Integral University, Lucknow

Effective from Session:								
Course Code	MT202	**Title of the Course**	COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES	**L**	**T**	**P**	**C**	
Year	II	**Semester**	III	3	1	0	4	
Pre-Requisite	NONE	**Co-requisite**	NONE					
Course Objectives	- The course is aimed to develop the skills in mathematics especially in statistics which is necessary for grooming them into successful graduate. - The topics introduced will serve as basic tools for specializedstudies in science field.							

	Course Outcomes
CO1	Recognize the error in the number generated by the solution and Compute solution of algebraic and transcendental equation bynumerical methods like Bisection method, Newton Rapshon method and other method.
CO2	Apply method of interpolation for equal and unequal interval.
CO3	Apply and Solve Numerical Differentiation & Integration method like Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.
CO4	Find Best Curve fitting for given data for example, Fitting of straight lines, second degree parabola.
CO5	Understand Statistical Methods for Data Analysis and sampling techniques like Test of significance, t-test, F-test, Chi-squaretest, Analysis of Variance.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit I	Error and Computer Arithmetic: Error and their analysis, Normalized Floating point arithmetic. Algebraic and Transcendental equations: Bisection method, Iteration method, False position method, Newton-Raphson method, Rate of convergence of methods. Solutions of simultaneous equations by Gauss Seidel method.	8	CO1
2	Unit II	Finite Differences: Difference operators, Difference tables, relation between operators, missing term techniques, Factorial polynomials. Interpolation for Equal Intervals: Newton's forward and backward formula, Gauss forward and backward formula, Stirling's formula, Bessel's formula. Interpolation for Unequal Intervals: Divided difference, Newton's divided difference formula, Lagrange's Interpolation formula	8	CO2
3	Unit III	Numerical Differentiation and Integration: Numerical differentiation, Numerical integration by Trapezoidal rule, Simpson's 1/3 rule, Simpson's3/8 rule, Boole's rule, Weddle's rule, Euler-Maclaurin's formula.	8	CO3
4	Unit IV	Solution of Differential Equations: Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta Method. Curve Fitting: Method of least squares, Fitting of straight lines, second degree parabola.	8	CO4
5	Unit V	Time Series and Forecasting: Moving average, forecasting models and methods. Testing of Hypothesis: Test of significance, t-test, F-test, Chi-square test, Analysis of Variance.	8	CO5

Reference Books:

1. Q.S. Ahmad, Zubair Khan and S.A. Khan, "Numerical and Statistical Techniques", Ane Books Pvt. Ltd., New Delhi.

2. S.S. Sastry, "Introductory Method of Numerical Analysis" , PHI, New Delhi.

3. P. Kandasamy, "Numerical Methods", S. Chand and Company, New Delhi.

4. Balaguruswamy, "Numerical Methods" , T.M.H. ,New Delhi.

5. Qazi Shoeb Ahmad, M. V. Ismail and S.A.Khan , "Business Mathematics and Statistics" ,Laxmi Publication ,Meerut.

e-Learning Source:

1. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106102157/lec22.pdf

2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/111107105/lec16.pdf

3. https://www.whitman.edu/mathematics/multivariable/multivariable_17_Differential_Equations.pdf

	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	2	2	1	3	3	3	3	1					2	2				
CO2	1	3	2	1	2	2	1	3					1	1				
CO3	3	1	3	2	3	2	3	2					3	3				
CO4	2	1	3	1	2	3	3	2					1	2				
CO5	3	2	1	2	3	2	2	1					3	1				

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

Integral University, Lucknow

Effective from Session: 2016-2017								
Course Code	CA201	**Title of the Course**	COMBINATORICS AND GRAPH THEORY	**L**	**T**	**P**	**C**	
Year	II	**Semester**	III	3	1	0	4	
Pre-Requisite	NONE	**Co-requisite**	NONE					
Course Objectives	- To study the concepts of Fundamentals of permutation and combination and generating function. - To learn recurrence relation and their fundamentals. Describe and solve problems using concepts of generating function and solution of recurrence relations - To learn the basic concepts of graph theory and their application in the field of computer science to solve different problems. - To learn Fundamentals of planar graph, dual graph and vector representation of graph, Introduction to matrix representation of graph. - To learn coloring of graph, chromatic number of a graph and chromatic polynomial of a graph.							

Course Outcomes	
CO1	Understand the different theoretical and cross-disciplinary problems and solve some real time problems using concepts of permutation, combination and concept of generating function
CO2	Understand the structure of recurrence relation and Describe and solve some real time problems using concepts of generating function and solution of recurrence relations.
CO3	Understand the basic concepts of graph theory and all of the relevant theorems covered in the course.
CO4	Understand the concepts in planar graph and matrix representation of graph.
CO5	Understand the coloring concept of a graph, four color theorems, five color theorem and its applications.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Permutation and Combination	Permutation, Combination, Permutation groups and application, Probability, Discrete numeric function and generating function, Combinatorial problems, Difference equation	7	CO1
2	Recurrence Relation	Introduction, Linear recurrence relation with constant coefficient, Homogeneous solution, Particular solution, Total solution, Solution by the method of generating function.	7	CO2
3	Graphs, Tree	Graph, Sub-graphs, Different types of graphs, Basic properties of graphs, Walks, Path and circuits, connected graphs, Disconnected graphs and component, Euler and Hamiltonian graphs, Various operations on graphs. Tree: Tree and fundamental circuits, Distance, Diameters, Radius and pendant vertices, Rooted and binary trees, counting trees, spanning trees, Finding all spanning trees of a graph and a weighted graph.	9	CO3
4	Cut Sets	Cut-sets and cut vertices, Properties of Cut Set, All cut sets in a graph, Fundamental Circuit and cut sets, Connectivity and Seperatability.	9	CO4
5	Coloring	Coloring and covering, Partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Four color problem. 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. John Truss, "Discrete mathematics for Computer Science", TMH.

3. C. L. Liu, "Discrete Mathematics", TMH.

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	CA202	**Title of the Course**	MULTIMEDIA SYSTEM	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	3	1	0	4
Pre-Requisite	NONE	**Co-requisite**	NONE				
Course Objectives	• To learn and understand technical aspect of multimedia systems. • To understand the standards available for different audio, video and text applications. • To design and develop various multimedia systems applicable in real time. • To learn various multimedia authoring systems. • To understand various networking aspects used for multimedia applications.						

Course Outcomes	
CO1	Developed understanding of technical aspect of multimedia systems.
CO2	Understand various file formats for audio, video and text media.
CO3	Develop various multimedia systems applicable in real time.
CO4	Design interactive multimedia software.
CO5	Apply various networking protocols for multimedia applications.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction	Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Convergence of Computer, Communication and Entertainment products. Stages of Multimedia Projects: Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, Tools for object generations, Video, Sound, Image capturing, Authoring tools, Card and page-based authoring tools.	8	CO1
2	Multimedia Building Blocks	Text, Sound MIDI, Digital Audio, Audio file formats, MIDI under windows environment, Audio &Video Capture	7	CO2
3	Data Compression	Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding, Higher Order Modeling, Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio, Loss less & Lossy compression.	9	CO3
4	Speech Compression & Synthesis	Digital Audio concepts, Sampling Variables, Loss less compression of sound, Loss compression & silence compression.	9	CO4
5	Images	Multiple monitors, Bitmaps, Vector drawing, Lossy graphic compression, Image file formats, Animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database, Content based retrieval for text and images, Video: Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and Retrieval of Video Database, Recent development in Multimedia.	8	CO5

Reference Books:

1. Tay Vaughan, "Multimedia, Making IT Work", Osborne McGraw Hill.

2. Buford, "Multimedia Systems", Addison Wesley.

3. Agrawal & Tiwari, "Multimedia Systems", Excel.

4. Mark Nelson, "Data Compression Book", BPB.

5.David Hillman, "Multimedia technology and Applications", Galgotia Publications.

6. Rosch, "Multimedia Bible", Sams Publishing.

7. Sleinreitz, "Multimedia System", Addison Wesley.

e-Learning Source:

1. https://nptel.ac.in/courses/106106200

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	2	3	1	1		2	1					2	1				
CO2	3	1			1								3	1				
CO3		3	2	2	1	2	1	1					2	2				
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: 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

PO-PSO CO	**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: 2016-2017								
Course Code	CA204	Title of the Course	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	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	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 E¬R 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: 2019-20								
Course Code	BM228	Title of the Course	ACCOUNTING AND FINANCIAL MANAGEMENT		L	T	P	C
Year	II	Semester	III		3	1	0	4
Pre-Requisite	NONE	Co-requisite	NONE					
Course Objectives	• The objective of this course is to provide knowledge of Financial Accounting and its application in business and help the students to understand the conceptual framework of financial management and its applications under various environmental constraints.							

Course Outcomes	
CO1	To get the in-depth knowledge of the concept of accounting. To interpret the accounting principles, standards and accounting terminology and its applicability in general and practical life.
CO2	To get the knowledge of Financial Management, its various decision making approaches as well as the methods of analyzing the financial statements.
CO3	Preparation of cost accounting statements in accordance with appropriate methods and standards.
CO4	To understand budget, budgetary control and budgeting approaches in accounting and its usage in the basic accounting arena.
CO5	To be able to prepare fund flow and cash flow statements with needed adjustments. To get the basic knowledge of Working Capital Management and its use in running the business.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Accounting	Meaning, Objective, Scope and Uses of Accounting, Types of Accounting, Fundamentals of Accounting: Concept and Conventions, Meaning of GAAP and IFRS, Books of Accounts: Journal, Ledger, Trial Balance, Profit and Loss Account and Balance Sheet, Accounting for Cash:Cash Book.	8	CO1
2	Financial Management	Meaning, Objective, Importance and Scope of Financial Management, Finance Functions and Various Decisions: Investment Decisions, Finance Decisions, Dividend Decisions, Capital Budgeting Decisions, Analysis of Financial Statement, Ratio Analysis: Liquidity, Solvency, Profitability and Efficiency Ratio, Cost Volume Profit Analysis (Break Even Analysis).	8	CO2
3	Cost Accounting	Meaning, Nature, Need, Elements of Cost, Cost Classification and Allocation of Costs, Absorption and Marginal Costing.	8	CO3
4	Budget and Budgetary Control	Budgetary Approach to Financial Planning, Different types of Budgets, Performance Budgeting, Zero Base Budgeting, Capital Budgeting, Role of Capital Budgeting in Risks and Uncertainties.	8	CO4
5	Fund Flow Statements	Definition, Meaning and Preparation, Cash Flow Statements: Definition, Meaning and Preparation, Working Capital Management: Concept, Nature, Types and Sources of Working Capital in Business.	8	CO5

Reference Books:

1. Kulkarni and Satya Prasad, "Financial Management", Himalaya Publishing House, Himalaya Publishing House Pvt. Ltd.; Fourteenth Edition
2. Chandra, Prasanna: Financial Management, Tata McGraw Hill, Delhi, Tata McGraw Hill Education
3. P.C. Tulsion, "Accountancy", Tata McGraw Hill, Tata Mcgraw Hill, 2-12, ISBN-13: 978   7--48367-5
4. Nand Dhameja and K.S. Sastry, "Finance and Accounting", Wheeler Publishing, Wheeler Publishing, 11TH RPRINT: 2—2

e-Learning Source:

1. Fundamentals of financial and management accounting (https://www.coursera.org/learn/financial-accounting-polimi)
2. Introduction to Financial and Management Accounting (https://www.classcentral.com/course/edx-introduction-to-financial-and-management-accounting-3552)
3. Financial Management Specialization (https://in.coursera.org/specializations/financial-management)
4. Fundamentals of financial and management accounting (https://www.coursera.org/learn/financial-accounting-polimi)

Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	1	2	1		1	1	1	1	3	1
CO2		2	2		1	1	1	1	2	1
CO3	1	1	2		1		1		2	1
CO4		2	1		1				1	2
CO5		2	1		1			1	2	1

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

Integral University, Lucknow

Effective from Session: 2016-2017								
Course Code	CA205	**Title of the Course**	MINI PROJECT		**L**	**T**	**P**	**C**
Year	II	**Semester**	III		0	0	3	2
Pre-Requisite	NONE	**Co-requisite**	NONE					
Course Objectives	- To strengthen the understanding of your fundamentals through effective application of theoretical concepts. - To understand the Project Development Process. - To plan for various activities of the project and distribute the work amongst team members. - To develop student's abilities to transmit technical information clearly and test the same. - To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.							

Course Outcomes	
CO1	Understand how to identify the issues and challenges of industry.
CO2	Understand, plan and execute a Mini Project with team.
CO3	To inculcate innovative thinking and thereby preparing students for main project.
CO4	Prepare a technical report based on the Mini project.
CO5	Deliver technical presentation based on the Mini Project work carried out.

Experiment	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Phase1	To understand and identify the real world problems, able to collect and prepare requirement document.	3	CO1
2	Phase2	To enable students to create very precise plan and solution for the identified problem.	3	CO2
3	Phase3	To build project team among the students for the project.	3	CO3
4	Phase4	To implement the project by using appropriate tools and techniques and prepare a technical mini project report.	3	CO4
5	Phase5	To improve the team building, communication and management skills of the students.	3	CO5

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

e-Learning Source:
1.   https://nptel.ac.in/courses/110104073
2.   https://nptel.ac.in/courses/110104073

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

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		**Co-requisite**						
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.

Experiment No.	Title of the Experiment	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					

Course Outcomes	
CO1	Creating and altering Databases, tables and writing a query using SQL DML/DDL commands.
CO2	Implementing the constraints like Primary key, Foreign key, Unique Key, Null, Not null and various relational algebra operations.
CO3	Using Aggregate functions in SQL with the concept of Grant and Revoke commands.
CO4	Implementing the various joins, sub-queries, set theory commands and Data constraints.
CO5	Using the commands to create Views, Indexes and PL/SQL basics.

Experiment No.	Title of the Experiment	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