15B11CI212 Theoretical Foundations of Computer Science

Propositional and predicate Logic, Proof techniques: Sets, Functions, Recursion, induction, Counting, combinatorics; Relations, closures of relations, equivalence relations, partial orderings, Hasse diagrams, lattices; Graphs, Euler and Hamiltonian paths, planar graphs, graph coloring problem, Boolean algebra, Binary arithmetic, algebraic structures, properties and applications; Introduction to Automata theory: Finite Automata and Regular languages, regular expressions, DFA, NFA, non-regular languages, context-free languages, Turing machine and its examples.

Subject Code	**15B11CI212**	Semester: Third	Session: Odd Sem 2023 Month from August to December 2023
Subject Name	**Theoretical Foundations of Computer Science**		
Credits	4	Contact Hours	3L +1T

Faculty (Names)	Coordinator(s)	Dr. Kavita Pandey (JIIT62), Dr. Himanshu Agrawal (JIIT128)
	Teacher(s) (Alphabetically)	JIIT62: Dr Amit Mishra, Dr Dharmveer Singh Rajpoot, Dr Kapil Madan, Dr Kavita Pandey, Dr Kirti Agarwal, Dr Tarun JIIT128: Dr Arti Jain, Dr Bansidhar Joshi, Dr Himanshu Agrawal, Dr Mukta Goel

COURSE OUTCOMES		**COGNITIVE LEVELS**
C211.1	Explain basic concepts of automata theory and formal languages	Understanding Level (C2)
C211.2	Apply the concepts of set theory, relations and functions in the context of various fields of computer science.	Apply Level (C3)
C211.3	Apply mathematical logic to solve problems.	Apply Level (C3)
C211.4	Evaluate Boolean functions and Analyze algebraic structure using the properties of Boolean algebra.	Analysis Level (C4)
C211.5	Inference formal statements to logical arguments and correlate these arguments to Boolean logic, truth tables, and rules of propositional and predicate calculus.	Analysis Level (C4)
C211.6	Analyze graph theory concepts for designing solutions to various computing problems.	Analysis Level (C4)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction to Discrete Mathematics and Set Theory	Discrete Mathematics: A Brief Introduction, Set Notations, Cardinality of Sets; Some Standard Sets; Venn Diagrams; Operations on Sets; Principle of inclusion and exclusion; Disjoint Sets; Partition; Ordered Set; Cartesian Product of Sets; Algebra of Sets, Bit vector representation of sets.	4
2.	Relations	Domain and Range, Inverse of Relation, Composition of Relations, Different Types of Relations; Partial Order Relation; Hasse Diagram; Lattices; Pictorial or Graphical Representation of Relations; Matrix Representation of Relations; Closure of Relations.	6

3.	Functions and Recursion	Relations vs. functions, Types of functions, composition of functions, Induction, Recursively defined functions, Cardinality, Modeling using Recurrence Relation, Solution of Recurrence Relations, Linear Recurrence Relation with Constant Coefficients.	4
4.	Algebraic Structures	Binary Operations: semi-group, group; Subgroup: Cosets; Ring; Field; Boolean algebra; Binary Arithmetic.	4
5.	Logics	Proposition, Logical Operators, Tautology, Contradiction, Logical Equivalence, Tautological Implication, Converse, Inverse, and Contrapositive, Normal Forms, Arguments validity check, Predicates, Methods of Proof.	5
6.	Counting and Combinatorics	Basic Counting Principle, Permutations and Combinations, Binomial Coefficients, Pigeonhole principle.	3
7.	Graph Theory	Different Types of Graphs, Subgraphs, Operations on Graphs, Walk, Path, and Circuit; Connected Graph, Disconnected Graph, and Components; Euler and Hamiltonian Graphs; Planar Graph; Coloring of Graphs.	5
8.	Automata Theory	Regular Languages: Deterministic finite automata, Non-deterministic finite automata, Regular Expression; Context Free Languages; Turing machine.	11
Total number of Lectures			**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25(Attendance (10), Assignments/Mini-project (15))
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Rosen, K. H., Discrete Mathematics and Its Applications with Combinatorics and Graph Theory, Tata McGraw-Hill, 2017.
2.	Liu, C. L., Elements of Discrete Mathematics, Tata McGraw-Hill, 2018.
3.	Linz, P, An Introduction To Formal Languages And Automata, Narosa Publishing House, 2013.
4.	Sipser, M., Introduction to the Theory of Computation, Second Edition, Thomson Course Technology, 2012.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI311	**Semester Odd (specify Odd/Even)**	**Semester III Session** 2023 -2024 **Month from** July to December
Course Name	Data Structures		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Ankita Wadhwa (J62), Dr. Mukesh Saraswat (J128)
	Teacher(s) (Alphabetically)	J62- Ankita Wadhwa , Deepti Singh, Manish Kumar Thakur, Sarishty Gupta, Tribhuwan K Tiwari J128- Mukesh Saraswat, Krishna Asawa, Neeraj Jain, Varsha Garg

COURSE OUTCOMES		**COGNITIVE LEVELS**
C210.1	Explain abstract data types, memory allocation schemes. and need of linear and non-linear data structures	Understand Level (Level 2)
C210.2	Apply and implement various linear data structures, like array, linked list, stack, and queue in different problems and applications	Apply Level (Level 3)
C210.3	Analyze the performance of various sorting and searching techniques	Analyze Level(Level 4)
C210.4	Demonstrate and implement various operations like search, traverse, insertion, deletion, *etc.* on different non-linear data structures	Apply Level (Level 4)
C210.5	Apply appropriate data structure to design an efficient solution for given and identified problem	Create Level(Level 6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Fundamentals of Linear and Non Linear Data Structures, Memory Allocation – Static and dynamic, Abstract Data Types	2

2.	Linear Data Structures	Implementation of Array, Linked List: Singly, Doubly, Circular, Implementation of Stack and Queue, Stack and Queue operations using STL, Recursion, Recursion removal using Stack	5
3.	Searching and Sorting	Searching – Linear Search, Binary Search, Interpolation Search, Median Search; Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count; Time and Space complexity analysis of searching and sorting algorithms	8
4.	Non-Linear Data Structure – Multi List and Tree	Implementation of Multi List, Binary Tree, K-ary Tree, Binary Search Tree, Threaded Tree, Balanced BST: AVL Tree and RB Tree, B Tree, B+ Tree, Priority Queue using Binary Heap, Binomial Heap, and Fibonacci Heap	17
5.	Non-Linear Data Structure – Graph	Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Basic Algorithms – Shortest Path, Minimum Spanning Tree	4
6.	Advanced Data Structures	Interval Tree, Segment Tree, Range Tree, KD Tree, Quad Tree, String Data Structures: Suffix Tree, Tries, Suffix Array	6
		Total number of Lectures	**42**

Evaluation Criteria **Components Maximum Marks** T1 20 T2 20 End Semester Examination 35 TA 25 (Mini Project(10), Attendance(5), Assignment/Quiz/Programming Contest(10)) **Total 100**	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Book:

1 Dinesh P. Mehta and Sartaj Sahni, Handbook of Data Structures and Applications, 2nd Ed., Chapman and Hall/CRC Computer and Information Science Series, CRC Press

2	Ellis Horowitz,Sartaj Sahni and Dinesh P. Mehta, Fundamentals of Data Structures in C++, Galgotia Press, 2009
3	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009
4	Seymour Lipschutz, Data Structures with C, Schaum's Outline Series, McGraw Hill, 2010
	Reference Book
1	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983
2	John R. Hubbard, Data Structures with C++, Schaum's Outline Series, McGraw Hill, First Edition, 2017.
3	Robert Lafore, Object Oriented Programming in C++, SAMS, 2002

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI312	**Semester: Odd**	**Semester: Odd Session:** 2023-2024 **Month from** Aug'23 to Dec'23
Course Name	Database Systems & Web		
Credits	4	**Contact Hours**	**4 (3+1)**

Faculty (Names)	**Coordinator(s)**	Anuja Arora, Deepika, Lalita Mishra
	Teacher(s) (Alphabetically)	Aditi Sharma, Anuja Arora, Deepika, DevpriyaSoni, Dhanalakshmi G, Janardhan, Lalita Mishra, Neetu Sardana, Shruti Gupta, Shweta Rani

COURSE OUTCOMES		**COGNITIVE LEVELS**
C212.1	Explain the basic concepts of Database systems and Web components.	Understand Level (Level II)
C212.2	Model the realworld systems using Entity Relationship Diagrams and convert the ER model into a relational logical schema using various mapping algorithms	Apply Level (Level III)
C212.3	Make use of SQL commands and relational algebraic expressions for query processing and also applying Javascript and PHP.	Apply Level (Level III)
C212.4	Simplify databases using normalization process based on identified keys and functional dependencies	Analyze Level (Level IV)
C212.5	Solve the atomicity, consistency, isolation, durability, transaction, and concurrency related issues of databases	Evaluate Level (Level V)
C212.6	Develop a simple web application with client and server side scripting using Javascript and PHP and connect with a given relational database	Create Level (LevelVI)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Databases	Introduction to Databases, Physical Level of Data Storage, Structure of relational databases, Review of SQL Create, Insert, Update, Delete and Select Statements, Overview of NoSQL databases	4
2.	Web Architecture & Introduction	Motivation, characteristics and complexities of web applications, Basics, of Web Server and Application server, differences between web application and conventional software, architecture layers.	2
3.	Client Side Web Technology	SGML, HTML 5, DHTML, CSS, Java script	~~3~~ 4
4.	Server Side Web Technology	PHP, Database Connectivity with PHP	4

5.	Database Design and ER Model	Entity type, Attributes, Relation types, Notations, Constraints, Extended ER Features	4
6.	Relational Model and Structured Query Language	SQL: Data Definition and Data Manipulation, Relational Algebra	9
7.	Procedural Language	PL/SQL: Stored Procedures, Functions, Cursors, Triggers	43
8.	Normalisation	Data Dependencies, 2NF, 3NF, BCNF, building normalised databases	5
9.	Transaction Management	Transactions, Concurrency, Recovery, Security	7
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25(Attendance:10, Assignments/Min-Project/Class Test/Quiz/Tutorial):15
Total	**100**

Project Based Learning: Each student in a group of 3-4 will choose a real-life application area. To make a project, the students will analyse and define the need of database systems in terms of functional requirements. Each group will design the Entity Relationship diagram to understand the organisational structure of the application area and implement the database in MySQL. Each group will identify 15-20 typical queries and execute them. For handling the multiple record they will implement cursors ad triggers. Student will design the webpage of the application area and connect with the database.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 5th Edition, McGraw-Hill,2006
2.	RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 4th Edition, Pearson Education, 2006.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rdEdition,Addison-Wesley,2006.
4.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 3rd Edition, Addison-Wesley,2002.
5.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
6.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education)
7.	"An introduction to database systems" by Bipin C. Desai, West Publishing Company, College & School Division, 1990 - Computers - 820 pages
8.	Christopher J. Date, Database Design and Relational Theory: Normal Forms and All That Jazz, 2012.
9.	Rajiv Chopra, Database Management System (DBMS): A Practical Approach, 5th Edition, 2016, 682 pages.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17CI372	**Semester** Odd	**Semester** III **Session** 2023 **Month from July** '23 **to Dec**'23
Course Name	Database System & Web Lab		
Credits	0-0-1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Aditi Sharma, DhanalekshmiGopinathan
	Teacher(s) (Alphabetically)	Archana Purwar, Ashish Kumar, Deepika Varshney, Indu Chawla, Janardhan Verma, Lalita Mishra, Neetu Sardana, Shruti Gupta, Somya Jain, Shweta Rani

COURSE OUTCOMES		**COGNITIVE LEVELS**
CI271.1	Develop web page using HTML, CSS with client-side scripting using JavaScript.	Apply (Level III)
CI271.2	Make use of relational database and SQL commands for query processing.	Apply (Level III)
CI271.3	Develop a simple web application with client and server-side scripting using JavaScript and PHP and connect to a given relational database.	Apply (Level III)
CI271.4	Make use of PL/SQL commands including stored procedures, stored functions, cursors, triggers for query processing.	Apply (Level III)
CI271.5	Design a Project based on database management system including a normalized database and a user interface.	Create (Level VI)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Client-Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	CI271.1
2.	Server-Side Web Technology	1. Develop a web application with client and server-side scripting using JavaScript. 2. Develop a web application with client and server-side scripting using PHP. 3. Design web application with database connectivity. 4. Design web application with entering user data into database. 5. Design web application for user - database interaction through PHP.	CI271.1, CI271.3
3.	SQL	1. MySQL Create Insert, Update, Delete and Select Statements. 2. Simple Queries, Sorting Results (ORDER BY Clause)	CI271.2

		3. SQL Aggregate Functions 4. Grouping Results (GROUP BY Clause) 5. Subqueries, ANY and ALL, Multi-Table Queries, EXISTS and NOT EXISTS 6. Combining Result Tables (UNION, INTERSECT, EXCEPT)	
4.	Procedural Language	1. Write PL/SQL program for storing data using procedures. 2. Write PL/SQL program for storing data using stored functions. 3. Write PL/SQL program for storing data using cursors and Triggers	CI271.4
5.	Project	Students are expected to design a web application based on PHP or JavaScript which is connected with database to execute insert, update, retrieve and delete data queries.	CI271.5

Evaluation Criteria

Components	**Maximum Marks**
Lab Test-120	
Lab Test-2	**20**
Day-to-Day	**60**(Project, Lab Assessment, Attendance)
Total	**100**

Project based learning: Each student in a group of 3-4 will have to develop a project based on different real-world problems. Students must study the Web and database related Technologies before finalizing the objectives. For handling the multiple records, they will implement cursors ad triggers. Student will design the webpage of the application area and connect with the database.Project development will enhance the knowledge and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 7th Edition, McGraw-Hill,2019
2.	RamezElmasri ,Shamkant B. Navathe, Fundamentals of Database Systems, 5thEdition, Pearson Education, 2015.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rd Edition,Addison-Wesley,2014.
4.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 6rd Edition, Addison-Wesley,2015.
5.	"PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
6.	"PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education), 5th Edition, 2016.

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11EC211	**Semester** Odd	**Semester** 3rd **Session** 2023 -2024 **Month from** July to December
Course Name	Electrical Science-2		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Pankaj Kumar Yadav, Yogesh Kumar
	Teacher(s) (Alphabetically)	Abhijeet Upadhya , Ankur Bhardwaj, Archana Pandey, Atul Kumar Atul Kumar Srivastava , Jitendra Mohan, Nitin Muchhal, Rachna Singh, Rishibrind Upadhyay, Samriti Kalia, Satyendra Kumar, Saurabh Chaturvedi, Shivaji Tyagi, Smriti Bhatnagar, , Varun Goel,

COURSE OUTCOMES		**COGNITIVE LEVELS**
C203.1	Remember the complete response of the first order and second order circuits with energy storage and/or non-storage elements.	Remembering Level (C1)
C203.2	Understand two-port network parameters and operational amplifier, first-order & second-order filters.	Understanding Level (C2)
C203.3	Applying the concept of semiconductors in PN junction diode, Zener diode and its various applications.	Applying Level (C3)
C203.4	Analyzing the characteristics and operation of bipolar junction transistor (BJT) and its biasing, stability aspects.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Transient Analysis	First-order RC/RL circuit analysis, sequential switching, differential equation approach for solving 1st and 2nd order network containing DC and Non constant source.	10
2.	Two Port Network Parameters	Introduction to Z, Y, h and Transmission two-port parameters and their conversions.	5
3.	Operational Amplifier and Filters	Introduction to Operational Amplifier and its applications, First-order and Second-order (Low Pass, High Pass, Band pass and Band Stop) Filters.	5
4.	Introduction to	Semiconductor Physics-Energy Band Model, Types of	6

	Semiconductor	semiconductors, Drift Current, conductivity equations and Hall Effect.	
5.	Diodes & it's Applications	P-N Junction diode, Biasing the PN Junction diode, Current–Voltage Characteristics of a P-N Junction, Half Wave Rectifier &Full Wave Rectifier, Clipper &Clamper Circuits, Zener Diode and its application as voltage regulator	8
6.	Introduction to Bipolar Junction Transistor	Transistor Construction and Basic Transistor Operation, Transistor Characteristics in different configuration (CE, CB, CC), Transistor Biasing & Stability.	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Project Based Learning: Students will learn about the transient responses of the first/second order circuits, which is the utmost requirement for electronic circuit design. Also, the students with the knowledge of OP-AMP and filters, can design and analyse the circuits for the signal processing applications.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	R. C. Dorfand James A. Svoboda, "Introduction to Electric Circuits", 9thed, John Wiley & Sons, 2013.
2.	Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric Circuits", 6th Edition, Tata McGraw Hill, 2019.
3.	Abhijit Chakrabarti, Circuit Theory Analysis and Synthesis, 7thed, Dhanpat Rai &Co. 2018.
4.	Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 11thed, Prentice Hall of India, 2014.
5.	Jacob Millman, Millman's Electronic Devices and Circuits (SIE), 4thed, McGraw Hill Education, 2015.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11HS211	**Semester :ODD (specify Odd/Even)**	**Semester** :III **Session 2023-24** Month from: July-December
Course Name	Economics		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Vandana Sehgal (JIIT62) Dr. Parveen Sharma (J128)
	Teacher(s) (Alphabetically)	Dr. Amandeep Kaur Dr. Amba Aggarwal Dr. Aviral Mishra Dr. Kanupriya Misra Bakhru Dr. Manas Behera Dr. Mukta Mani Dr. Neha Singh Dr. Sakshi Varshney

COURSE OUTCOMES		**COGNITIVE LEVELS**
C206.1	*Explain* the basic micro and macro economics concepts.	Understanding Level(C2)
C206.2	*Apply* the basics of national income accounting and business cycles to Indian economy.	Apply Level (C3)
C206.3	*Examine* the various business forecasting methods.	Apply Level (C3)
C206.4	*Analyze* the theories of demand, supply, elasticity and consumer choice in the market.	Analyze Level (C4)
C206.5	*Analyze* the theories of production, cost, profit and break even analysis	Analyze Level (C4)
C206.6	*Evaluate* the different market structures and their implications on the behavior of the firm.	Evaluation Level(C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Economics Definition, Basic economic problems, Resource constraints and welfare maximization. Micro and Macro economics. Production Possibility Curve. Circular flow of economic activities.	2
2.	Basics of Demand, Supply and Equilibrium	Demand side and supply side of the market. Factors affecting demand & supply. Elasticity of demand & supply – price, income and cross-price elasticity. Market equilibrium price.	6
3.	Theory of Consumer Choice	Theory of Utility and consumer's equilibrium. Indifference Curve analysis, Budget Constraints, Consumer Equilibrium.	2
4.	Demand forecasting	Regression Technique Time-series Smoothing Techniques: Exponential, Moving Averages	4

		Method	
5.	Production theory and analysis	Production function. Isoquants, Isocostlines, Optimal combination of inputs. Stages of production, Law of returns, Return to scale.	2
6.	Cost Theory and Analysis	Nature and types of cost. Cost functions- short run and long run Economies and diseconomies of scale	2
7.	Market Structure	Market structure and degree of competition Perfect competition Monopoly Monopolistic competition Oligopoly	6
8	National Income Accounting	Overview of Macroeconomics, Basic concepts of National Income Accounting,	2
9	Macro Economics Issues	Introduction to Business Cycle, Inflation-causes, consequences and remedies: Monetary and Fiscal policy.	2
		Total number of Lectures	28 (lectures)

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ Project+ Class Participation)
Total	**100**

Project based learning: Students have to form a group (maximum 5 students in each group) and have to do an economic analysis on the topic assigned. An economic impact analysis assesses the impact of an event on the economy in a particular area. It generally measures the effect on revenue, profits, wages and jobs. The knowledge gained in conducting economic analysis will enhance student's decision-making skills.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	H.C. Petersen, W.C. Lewis, *Managerial Economics*, 4th ed., Pearson Education 2001.
2.	D. Salvatore, Managerial Economics in a Global Economy, 8th ed., Oxford University Press, 2015.
3.	S. Damodaran, Managerial Economics, 2 nd ed., Oxford University Press, 2010.
4.	M. Hirschey, Managerial Economics, 12th ed., Cengage India, 2013.
5.	P.A. Samuelson, W.D. Nordhaus, S. Nordhaus,Economics,18th ed., Tata Mc-Graw Hill, 2006.
6.	S.K. Misra& V. K. Puri, Indian Economy, 38th ed., Himalaya Publishing House, 2020.

Detailed Syllabus
Lab-wise Breakup

Course Code	**15B17CI371**	**Semester : Odd**	**Semester 3rd Session 2023 -2024 Month from July to Dec 2023**
Course Name	**Data Structure Lab**		
Credits	**2**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	**Taj Alam (J62)/ Ambalika Sarkar (J128)**
	Teacher(s) (Alphabetically)	J62 – Dr. Ankita Jaiswal, Dr. Ankit Vidyarthi, Dr. Ankita Wadhwa, Dr. Bhawna Saxena, Dr. Himansu Patnayak, Dr. Manju, Dr. Pratishtha, Dr. Taj Alam, Dr. Vivek Kumar Singh. J128 – Ms. Ambalika Sarkar, Dr. Jagriti, Dr. Mukesh Saraswat, Dr. Neeraj Jain, Mr. Shariq Murtaza, Dr. Shikha Mehta, Dr. Varsha Garg

COURSE OUTCOMES		**COGNITIVE LEVELS**
C270.1	Demonstrate programs using object-oriented programming (C++)	Apply Level (C3)
C270.2	Implement various searching (Linear, Binary, Interpolation, Median) and sorting (Merge, Radix, and Quick) algorithms	Apply Level (C3)
C270.3	Experiment with lists, multi linked list for sparse matrix representation, rat in a maze problem, n queens problem, etc.	Apply Level (C3)
C270.4	Execute the programs for different tree data structure operations like, storage, search, traverse, insertion, deletion, updating, etc. on binary trees, k-ary trees, binary search trees, AVL trees, heap trees, B trees and B+ trees.	Apply Level (C3)
C270.5	Execute the various operations (Storage, Search, Traverse, Insertion, Deletion, Updating, Path finding, Minimum spanning tree etc.) on different Graph data structures.	Apply Level (C3)
C270.6	Demonstrate the programs for priority queue and hashing techniques	Apply Level (C3)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction	Fundamentals of Data Structures, Memory Allocation, Abstract Data Types, Linear and Non Linear DS	C270.1
2.	Linear Data Structures using Object Oriented Programming	Review of linear data structures; Basics of Object oriented programming (OOPS) - Class Diagram and Relationship – Association, Aggregation, and Composition, Polymorphism, Templates; Implementation of Array, Stack and Queue using OOPS, Stack, and Queue operations;	C270.1
3	Lists	Introduction to lists, multi linked list for sparse matrix representation, rat in a maze problem, n queens problem	C270.3
3.	Searching and Sorting using Object Oriented Programming	Searching – Linear Search, Binary Search, Median Search; Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count; Time and Space complexity analysis of searching and sorting algorithms	C270.2

4.	Non-Linear Data Structure – Tree	Binary Tree, K-ary Tree, Binary Search Tree, Threaded Tree, AVL Tree, B Tree, B+ Tree, RB Tree, Priority Queue using Binary Heap	C270.4
5.	Non-Linear Data Structure – Graph	Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Basic Algorithms – Shortest Path, Minimum Spanning Tree	C270.5
5.	Performance Evaluation of Various Data Structures	Apply and evaluate performance of various data structures over following applications: Tower of Hanoi, Priority Queue, Expression Conversion and Evaluation, etc	C270.6
6.	Hashing	Introduction to hashing, Collision resolution – open and closed hashing methods, Cuckoo hashing, Coalesced Hashing, Perfect Hash function, Universal Hashing.	C270.6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test -1	**20**
Lab Test -2	**20**
Lab Evaluation-1	**10**
Mini-Project	**20**
Lab Evaluation-2	**15**
Attendance	**15**
Total	**100**

Project Based Learning: Each student in a group of 3-4 will develop one project using some data structures and explaining the real time usage of the developed application. The project is to be assessed based on the data structures involved and mapping it to real time problem. This course will help students grow their technical skills in terms of implementation and in turn will help in employability like web development, algorithms design and efficiency improvement.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1	Dinesh P. Mehta and Sartaj Sahni, Handbook of Data Structures and Applications, 2nd Ed., Chapman and Hall/CRC Computer and Information Science Series, CRC Press
2	Ellis Horowitz, Sartaj Sahni and Dinesh P. Mehta, Fundamentals of Data Structures in C++, Galgotia Press, 2009
3	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983
4	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009
5	Robert Lafore, Object Oriented Programming in C++, SAMS, 2002

Detailed Syllabus

Lab-wise Breakup

Course Code	15B17CI372	**Semester** Odd	**Semester** III **Session** 2023 **Month from July** '23 **to Dec**'23
Course Name	Database System & Web Lab		

Faculty (Names)	**Coordinator(s)**	Dhanalekshmi, Aditi Sharma
	Teacher(s) (Alphabetically)	Archana Purwar, Deepika Varshney, Indu Chawla, Janardan Verma Lalita Mishra, Shruti Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
C271.1	Develop web page using HTML, CSS with client-side scripting using JavaScript.	Apply (Level III)
C271.2	Make use of relational database and SQL commands for query processing.	Apply (Level III)
C271.3	Develop a simple web application with client and server-side scripting using JavaScript and PHP and connect to a given relational database.	Apply (Level III)
C271.4	Make use of PL/SQL commands including stored procedures, stored functions, cursors, triggers for query processing.	Apply (Level III)
C271.5	Design a Project based on database management system including a normalized database and a user interface.	Create (Level VI)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Client-Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	C271.1
2.	Server-Side Web Technology	1. Develop a web application with client and server-side scripting using JavaScript. 2. Develop a web application with client and server-side scripting using PHP. 3. Design web application with database connectivity. 4. Design web application with entering user data into database. 5. Design web application for user - database interaction through PHP.	C271.1, C271.3
3.	SQL	1. MySQL Create Insert, Update, Delete and Select Statements. 2. Simple Queries, Sorting Results (ORDER BY Clause)	C271.2

		3. SQL Aggregate Functions 4. Grouping Results (GROUP BY Clause) 5. Subqueries, ANY and ALL, Multi-Table Queries, EXISTS and NOT EXISTS 6. Combining Result Tables (UNION, INTERSECT, EXCEPT)	
4.	Procedural Language	1. Write PL/SQL program for storing data using procedures. 2. Write PL/SQL program for storing data using stored functions. 3. Write PL/SQL program for storing data using cursors and Triggers	C271.4
5.	Project	Students are expected to design a web application based on PHP or JavaScript which is connected with database to execute insert, update, retrieve and delete data queries.	C271.5

Evaluation Criteria
Components Maximum Marks
Lab Test-1 20
Lab Test-2 20
Day-to-Day 60
(Project, Lab Assessment, Attendance)
Total 100

Project based learning: Each student in a group of 3-4 will have to develop a project based ondifferent real-world problems. Students must study the web and database related technologiesbefore finalizing the objectives. For handling the multiple records, they will implement cursors andtriggers. Student will design the webpage of the application area and connect with the database.Projectdevelopment will enhance the knowledge and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 7th Edition, McGraw-Hill,2019
2.	RamezElmasri ,Shamkant B. Navathe , Fundamentals of Database Systems, 5th Edition, Pearson Education, 2015.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rd Edition, Addison-Wesley, 2014.
4.	Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 6rd Edition, Addison-Wesley,2015.
5.	“PHP and MYSQL Manual” by Simon Stobart and Mike Vassileiou
6.	“PHP and MYSQL Web Development” by Luke Welling and Laura Thomson(Pearson Education), 5th Edition, 2016.

Course Description
Lecture wise Breakup

Course Code	15B17EC271	**Semester -:** Odd (specify Odd/Even)	**Semester-:** III **Session** 2023-2024 **Month- : August- December**
Course Name	Electrical ScienceLab-II		
Credits	1	**Contact Hours**	0-0-2

Faculty (Names)	**Coordinator(s)**	Atul K Srivastava, Dr. Bajrang Bansal
	Teacher(s)	Dr. Vijay Khare, Dr, Richa Gupta, Dr. Ajay Kumar, Dr. Rachna Singh, Dr. Shraddha Saxena, Dr. Samriti Kalia, Dr. Rishibrind Upadhaya, Dr. Nitin Muchhal, Dr. Pimmi Gandotra, Dr. Shivani ,Dr. Ankur Bharadwaj, Mr. Shivaji Tyagi, Mrs Smriti Bhatnagar,Mr. Mandeep Narula, Mrs K. Nisha,Dr. Vishal N Saxena, Dr. Vimal Kumar Mishra, Dr. Yogesh Kumar, Dr. Parul Arora, Dr. Vinay Tikkiwal, Dr. Raghvenda Kumar Singh, Divya Kaushik.

COURSE OUTCOMES		**COGNITIVE LEVELS**
C204.1	Recall the basic concepts and terms about different equipment like CRO, function generator, multi meter, and components like resistor, capacitor, inductor, breadboard, diode, andtransistor.	Remembering Level (C1)
C204.2	Illustrate the transient analysis of first order series RC circuits.	Understanding Level (C2)
C204.3	Experiment with different types of two-port network models and Op-amp configurations.	Applying Level (C3)
C204.4	Examine the characteristics of PN junction and Zener diodes and analyze their applications.	Analyzing Level (C4)
C204.5	Explain the characteristics of a BJT in different configurations like common emitter and common base.	Evaluating Level (C5)

Module No.	**Title of the Module**	**List of Experiments**	**COs**
1.	Introduction: Basic equipment & first order passive circuits	To Study the basic concepts and terms about different equipment like CRO, function generator, Regulated D.C. power supply and Multi Meter.	C204.1
		To Study the transient response of a series RC circuit and the time constant concept using pulse waveforms.	C204.2
2.	Two port resistive networks	To determine the Z-parameters of a 2- port resistive network.	C204.3
		To determine the h-parameters of a two-port resistive network.	C204.3
3.	Operational amplifier and	To realize inverting and non inverting configurations using Op- Amp IC 741 amplifier.	C204.3

	its applications	To realize an adder and substractor circuits using Op- Amp IC 741 amplifier.	C204.3
4.	PN junction and Zener diodes	To study the forward and reverse bias (volt-ampere) characteristics of a simple p-n junction diode. Also determine the forward resistance of the diode.	C204.4
		To study the forward and reverse bias volt-ampere characteristics of a zener diode. Also determine the breakdown voltage, static and dynamic resistances.	C204.4
5.	Diode applications	To observe the output waveform of half/full wave rectifier and calculate its ripple factor and efficiency.	C204.4
		Realization of desired wave shapes using clipper and clamper circuits.	C204.4
		To study Zener voltage regulator and calculate percentage regulation for line regulation and load regulation.	C204.4
6.	Bipolar Junction Transistor	To plot input characteristics of a common emitter npn BJT.	C204.5
		To plot output characteristics of a common emitter npn BJT.	C204.5
		To plot input characteristic of a BJT in Common Base Configuration.	C204.5
		To plot output characteristic of a BJT in Common Base Configuration.	C204.5
7.	First order filters	To plot frequency and phase response of First order low pass and high pass filter.	C204.5

Evaluation Criteria

Components	**Maximum Marks**
Viva1	20
Viva2	20
Attendance, and D2D	60 (15+45)
Total	**100**

Project Based Learning: Students will learn about the transient responseof first and second order passive circuits. Also, student will learn about Op-amp and its applications like adder and substractor circuits. This course also gives the understanding of semiconductor diodes and Bipolar Junction Transistor. These concepts are the required for Electronic circuit design.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	R.C.Dorf, A. Svoboda, "Introduction to Electric Circuits",9th ed, John Wiley & Sons, 2013.
2.	D. Roy Choudhary and Shail B. Jain, " Linear Integrated Circuit," 2nd Edition, NAILP, 2003
3.	A.S .Sedra & K.C.Smith, Microelectronic Circuits Theory and Application, 6th Edition, Oxford University Press, 2015(Text Book)

Detailed Syllabus
Lecture-wise Breakup

Course Code	**22B15HS211**	**Semester: Odd**	**Semester: III Session: 2023-24** **Month: August-December**
Course Name	**Professional Communication Practice**		
Credits	0	**Contact Hours**	**0-0-2**

Faculty (Names)	**Coordinator(s)**	Dr Ekta Srivastava Dr Nibha Sinha, Dr Purva Srivastava
	Teacher(s) (Alphabetically)	Dr Anshu Banwari, , Dr Badri Bajaj, Dr Ekta Srivastava, Dr.Gaurika Chugh, Dr Ila Joshi, Dr Namreeta Kumari, Dr. Nibha Sinha, Dr Praveen Sharma, Dr. Purwa Srivastava, Dr. Shweta Verma,

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
C251.1	Develop an understanding of professional ethics in contemporary workplace settings.	Understanding(C2)
C251.2	Apply workplace communication skills in a professional setting.	Apply(C3)
C251.3	Develop their professional and social competence.	Apply(C3)
C251.4	Analyze one's strengths and frame professional goals.	Analyze(C4)

	Module No.	**Title of the Module**	**Description of the module**	**List of Activities**	**Number of Labs**
	1.	Intrapersonal Communication	Self-exploration**,** Setting Personal, Professional Goals with Holistic Perspectives	Practical Sessions on a) Self Inventory, b) Goal Setting c) SWOC Analysis	3 labs
	2	Interpersonal Communication	Extending Intrapersonal influence for enhancing social competence. Inculcating assertiveness, empathy, Inclusivity and win- win approach to communication.	Practice session through role-play on situation related to a) workplace conflict, b) business negotiation c) Gender sensitization	3 labs
	3.	Professional Interaction and Etiquettes	Liaison harmoniously with audience, taking initiatives and team focus	Practical Session on mediated interpersonal communication a) Topical group discussion, b) case study group discussion c) Mock interviews)	4 labs

	4.	Professional written communication	Enhancing professional competency through professional writing	Practical session on styles of workplace writing: a) E-mail, b) Report, c) Website and Resume writing	3 labs
	5.	Professional Ethics	Enhancing Ethical Awareness	Case Study and oral discussion on ethical dilemmas	1 Lab
			Total number of Labs		**14**

Evaluation Criteria	**Maximum Marks**
Practical File [Written assignments of Module-1(15 Marks) & Module 4(15 Marks)]	**30**
Lab test 1 (Mid Term Evaluation) (Based on Group Discussion)	**20**
Lab Test 2 (End Term Presentation) (Based on Role Play)	**20**
Project and Assignment	**20**
Attendance	**10**

Project based learning: The students in group of 4-5 will find out their future area of work (Like: Wastewater Management, Environmental Engineering, Power Generation and Distribution, Web Development, Cybersecurity, Software Development, Construction and Infrastructure, Geotechnical Engineering etc) and make a research based detailed report which considers all skills and ethical dilemma related to it. Also provide solutions to sort out the ethical challenges. Students can also conduct interviews with professionals from their fields to gather insights into the skills and ethical challenges they have encountered in their careers. These reports can be presented in the format of journals or magazines altogether.

Reference:

1	George Cheney, Daniel J. Lair, Dean Ritz and Brenden E. Kendall, Just a Job?: Communication, Ethics and Professional Life, Oxford University Press, USA, 2009.
2	Timothy S. Boswood, "Redefining the professional in International Professional Communication," in Exploring the Rhetoric of International Professional Communication, Carl R. Lovitt and Dixie Goswami, Ed. Routledge, 2020, pp. 111-136.
3	Steven A. Beebe and Timothy P. Mottet. Business and Professional Communication, Principles and Skills for Leadership, Pearson, 2013.
4	R. Almonte, A Practical Guide to Soft Skills: Communication, Psychology, and Ethics for Your Professional Life. Routledge, 2021.
5	K. M. Quintanilla &S. T. Wahl, Business and Professional Communication: Keys for Workplace Excellence. Sage Publications, 2020
6	K.Floyd& P. W, Cardon, Business and Professional Communication. McGraw-Hill Education,2020
7	P. Hartley & P. Chatterton, Business Communication: Rethinking your professional practice for the post-digital age. Routledge, 2015