Integral University, Lucknow

Effective from Session: 2016-2017							
Course Code	CA203	**Title of the Course**	Object Oriented Programming Concepts Using C++	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To learn object-oriented programming paradigms and various object-oriented modeling. • To learn basic concepts, structure syntax of C++. • To learn & implement various programming problems in C++. • To learn & implement advanced programming concepts in C++ • To learn error handling technique in C++ and improve problem solving ability.						

Course Outcomes	
CO1	Know basic knowledge of object-oriented modeling and its application in computer science.
CO2	Understand basic concepts & structure of object-oriented programming language using C++.
CO3	Design and develop various programming problems using basic concepts of C++.
CO4	Learn and implement advance programming concepts of C++ like Inheritance, operator overloading, etc.
CO5	Learn and implement exception handling mechanism for debugging in C++.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Object-Oriented Analysis and Data Modeling	Introduction to Object Oriented Concepts, Object Oriented Analysis Modeling, Data Modeling. Object-Oriented Design: Origin of Object-Oriented Design, Object Oriented Design Concepts, Object Oriented Design methods, Class and object definition, Refining operations, Program Components and Interfaces, Annotation for Object-Oriented Design, Implementation of Detail Design, An alternative Object-Oriented Design Strategy, Integrating OOD with SA/SD.	8	CO1
2	Introduction to OOP and C++	Advantages of OOP, Need of object-oriented programming, Characteristics of object- oriented languages. C++ Programming Basics: Basic program structure, Input/output using cin/cout, Preprocessor Directives, Comments, Integer, Character, Float data types, Manipulators, Operators, Library functions, Enumerated Data Types.	8	CO2
3	Functions	Basic of functions, Passing arguments to and returning values from functions, Reference Arguments, Overloaded functions, Inline functions, Default Arguments, Friend function, Variable and Storage classes, Call by value and Call by reference. Objects and Classes: Using class and object, Constructors, Destructor, Objects as function arguments	8	CO3
4	Arrays and Operator Overloading	Array Fundamentals, Arrays as class member data, Arrays of objects, Strings, Overloading Unary and Binary operators, Data conversion, Pitfalls of overloading and Conversion. Inheritance: Derived class and their constructs, Inheritance levels, Public and Private Inheritance, Overriding member functions.	9	CO4
5	Pointers	Pointers with Arrays, Functions, Strings, Pointer to objects, new-delete, Linked-Lists. Virtual Functions: Virtual, Static function, this pointer. Error Handling: Try –Catch Block, Finally, Throws.	8	CO5

Reference Books:

1. Lafore, Rober S, "The Waite's Group Object Oriented", TMH.
2. Barkakati, Nabajoti, "Object Oriented Programming in C++", Prentice Hall of India.
3. E. Balagrusamy, "Object oriented programming in C++", TMH.

e-Learning Source:

1. https://nptel.ac.in/courses/106105153
2. https://nptel.ac.in/courses/106105151

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	3		1		1		1						3	1				
CO2	3	1	2			1	1						3	1				
CO3		2	3	1	1	2	2						2	2				
CO4	1	1	3	1		2	2						2	2				
CO5	1	1	3	1		1	2						2	2				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2023-2024							
Course Code	CA204	**Title of the Course**	Fundamentals of Database Management System	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To learn the basic knowledge of Database Management System and various types of data models. • To learn the concept and syntax of ER Diagram and the extended ER features. • To learn various constraints and writing SQL queries. • To learn the basic structure of Oracle system. • To learn the concept of Normalization. • To learn the various issues in transaction processing. • To learn the recovery system and basics of concurrency control system.						

Course Outcomes	
CO1	Able to understand the basic concepts of DBMS, Difference between DBMS and File Processing System, applications of DBMS and various DBMS Models.
CO2	Able to understand the basic concepts of ER Model and How to draw ER Diagrams.
CO3	Ability to define various constraints and writing queries using SQL syntax.
CO4	Applying the Relational algebra and Calculus to define expressions for queries and understanding various Normal forms used for Normalization approach.
CO5	Acquainted with the basic issues while implementing the concept of Transaction and recovery.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to Databases	Introduction to Databases: Advantage of Database System, Database System versus File System, View of Data, Database System Concepts and Architecture: Data Models, Schemas and Instances, Three schema architecture and Data Independence, Database Languages and Interfaces, Classification of Database Management Systems.	8	CO1
2	Entity-Relationship Model	Entity-Relationship Model: Basic Concepts, Constraints, Keys: Primary Key, Super key, Candidate key, Entity Types, Entity Sets, Design issues, Entity-Relationship Diagram, Relations, Relationship types, Roles and Structural Constraints, Weak Entity sets, Extended ER Features, Design of E-R Database Schema, Reduction of an E-R Schema to tables.	8	CO2
3	Relational Model and Constraints	Relational model Concepts, Structure of Relational Databases, Constraints: Entity integrity, Referential Integrity, Domain Constraints, Assertions, Triggers, Security and Authorization, Authentication and Encryption. SQL: Data Definition, Constraints, Schema Changes in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Views (in SQL), Specifying General Constraints as Assertion, Additional features. Oracle: Basic Structure of the Oracle System.	8	CO3
4	Relational Algebra	The Relational Algebra, Tuple Relational Calculus, Data Normalization. Functional dependencies, Normal form concepts and Types: First Normal Form, Second Normal Form, Boyce-Codd Normal form, Third Normal form and Fourth Normal Form.	8	CO4
5	Transaction Management and Recovery Techniques	Introduction to Transaction Processing, Transaction Concepts and Properties, Schedules, Serializability of Schedules, Conflict and view serializable schedules, Recovery Concepts, Recovery from Transactions, Introduction to Concurrency Control Techniques.	8	CO5

Reference Books:

1. Elmasri, Nawathe,"Fundamentals of Database Systems", Addison Wesley.
2. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGraw-Hill.

e-Learning Source:

1. https://nptel.ac.in/courses/106105177
2. https://nptel.ac.in/courses/106105175

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	3	1			1	1							3	1				
CO2	3	1	2			1	1	2					2	1				
CO3		2	3	1	1	2	2						3	1				
CO4	1	3	2	2		2	1						2	2				
CO5		2	2	1	1	1		1					2	2				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	CA218	**Title of the Course**	Data Compression and Multimedia System	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	3	1	0	4
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• Explain digital audio, perceptual audio coding and MPEG audio compression standard. • Describe different lossless and lossy image and video compression techniques and standards. • To understand the concept of scalar and vector quantization. • To learn and understand technical aspect of multimedia systems. • To understand the standards available for different audio, video and text applications.						

Course Outcomes	
CO1	Describe and apply various techniques for text compression and also evaluate performance of the coding techniques.
CO2	Understand the operation of scalar and vector quantizer.
CO3	Describe different lossless and lossy image and video compression techniques and standards.
CO4	Developed understanding of technical aspect of multimedia systems.
CO5	Understand various file formats for audio, video and text media.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to Compression Techniques:	Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression. Introduction to Information Theory and Models: Physical models, Probability models, Markov models.	8	CO1
2	Huffman Coding Algorithms:	Minimum variance Huffman codes. Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure, Applications of Huffman coding	8	CO2
3	Arithmetic Coding, Scalar and Vector Quantization:	Arithmetic Coding: Coding a sequence, Generating a Binary code, Comparison of Arithmetic and Huffman coding. Dictionary based compression techniques Static Dictionary: Diagram Coding, Adaptive Dictionary, The LZ77, LZ78 and LZW Approach. Concept of Vector Quantization Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo Gray Algorithm. Image compression Techniques	8	CO3
4	Introduction to Multimedia:	Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Convergence of Computer, Communication and Entertainment products. Stages of Multimedia Projects, Multimedia software's, presentation tools, Tools for object generations, Video, Sound, Image capturing, Authoring tools.	8	CO4
5	Multimedia Building Blocks:	Text, Graphics and Image Data Representations: Popular File Formats, Sound MIDI, Digital Audio, Audio file formats, MIDI under windows environment, Multimedia Network Communications and Applications. Virtual Reality: Intelligent multimedia system, Desktop Virtual Reality (VR). VR operating System.	8	CO5

Reference Books:

1. Khalid Sayood, “Introduction to Data Compression”, Morgan Kaufmann Publishers.
2. David Salomon, “Data Compression: The Complete Reference”, Springer.
3. Buford, “Multimedia Systems”, Addison Wesley.
4. Sleinreitz, “Multimedia System”, Addison Wesley.
5. Fundamentals of Multimedia, Ze-Nian Li and Mark S. Drew School of Computing Science Simon Fraser University, Pearson Education International, ISBN 0-13-127256-X

e-Learning Source:

1. https://in.coursera.org/lecture/algorithms-part2/introduction-to-data-compression-OtmHU
2. https://archive.nptel.ac.in/courses/117/105/117105083/

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	1	3		1		2						3	1				
CO2	3	1	1			1							3	1				
CO3	2	2	1	1		2							3	1				
CO4	1	1	3			1	2	2					1	2				
CO5		3	1	2	1	1							2	3				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2023-2024							
Course Code	CA221	**Title of the Course**	Web Development	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	CA223				
Course Objectives	• To learn web development fundamentals and client server architecture with language of internet & www. • To learn HTML structure to create Web pages and tells the browser how to display them. • To learn CSS (Cascading Style Sheets) for giving style and layout to web pages • To learn basics of client-side Java Script for controlling the behavior of different elements of HTML • To learn Document Object Model (DOM) and its programming interface for web documents.						

Course Outcomes	
CO1	Know about web development fundamentals and client server architecture with web browsers, internet & www.
CO2	Understand HTML Hyper Text Markup Language used to create Web pages and tells the browser how to display them
CO3	Able to understand CSS (Cascading Style Sheets) used to style and layout web pages
CO4	Hands on practice on client-side Java Script for controlling the behavior of different elements of HTML
CO5	Implement Document Object Model (DOM) to accomplish programming interface for web documents.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Web	Web Development Fundamentals, Internet, Protocols, World Wide Web, concept of create, build, and maintain websites and web applications, Fundamentals of Web Design, Webpages and Website, Web applications, Client Server Architecture, Uniform Resource Locator, http and https, IP Addresses and DNS, Domain Names, Static Web Page vs. Dynamic Web Page, Absolute and Relative Paths, Web Browsers	8	CO1
2	Introduction to HTML	HTML: Introduction to HTML, HTML Structure, HTML Tags, Text Formatting, Linking Documents, Hyperlinks and Sections, Lists, Adding Graphics to HTML Documents, HTML Special Characters, Block and Inline Elements, HTML Tables, HTML Forms, HTML Frames DHTML: Introduction to DHTML, DHTML Technologies: XHTML, CSS, JavaScript, Document Object Model (DOM)	8	CO2
3	CSS and CSS3	Introduction to Cascading Style Sheets (CSS), inline, internal and external CSS, CSS coding best practices, Link CSS to HTML web pages, CSS Selectors and Properties, CSS specificity and inheritance, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties, CSS positioning and display properties, CSS media queries, CSS float and clear properties, CSS selector priority, Shorthand Font Property, tools to inspect and diagnose CSS	8	CO3
4	Introduction to JavaScript	Introduction to JavaScript, Advantages, Limitations, Script element, Client-side Script, alert, confirm and prompt, Variables and Operators, Data Types and Num Type Conversion, Math and String Manipulation, String Operations, Objects and Arrays, Date and Time, Conditional Statements, Switch Case, loops in JavaScript, Cookies, Functions, Event handlers, External Script Files, Popup Boxes, Form Handling, Debugging in JavaScript, Firebug, JavaScript Console Object	8	CO4
5	Document Object Model (DOM)	JavaScript DOM API, DOM Manipulation, Common Element Properties, Access Elements through DOM Tree Structure, HTML DOM Event Model, Common DOM Events, Built-in Browser Objects, DOM Hierarchy, Navigator Object, Screen Object, Document and Location, Manipulate and change HTML elements using DOM	8	CO5

Reference Books:

1. Jessica Burdman, "Collaborative Web Development", Pearson Education Asia.
2. Ivan Bayross, "HTML, DHTML, JavaScript, Perl CGI", BPB Publication.
3. Mark O'Ncile, "Web Services – Security", TMH.

e-Learning Source:

1. Institutional Learning Management System i.e Integral Learning Initiative (ILI)
2. NPTEL Video Lectures

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	3		1			1		1										
CO2	3	1	1	1	1													
CO3	3	1	1					1										
CO4	2	1	2	1		2												
CO5	1	1	3			2	1											

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2023-2024							
Course Code	CA222	**Title of the Course**	Discrete Mathematical Structure	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To study the concepts Relation and functions. • To learn Algebraic Structures and Propositional Logic and their application in computer science. • To learn Lattices: Ordered set, Posets and Introduction to Lattices, Properties of lattices. • To learn Introduction of the Language, Kleene closure and finite automata with output and Finite Automata without output. • To learn the concepts of Non-Regular language: Pumping lemma, Introduction to Pushdown Automata, Introduction to Turing Machine.						

Course Outcomes	
CO1	Understand the concepts of relations and functions and terminology.
CO2	Understand the concept Algebraic Structures and Propositional Logic and their application in computer science
CO3	Understand the concept of Lattices: Ordered set, Posets and Introduction to Lattices, Properties of lattices.
CO4	Understand the concepts of Introduction of the Language, Kleene closure and finite automata with output and Finite Automata with output.
CO5	To understand the concepts of Non-Regular language: Pumping lemma, Introduction to Pushdown Automata, Introduction to Turing Machine.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Relation	Relation: Relations on sets, Types of relations in a set, Properties of relations, Composition of relations, Representation of relations, Closures of relations. Function: Types of functions, Composition of functions, Recursively defined function.	7	CO1
2	Algebraic Structures	Algebraic Structures: Properties, Semi Group, Monoid Group, Abelian Group, Properties of Group, Sub-group, Cyclic Group, Cosets, Permutation Group, Homomorphism, Isomorphism and Automorphism of Groups. Propositional Logic: Preposition, Tautologies, Contradictions, Algebra of Proposition, Logical Implication, Logical Equivalence, Normal Forms, Predicates and Quantifiers.	8	CO2
3	Lattices	Lattices: Ordered set, Posets , Hasse diagram, Hasse diagram of partially ordered set Consistent enumeration, Isomorphic ordered set, Well ordered set, Introduction to Lattices, Properties of lattices, Bounded lattices, Distributive lattices, and Complemented lattices.	7	CO3
4	Automata	Automata: Introduction of the Language, Kleene closure, Arithmetic expressions, Regula expressions, Generalized transition graph, Conversion of regular expression to Finit Automata, Non deterministic finite automata, Deterministic finite automata, Conversion of NFA to DFA, Optimization of DFA. Finite Automata with output: Moore machine, Mealy machine, Conversions (Moore machine to Mealy machine and vice-versa).	10	CO4
5	Non-Regular language	Non-Regular language: Pumping lemma, Introduction to Pushdown Automata, Introduction to Turing Machine, Introduction to Chomsky Normal Form (CNF), Chomsky Hierarchy.	8	CO5

Reference Books:

1. Liptschutz, Seymour, “Discrete Mathematics”, TMH. 2.
2. Trembley, J.P and R. Manohar, “Discrete Mathematical Structure with Application to Computer Science”, TMH
3. Hopcroft J.E, Ullman J.D., “Introduction to Automata theory, Languages and Computation”, Narosa Publishing House.
4. C.L.Liu, “Elements of Discrete Mathematics”, McGraw Hill.

e-Learning Source:

1. https://onlinecourses.nptel.ac.in/noc20_cs82/preview
2. https://nptel.ac.in/courses/106106183

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	3	1			1	1		1					3	1				
CO2	3	1	2			1	1						2	2				
CO3	2	2	1	1		2							3	1				
CO4	2	1	1			2	1						2	1				
CO5	2	1	1	1		1							3	1				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2023-2024							
Course Code	CA224	**Title of the Course**	Graph Theory & Applications	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To study the basic concepts of graph and solve the different problems. • To learn concepts of graph theory and their application in the field of computer science. • To study the basic concepts vector representation of graph and introduction to matrix representation of graph. • To study the basic concepts coloring of graph, chromatic number of a graph and chromatic polynomial of a graph. • To learn the concepts of directed graph and introduction to matrix representation.						

Course Outcomes	
CO1	Understand the basic concepts of graph theory and all of the relevant theorems covered in the course.
CO2	Understand the basic concepts of Trees, spanning trees and relevant algorithm.
CO3	Understand the basic concepts Vector space, Matrix and the relevant theorems covered in the course.
CO4	Understand the Coloring concepts and relevant theorem covered in the course.
CO5	Understand the concept of a directed graph and related matrix.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Graphs	Graphs, sub-graphs, some basic properties, Walks, Path & circuits, Connected graphs, Disconnected graphs and component, Euler and Hamiltonian graphs, The traveling salesman problem, Various operation on graphs.	7	CO1
2	Tree	Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal's and Dijkstra Algorithms. Cut-sets and cut vertices, some properties, All cut sets in a graph, Fundamental circuit and cut sets, Connectivity and seperatability.	9	CO2
3	Vector space and Matrix	Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set verses subspaces, orthogonal vectors and subspaces, incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationships among Af, Bf, and Cf, fundamental circuit matrix and rank of B, adjacency matrices, rank-nullity theorem.	8	CO3
4	Coloring	Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem.	8	CO4
5	Directed graph	Directed graph, Types of directed graphs, Directed paths and connectedness, Euler digraph, Trees with directed edges, Fundamental circuit in digraph, Matrices A, B, C of digraph adjacency matrix of digraph.	8	CO5

Reference Books:

1. Deo Narsing, "Graph Theory with applications to engineering and computer science", PHI.
2. Harary F., "Graph Theory-With Applications to Engineering and Computer Science", Narosa Publishing House.
3. Singh S. B, "Combinatorics and Graph Theory", Khanna Book Publishing.
4. Swapan K Sarkar, "Discrete Mathematics", S.Chand Publication.

e-Learning Source:

1. https://nptel.ac.in/courses/111106102
2. https://onlinecourses.nptel.ac.in/noc21_ma68/preview, https://nptel.ac.in/courses/111106050

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	3	1	2	1								3	1				
CO2	2	3	1	2	1		1						2	2				
CO3	3		2			1	1						3	1				
CO4	2	1	1	1		1							3	2				
CO5	2	1	3	1		2	1						2	1				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2016-2017							
Course Code	CA206	**Title of the Course**	C++ Lab	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**0**	**0**	**3**	**2**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To explain basic concepts and techniques of C++. • To explain concepts and techniques to implement overloading. • To explain concepts and techniques to implement functions. • Demonstrate the significance of constructors and destructor and inheritance. • To explain concepts and techniques to implement polymorphism, exception handling and searching, sorting.						

Course Outcomes	
CO1	To develop a program using classes and objects.
CO2	Able to design a program for operator overloading and function overloading.
CO3	To develop a program using friend function, inline function and static member function.
CO4	To develop a program using constructors and destructor and inheritance.
CO5	To develop a program for polymorphism using virtual function, exception handling and searching, sorting.

Unit No.	**Content of Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	OOP	Program illustrating Classes and Objects.	2	CO1
2	Operator Overloading	Program illustrating use of Operator Overloading	2	CO1
3	Function Overloading	Program illustrating use of Function Overloading.	2	CO2
4	Functions	Program illustrating use of Friend function	2	CO2
5	Constructor	Program illustrating Inline function, Static Member functions.	2	CO3
6	Constructor	Program illustrating use of Constructor and various types of Constructor.	2	CO3
7	Inheritance.	Program illustrating various forms of Inheritance.	2	CO4
8	Virtual functions	Program illustrating use of Virtual functions.	2	CO-4
9	Exception Handling	Program illustrating how Exception Handling is done.	2	CO5
10	Implement Algorithms	Program implementing various kinds of Sorting algorithms, Search algorithms.	2	CO5

Reference Books:

1. Lafore, Rober S, "The Waite's Group Object Oriented", TMH.
2. Barkakati, Nabajoti, "Object Oriented Programming in C++", Prentice Hall of India.
3. E. Balagrusamy, "Object oriented programming in C++", TMH.

e-Learning Source:

1. https://nptel.ac.in/courses/106105153
2. https://nptel.ac.in/courses/106105151

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	1	3		1	1							2	1				
CO2	1	1	3	2		1	1						3	1				
CO3	2	1	3	1	1	2	1						1	2				
CO4	1	2	3	2		1	1						2	1				
CO5	2	1	3	1	1	1							2	2				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2016-2017						
Course Code	CA207	**Title of the Course**	DBMS Lab	**L**	**T**	**P**
Year	II	**Semester**	III	**0**	**0**	**2**
Pre-Requisite	None	**Co-requisite**	None			
Course Objectives	● To explain basic database concepts and how to implement the DDL and DML commands in SQL. ● To demonstrate the use of constraints, relational algebra operations and Grouping (Group by clause, Clause). ● To familiarize with use of Aggregate function in queries, concept of granting permissions (Grant, Revoke). ● To develop an understanding of essential DBMS concepts such as joins, union, intersection and also concept of Sub-query, Data constraints (Unique Key, Primary Key, Foreign Key). ● To demonstrate the concept of creating Views, Indexes and Introduction to PL/SQL					

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Tables	Creating tables.	2	CO1
2	Manipulation	Insertion, Deletion, Updation and Retrieval of data	2	CO1
3	Operations	Arithmetic operations, Logical operations and Pattern matching.	2	CO2
4	Aggregate Functions	Use Aggregate function in query.	2	CO2
5	Permissions	Granting permissions (Grant, Revoke).	2	CO3
6	Joins	Write commands for Joins, Union and Intersection.	2	CO4
7	Sub query	Concept of Sub-query.	2	CO4
8	Constraints	Concept of Data constraints (Unique Key, Primary Key, Foreign Key). Creating Views and Indexes. Introduction to PL/SQL. Concept of Grouping (Group by clause, Having Clause).	2	CO5

Reference Books:

1. Elmasri, Nawathe ,“Fundamentals of Database Systems”, Addison Wesley.
2. Silberschatz, Korth, Sudarshan, “Database System Concepts”, McGraw-Hill.

e-Learning Source:

1. https://nptel.ac.in/courses/106105177
2. https://nptel.ac.in/courses/106105175

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	1	3		1	1							2	2				
CO2	2		2	1		2	1						1	2				
CO3	3	1	2	1	1	2							2	1				
CO4	2	2	3	1		2	2						2	2				
CO5	1		3	1	1	1	1						2	1				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2023-2024							
Course Code	CA223	**Title of the Course**	Web Development Lab	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**0**	**0**	**3**	**2**
Pre-Requisite	None	**Co-requisite**	CA221				
Course Objectives	● To learn and apply the basic tags of HTML for creating web pages. ● To learn and create web pages using the multimedia tags of HTML. ● To learn hyperlink and frame tag and create web pages using them. ● To learn JavaScript scripting language and make validations on web pages using JavaScript. ● To learn and design websites using client-side scripting and document object model						

Course Outcomes	
CO1	Able to create web page(s) using HTML tags.
CO2	Able to create web page(s) using HTML and CSS.
CO3	Able to create web page(s) using HTML, CSS and JavaScript
CO4	Able to implement Client Side and Server-Side validations of web page using JavaScript.
CO5	Able to implement client-side scripting using document object model.

Experiment No.	**Title of the Experiment**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Table	Create a CV using table tag.	2	CO1
2	HTML Tag	Create Web Page having one audio and one video file.	2	CO2
3	Frame	Create Web Page using Frame (Only three Frame) also link hyperlinks to its target frame.	2	CO3
4	Java Script	Create JavaScript page and call it to the HTML Page.	2	CO1
5	Multimedia	Create Web Page having Media player with Play stop and Pause.	2	CO2
6	Java Script	Create Web Page to perform calculation on two numbers (Add, Sub, Mul, Div) using JavaScript.	2	CO4
7	External CSS	Create Web Page of Student Registration with proper styling using external CSS.	2	CO3
8	Advanced java JavaScript	Create a HTML Form with some controls and perform JavaScript Form Validation using client-side data validation. If the form is not valid, the form is not submitted until the errors are fixed.	2	CO4
9	Advanced java JavaScript	Create Tic Tac Toe Game using JavaScript.	2	CO4
10	Advanced java JavaScript	Design and implement a small website for the University.	2	CO5

Reference Books:

1. Jessica Burdman, “Collaborative Web Development”, Pearson Education Asia.
2. Ivan Bayross, “HTML, DHTML, JavaScript, Perl CGI”, BPB Publication.
3. Mark O’Ncile, “Web Services – Security”, TMH.

e-Learning Source:

1. Institutional Learning Management System i.e Integral Learning Initiative (ILI)
2. NPTEL Video Lectures

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	1	3		1		1											
CO2	2	1	3	1			1											
CO3	2	2	3	1	1	1												
CO4	1	1	3	2		1	1											
CO5	2	1	3	2			2											

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation