. Check if a linked list is palindrome.
26. Reverse a double linked list.

27. Find the middle element of a single linked list.
28. Find the middle element of a double linked list.
29. Merge two sorted single linked lists.
30. Detect and remove a loop in a circular linked list.
Binary Tree
31. Construct a code to Insert, Delete and search and update a data in Binary Search Tree (BST)
32. Construct a code for Tree Traversal (Preorder, Inorder, Postorder).
33. Construct a code Count the number of Leaves in a Binary Tree
34. Construct a code to find the Height of a Binary Tree
35. Construct a code to print all Paths from the Root to Leaf Nodes in a Binary Tree
36. Construct a code to convert a Binary Tree to its Mirror Tree
BST
37. Construct a code to find the Node with Minimum Value in a Binary Search Tree.
38. Construct a code for Binary Search Tree (BST) Implementation.
39. A program to check if a Binary Tree is a Binary Search Tree (BST)
AVL Tree
40. Construct a code to check if a Binary Tree is a Balanced Binary Tree
Graph
41. Construct a code to represent graph using adjacency matrix and adjacency list.
42. Implement BFS and DFS algorithm.
43. Implement the minimum cost spanning tree.
Sorting
44. Implement bubble sort in a non-recursive way.
45. Implement selection sort in a non-recursive way.
46. Implement insertion sort in a non-recursive way.
47. Implement Merge sort in a non-recursive way.
48. Implement Merge sort in a recursive way.
49. Implement Quick sort in a recursive way.
50. Implement Heap sort in a non-recursive way
Total Hours: 48 hrs.

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LAB Course Code: CBCA0255	**LAB Course Name:** Workplace Communication Lab 2	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**4**	**2**

Pre-requisite: The students should have completed the Workplace Communication course in the first semester

Course Objectives:

- To improve proficiency in Business English to the B1/B2 (Intermediate) of CEFR.
- To understand the nuances of communication, both verbal and non-verbal.
- To train for career enhancement.
- To incorporate the key concepts of ethics, etiquette, and life skills.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Understand the role and importance of various communication skills essential for career development.	K2
CO2	Develop and apply effective listening skills in both personal and professional contexts.	K6
CO3	Demonstrate fluency and spontaneity while speaking.	K3
CO4	Read and interpret complex written texts.	K2
CO5	Construct clear and concise texts on a variety of topics.	K6

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	-	1	-	-	3	-	-	3
CO2	-	-	-	-	3	-	-	2
CO3	-	-	-	-	3	-	-	2
CO4	-	2	-	-	-	-	-	2
CO5	-	1	-	-	3	-	-	2

List Of Practical's (Indicative & Not Limited To)

1.	**Introduction to the course and the evaluation scheme** Students will gain knowledge about the Examination pattern.
2.	**Active Listening Role-Play** Students pair up and take turns playing the roles of speaker and listener in various scenarios. They practice active listening techniques such as paraphrasing and asking clarifying questions.
3.	**Professional Self-Introduction** Students prepare and deliver brief introductions, focusing on clarity and professionalism. They receive peer feedback on content and delivery.
4.	**Annotating Professional Documents** Students read sample professional documents and practice annotating them to highlight main ideas, key terms, and important details. This activity enhances their reading comprehension and analytical skills.
5.	**Writing Reflective Journal Entries** Students maintain a reflective journal throughout the session, documenting their learning experiences, insights, and reflections on communication practices. This activity encourages self-awareness and critical thinking while strengthening writing skills.
6.	**Active Listening in Group Networking Sessions** Students participate in group networking sessions where they actively listen to others' introductions and conversations. They practice building connections based on what they hear.
7.	**Small Talk Practice Sessions** Students participate in small group discussions where they practice initiating and sustaining small talk conversations.
8.	**Reading for Tone and Intention** Students will read paragraphs of different genres and try to comprehend the tone and intention of the writer.
9.	**Writing Responses to Common Text Messages** Students practice writing short and effective text responses to hypothetical scenarios or prompts. They learn to convey their

	message clearly and concisely.
10.	**Listening Comprehension Quiz** Students listen to a recorded webinar or online meeting and then take a comprehension quiz based on the content discussed.
11.	**Virtual Panel Discussion** Students participate in a virtual panel discussion on a topic related to digital communication. Each student takes on a role and presents their perspective clearly and confidently, fostering effective communication skills in virtual settings.
12.	**Analyzing Digital Content** Students analyze online articles or posts and evaluate the evidence and logic presented.
13.	**Creating Digital Etiquette Guides** Students research and compile guidelines for digital writing ethics and etiquette. They create informative documents or presentations outlining best practices for communication in digital environments.
14.	**Identifying Barriers to Effective Listening** Students participate in a listening exercise where they encounter various barriers such as distractions, preconceptions, and multitasking. They reflect on how these barriers affect their ability to listen effectively and discuss strategies for overcoming them.
15.	**Role-Playing Handling Interruptions and Objections** Students engage in role-play where they practice handling interruptions in professional conversations. They learn to respond calmly and confidently while maintaining control of the discussion, improving their ability to manage challenging communication situations.
16.	**Speed-Reading and Comprehension Exercise** Students engage in a speed-reading exercise where they read a passage at an accelerated pace. They then reflect on their comprehension and discuss strategies for balancing reading speed with understanding effectively.
17.	**Miscommunication Reflection** Students reflect on instances of miscommunication in writing. They learn to avoid miscommunication.
18.	**Listen and speak** Participants will listen to their peers reading aloud and write down the gist; and will repeat verbatim what is read.
19.	**Choosing a topic and speaking on it** Students experiment with different opening techniques, such as storytelling, asking a thought-provoking question, or sharing a surprising statistic, to hook the audience's attention at the beginning of their presentations. They receive feedback on the effectiveness of their openings.
20.	**Group Talk** Students find out relevant and trending presentation topics from their field and justify their choice.
21.	**Case Study Analysis** The students will learn critical analysis through real time situations presented in case studies.
22.	**Language Toolbox 3: Language concord** The students will be able to develop and improve their language proficiency.
23.	**Conversations in different situations (through caselets)** Participants will learn to converse in different professional situations.
24.	**Hansei Activity** The students will reflect on the course and share their key learnings.
	Total Hours: 48 hrs.

Required Software and Tools

- British Council English Score Mobile App

Textbooks:

S. No.	Book Title	Author
1.	ABC Workbook,	NIET Publishing House, Meerut, 2023

Reference Book

S. No.	Book Title	Author

1.	Cambridge English Business Benchmark (Pre-intermediate to Intermediate)	2nd edition, Norman Whitby, Cambridge University Press, 2013, UK.
2.	Listening in the Language Classroom	John Field, Cambridge University Press, 2021, UK.
3.	Speaking: Second Language Acquisition, from Theory to Practice	William Littlewood, Cambridge University Press, 2022, UK.
4.	Second Language Writing in Transitional Spaces: Teaching and Learning Across Languages and Cultures	Viniti Vaish and Guangwei Hu, Routledge, 2019, UK.
5.	The Writing Revolution: A Guide to Advancing Thinking Through Writing in All Subjects and Grades	Judith C. Hochman and Natalie
6.	The Cambridge Handbook of Corrective Feedback in Second Language Learning and Teaching	Hossein Nassaji and Eva Kartchava, Cambridge University Press, 2021, UK
7.	IELTS 11: General Training with answers. Cambridge English, 2018	

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LAB Course Code: CBCA0252	**LAB Course Name:** Business Intelligence & Analytics Lab	**L**	**T**	**P**	**C**
Course Offered in: BCA		0	0	2	1

Pre-requisite: Basic understanding of computers and familiarity with Microsoft Excel.

Course Objectives:

Understand the basic of google analytics and how to track website data.

Course Outcome: After completion of the course, the student will be able to		**Bloom's Knowledge Level (KL)**
CO1	Apply advance excel functions to carry out detailed calculations and facilitate data-driven decision-making.	K4
CO2	Implement advanced Excel skills to transform and analyze data, and to create visual representations, formulas, functions, and pivot tables.	K5
CO3	Develop Power BI reports by integrating data sources, visualizations and publishing them as multi-page dashboards.	K4
CO4	Implement interactive dashboards and visual reports to articulate insights and support decision-making processes.	K3
CO5	Analyze website tracking systems that encompass goal creation, event monitoring, and audience behavior analysis to support strategic objectives.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	3	2	1	1	2
CO2	2	2	3	3	2	2	1	2
CO3	2	2	2	3	1	1	1	2
CO4	3	3	3	3	1	1	1	2
CO5	2	3	3	3	3	2	1	2

List Of Practical's (Indicative & Not Limited To)

Advance Excel

1. Integrate Power BI with other Microsoft tools (e.g., Excel, SQL Server).
2. Explore advanced Power BI features (e.g. Machine Learning, R scripting).
3. Create a spreadsheet with basic formulas: SUM, AVERAGE, and COUNT
4. Use colors to highlight cells that meet specific conditions.
5. Use the PivotTable to summarize and analyze data.
6. Create a line chart to display data over time
7. Set up data validation rules to restrict user input.
8. Edit and modify a recorded macro
9. Use conditional formatting to highlight cells that contain errors
10. Use the VLOOKUP function to retrieve data from another table
11. Use the Analysis Tool-Pak (ATP) to perform statistical analysis
12. Use the PivotChart to summarize and analyze data
13. Create a stacked area chart to display data over time
14. Debug errors using the Visual Basic Editor
15. Create an array formula using the SUMIFS function
16. Use functions such as SUM, AVERAGE and COUNT in formulas
17. Edit and modify a recorded macro
18. Debug errors using the Visual Basic Editor
19. Highlight cells that meet multiple conditions using conditional formatting

20. Use the Analysis Tool-Pak (ATP) to perform advanced statistical analysis
Power BI
21. Create a new Power BI report and explore the interface.
22. Connect to a sample data source (e.g., Excel file) and import data into Power BI.
23. Create a new table from the imported data and customize its layout.
24. Filter and sort data in the table using various options.
25. Create a simple chart (e.g., bar chart) from the table data.
26. Add interactivity to the chart by enabling drill-down capabilities.
27. Create a new dashboard with multiple visualizations (e.g., charts, tables).
28. Create measures in the table and use them in visualizations.
29. Create a matrix visualization from the table data.
30. Create a DAX formula to calculate a custom measure.
31. Create a gauge visualization from the table data.
32. Use various visualizations (e.g., maps, trees) to represent data in different ways.
33. Create a KPI card visualization from the table data.
34. Publish the report to Power BI Service and share it with others.
35. Optimize performance by working with large datasets.
36. Create a story in Power BI using multiple visualizations.
37. Use Power BI APIs to automate tasks and integrate with other applications.
38. Create a custom visual using Power BI's visual development tools.
39. Integrate Power BI with other Microsoft tools (e.g., Excel, SQL Server).
40. Explore advanced Power BI features (e.g., machine learning, R scripting).
Google Analytics
41. Set up a Google Analytics account and track a website's basic metrics (e.g. page views, bounce rate, average session duration).
42. Set up goals and ecommerce tracking in Google Analytics.
43. Analyze audience demographics in Google Analytics.
44. Create segments in Google Analytics to analyze specific audience groups.
45. Track events in Google Analytics (e.g. form submissions, button clicks).
46. Analyze referral traffic in Google Analytics
47. Set up funnels in Google Analytics to track user flow
48. Create custom dashboards in Google Analytics.
49. Analyze user flow in Google Analytics
50. Set up A/B testing in Google Analytics
Total Hours: 48 hrs.

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LAB Course Code: CBCA0257	**LAB Course Name:** Field Activities for Community Engagement	**L**	**T**	**P**	**C**
Course Offered in: BCA		**0**	**0**	**2**	**-**

Pre-requisite: None

Course Objectives:

- To develop an appreciation of rural culture, lifestyle and wisdom amongst students.
- To learn about the status of various agricultural and development programs.
- To understand causes for distress and poverty faced by vulnerable households and explore solutions for the same.
- To apply classroom knowledge of courses to field realities and thereby improve quality of learning.

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level (KL)**
CO1	Understand rural life, Indian culture & ethos and social realities.	K2
CO2	Develop a sense of empathy and bonds of mutuality with local community.	K3
CO3	Appreciate significant contributions of local communities to Indian society and economy.	K2
CO4	Learn to value the local knowledge and wisdom of the community.	K2
CO5	Identify opportunities for contributing to community's socioeconomic improvements.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	1	2	1	1	2	1	3	2
CO2	1	2	2	1	3	1	3	2
CO3	1	2	2	1	2	2	3	2
CO4	1	2	2	1	2	1	3	3
CO5	2	3	3	1	3	2	3	3

List Of Practical's (Indicative & Not Limited To)

1. Interaction with Self-Help Group (SHG) women members, and study of their functions and challenges; planning for their skill building and livelihood activities
2. Visit MGNREGA project sites, interact with beneficiaries and interview functionaries at the work site
3. Field visit to Swachh Bharat project sites, conduct analysis and initiate problem-solving measures
4. Conduct Mission Antyodaya surveys to support under Gram Panchayat Development Plan (GPDP)
5. Interactive community exercise with local leaders, panchayat functionaries, grass-root officials and local institutions regarding village development plan preparation and resource mobilization
6. Visit Rural Schools / mid-day meal centers, study academic and infrastructural resources and gaps
7. Participate in Gram Sabha meetings, and study community participation
8. Associate with Social audit exercises at the Gram Panchayat level, and interact with program beneficiaries
9. Visit to local Nagarpalika office and review schemes for urban informal workers and migrants
10. Attend Parent Teacher Association meetings, and interview school drop outs
11. Visit local Anganwadi Centre and observe the services being provided
12. Visit local NGOs, civil society organization's and interact with their staff and beneficiaries,
13. Organize awareness programs, health camps, Disability camps and cleanliness camps
14. Conduct soil health test, drinking water analysis, energy use and fuel efficiency surveys
15. Raise understanding of people's impacts of climate change, building up community's disaster preparedness

Total Hours: 40 hrs.