Subject Code	**15B11CI212**	Semester: Third	Session: Odd Sem 2021 Month from August to December 2021
Subject Name	**Theoretical Foundations of Computer Science**		
Credits	4	Contact Hours	3L +1T

Faculty (Names)	Coordinator(s)	Dr. Dharmveer Singh Rajpoot (JIIT62), Mr. Himanshu Agrawal (JIIT128)
	Teacher(s) (Alphabetically)	Dr. Ankita Verma, Dr. Apeksha, Dr. Dharmveer Singh Rajpoot, Ms. Kirti Aggarwal, Dr. Potukuchi Raghu Vamsi, Dr. Shulabh

COURSE OUTCOMES		**COGNITIVE LEVELS**
C211.1	Apply the concepts of set theory, relations and functions in the context of various fields of computer science e.g. Database, Automata, Compiler etc.	Apply Level (C3)
C211.2	Evaluate Boolean functions and Analyze algebraic structure using the properties of Boolean algebra.	Evaluation Level (C5)
C211.3	Convert formal statements to logical arguments and correlate these arguments to Boolean logic, truth tables, rules of propositional and predicate calculus.	Analysis Level (C4)
C211.4	Apply the fundamental principle of counting, combinatorics and recurrence relations to find the complex pattern and sequences in Given datasets.	Apply Level (C3)
C211.5	Apply graph theory concepts for designing solutions of various computing problems e.g. shortest path, graph colouring, job Sequencing etc.	Apply Level (C3)
C211.6	Explain basic concepts of automata theory and formal languages e.g. Finite automata, regular expressions, context-free grammars etc.	Understanding Level (C2)

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, 2008.
2.	Liu, C. L., Elements of Discrete Mathematics, Tata McGraw-Hill, 2008.
3.	Ullman J. D. Foundations of Computer Science: C Edition, W. H. Freeman; 1994
4.	Tremblay and Manohar , Discrete Mathematical Structures, Tata McGraw Hill
5.	Lipschutz, S. and Lipson, Discrete Mathematics, Tata McGraw-Hill, 2009.
6.	Journal of Discrete Mathematics, Elsevier.
7.	Linz, P, An Introduction To Formal Languages And Automata, Narosa Publishing House, 2007.
8.	Sipser, M., Introduction to the Theory of Computation, Second Edition, Thomson Course Technology, 2007.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI311	**Semester Odd** **(specify Odd/Even)**	**Semester III Session** 2021 -2022 **Month from** July to December
Course Name	Data Structures		

Credits	4	Contact Hours	4

Faculty (Names)	Coordinator(s)	Dr. Tribhuwan Tewari (J62), Prof. Krishna Asawa (J128)
	Teacher(s) (Alphabetically)	J62- Dr. Tribhuwan Tewari , Dr. Manish K. Thakur, Dr. Vivek Kumar, Dr. Dhanalekshmi G., Ms. Sarishty Gupta J128- Prof. Krishna Asawa, Dr. Rashmi, Dr. Gaurav Nigam, Ms. 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	Understand Level (Level 2)
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 Data Structures, Memory Allocation, Abstract Data Types, Linear and Non Linear DS	3
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	7
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	9
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	13
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**
Project Based Learning: Each student in a group of 3-4 will choose a real-life computer application area. To make a project, the students will analyze the problem and identify the appropriate data structures to automate the same.			

Evaluation Criteria

Components	Maximum Marks

T1	20
T2	20
End Semester Examination	35
TA	25 (Mini Project(10), Attendance(5),Assignments(5), Online Test(5))
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 :** 2021-2022 **Month from** Aug'21 to Dec'21
Course Name	Database Systems & Web		
Credits	4	**Contact Hours**	**4(3+1)**

Faculty (Names)	**Coordinator(s)**	Dr. Anubhuti, Aditi Sharma, Dr. Indu
	Teacher(s) (Alphabetically)	Dr. Payal, Anuradha, Shariq, Dr. Vartika, Ankit Vidyarthi, Mahendra Kumar Gurve, Megha Rathi, Sonal

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	Develop a simple web application with client and server side scripting using Javascript and PHP and connect with a given relational database	Create Level (Level VI)
C212.4	Make use of SQL commands and relational algebraic expressions for query processing.	Apply Level (Level III)
C212.5	Simplify databases using normalization process based on identified keys and functional dependencies	Analyse Level (Level IV)
C212.6	Solve the atomicity, consistency, isolation, durability, transaction, and concurrency related issues of databases	Apply Level (Level III)

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.	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	4
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, 3rd Edition,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** 2021 **Month from August** '21 **to Dec**'21
Course Name	Database System & Web Lab		
Credits	0-0-1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Mahendra Gurve, Payal Khurana Batra, Prathistha verma
	Teacher(s) (Alphabetically)	Anuradha Gupta, Shariq, Vartika Puri, Aditi Sharma, Indu Chawla, Sonal, Megha Rathi, Prathistha verma, Vikas Hassija

COURSE OUTCOMES		COGNITIVE LEVELS
CI271.1	Explain the basic concepts of Database systems and Web components.	Understand (Level II)
CI271.2	Develop web page using HTML, CSS with client side scripting using javascript.	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	Programming PL/SQL including stored procedures, stored functions, cursors, Triggers.	Apply (Level III)
CI271.5	Design and implement a database schema for a given problem-domain and normalize a database.	Creating (Level VI)
CI271.6	Design a Project based on database management	Create (Level VI)

Module No.	Title of the Module	List of Experiments	CO
1.	Introduction to MySQL commands.	1. MySQL Create, Insert, Update, Delete and Select Statements.	CI271.1
2.	Client Side Web Technology	1. Design web page using SGML, HTML 5, DHTML, CSS, Java script.	CI271.2
3.	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 databased connectivity. 4. Design web application with entering user data into database. 5. Desig web application for user - databse interaction through PHP.	CI271.3, CI271.5
4.	SQL	Simple Queries, Sorting Results (ORDER BY Clause), SQL Aggregate Functions, Grouping Results (GROUP BY Clause),Subqueries, ANY and ALL,Multi-Table Queries, EXISTS and NOT EXISTS, Combining Result Tables (UNION, INTERSECT, EXCEPT),Database Updates	CI271.4

5.	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
6.	Project	Students are expected to designed web application based on Php or JavaScript and connect with databased to execute insert, update, retrieve and delete data queries.	CI271.5, CI271.6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test-1	**20**
Lab Test-2	**20**
Day-to-Day (Project, Lab Assessment, Attendance)	**60**
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.	Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 7th Edition, McGraw-Hill,2019
2.	Ramez Elmasri , Shamkant B. Navathe , Fundamentals of Database Systems, 5th Edition, Pearson Education, 2015.
3.	Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rd Edition, Addison-Wesley,2006.
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

Project based learning: Each student in a group of 2-3 will have to develop a Project based on different real-world problems. Students have to study the Web and database related Technologies for developing the project. This will enhance the knowledge, development skills and employability of the students in IT sector.

Detailed Syllabus
Lab-wise Breakup

Course Code	**15B17CI371**	**Semester : Odd**	**Semester 3rd Session 2021 -2022** **Month from July to Dec 2021**
Course Name	**Data Structure Lab**		
Credits	**2**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	**Sherry Garg (J62)/ Varsha Garg(J128)**
	Teacher(s) (Alphabetically)	J62 – Dr Dhanlakshmi, Dr Manish K Thakur, Nishtha Ahuja, Prantik Biswas Dr Satish Chandra, Sherry Garg, Dr Vikash, Dr Vivek K Singh J128 – Dr Gaurav K Nigam ,Dr Krishna Asawa, Dr Rashmi Kushwaha, Dr Shikha Mehta, Varsha Garg

COURSE OUTCOMES		**COGNITIVE LEVELS**
C270.1	Develop programs for various data structures, like array, linked list, stack, and queue in different problems and applications	Apply Level (C3)
C270.2	Develop various searching (Linear, Binary, Interpolation, and Median) and sorting (Merge, Radix, and Quick) algorithms. Experiment with lists, multi linked list for sparse matrix representation, priority queue and hashing techniques.	Apply Level (C3)
C270.3	Develop 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)
C270.4	Apply various operations (Storage, Search, Traverse, Insertion, Deletion, Updating, Path finding, Minimum spanning tree etc.) on different Graph data structures.	Apply Level (C3)
C270.5	Develop advanced DS and string algorithms and various associated operations	Apply Level (C3)
C270.6	Apply appropriate ADT to design an efficient solution for a given and identified problem	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 C270.6
2.	Linear Data Structures with and without STL	Review of linear data structures; STL; Implementation of Array, Stack and Queue, Stack, and Queue operations using STL; Priority Queue	C270.1 C270.6
3.	Searching and Sorting	Searching – Linear Search, Binary Search, Median Search;	C270.2

		Hashing – Hash Table, Chaining, Probing; Sorting – Merge, Quick, Radix, Bucket, and Count. Introduction to lists, multi linked list	C270.6
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	C270.3 C270.6
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	C270.4 C270.6
5.	Advanced Data Structures	Interval Tree, Segment Tree, KD, Quad Tree	C270.5 C270.6
6.	String Data Structure	Introduction to Trie, Suffix Array, storage, Traversal, insertion and deletion	C270.5 C270.6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test -1	**20**
Lab Test -2	**20**
Lab Evaluation	**15**
Mini-Project	**20**
Lab Quiz	**10**
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
Lecture-wise Breakup

Course Code	15B11EC211	**Semester** ODD **(Specify Odd/Even)**	**Semester** 3rd **Session** 2021 -2022 **Month from** August-December 2021

Course Name	Electrical Science-2		
Credits	4	**Contact Hours**	LTP: 3-1-0

Faculty (Names)	**Coordinator(s)**	Madhu Jain, Megha Agarwal
	Teacher(s) (Alphabetically)	Archana Pandey, Atul Kumar, Atul Srivastava, Bajrang Bansal, Bhagirath Sahu, Garima Kapur, Jyoti Vyas, Kirmender Singh, Mandeep Narula, Satyendra Kumar, Shradha Saxena, Shruti Kalra, Vinay Kumar Tikkiwal, Vivek Dwivedi, Yogesh Kumar

COURSE OUTCOMES		**COGNITIVE LEVELS**
C203.1	Study and analyze the complete response of the first order and second order circuits with energy storage and/or non-storage elements.	Analysing Level (C4)
C203.2	Understand two-port network parameters and study operational amplifier, first-order&second-orderfilters.	Understanding Level (C2)
C203.3	Study the properties of different types of semiconductors, PN junction diode, Zener diode and analyze diode applications.	Analysing Level (C4)
C203.4	Study the characteristics, operation of bipolar junction transistor (BJT) and its biasing, stability aspects.	Understanding Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Transient Analysis	First-order network analysis, sequential switching, Differential equation approach for DC and Non constant source, second order network analysis using differential equation approach for DC and non-constant source	10
2.	Two Port Network Parameters	Definition of Z, Y, h and Transmission parameters and their conversions.	5
3.	Introduction to 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) RLC Filters.	5
4.	Introduction to Semiconductor	Semiconductor Physics-Energy Band Model, Carrier Statistics, Intrinsic Semiconductors, Extrinsic Semiconductors, Fermi Level, Charge densities in a semiconductor, Carrier Mobility and Drift Current, Hall Effect, Recombination of charges, diffusion and conductivity equation.	6
5.	Diodes &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&Clamping Circuits, Zener Diode and its application as voltage reference, Line and Load Regulations of reference circuits.	8
6.	Bipolar Junction Transistor	Transistor Construction and Basic Transistor Operation, Transistor Characteristics (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)

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

Course Description

Course Code	15B17EC271	**Semester -:** Odd (specify Odd/Even)	**Semester-:** 3, **Session** 2021 -2022 **Month- : September- December**
Course Name	Electrical Science Lab-2		
Credits	1	**Contact Hours**	0-0-2

Faculty (Names)	**Coordinator(s)**	Dr. Satyendra Kumar, Mr. Ankur Bhardwaj
	Teacher(s)	Dr. Ashish Gupta, Dr. Ajay Kumar, Dr. Alok Joshi, Dr. Amit Goyal, Dr. Archana Pandey, Mr. Atul Kumar Srivastava, Dr. Bajrang Bansal, Dr. Garima Kapoor, Dr. Hemant Kumar, Dr. Jasmine Saini, Dr. Juhi Gupta, Dr. Kapil Dev Tyagi, Dr. Kaushal Nigam, Dr. Kirmender Singh, Dr. Megha Agarwal, Dr. Parul Arora, Mr. Raghvendra Singh, Dr. Satyendra Kumar, Dr. Saurabh Chaturvedi, Mr. Shivaji Tyagi, Mrs. Shradhha Saxena, Dr. Shruti Kalra, Mrs. Smriti Bhatnagar, Dr. Varun Goel, Mr. Vinay Tikkiwal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C204.1	Study and analyze time response of first order and second order passive circuits	Analyzing level (C4)

C204.2	Understand two port resistive network parameters, operational amplifier applications and first order filter.	Understanding level (C2)
C204.3	Understand the characteristics of pn junction diode and its applications	Understanding level (C2)
C204.4	Understand the characteristics of Common emitter and common base configurations of BJT.	Understanding level (C2)

Module No.	**Title of the Module**	**List of Experiments**	**COs**
1.	First and Second order passive circuits	Study the transient response of a series RC circuit and understand the time constant concept using pulse waveforms.	C204.1
		Study of Time Response of R-L-C Network	C204.1
2.	Two port resistive networks	To determine the Z-parameters of a 2- port resistive network.	C204.2
		To determine the h-parameters of a two-port resistive network.	C204.2
3.	Operational amplifier and its applications	To realize inverting and non inverting configurations using Op- Amp IC 741 amplifier.	C204.2
		To realize an adder and substractor circuits using Op- Amp IC 741 amplifier.	C204.2
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.	C204.3
		To study the forward and reverse bias volt-ampere characteristics of a zener diode. Also determine the breakdown voltage, static and dynamic resistances.	C204.3
5.	Diode applications	To observe the output waveform of half/full wave rectifier and calculate its ripple factor and efficiency.	C204.3
		Realization of desired wave shapes using clipper and clamper circuits.	C204.3
		To study Zener voltage regulator and calculate percentage regulation for line regulation and load regulation.	C204.3
6.	Bipolar Junction Transistor	To plot input characteristics of a common emitter npn BJT.	C204.4
		To plot output characteristics of a common emitter npn BJT.	C204.4
		To plot input characteristic of a BJT in Common Base Configuration.	C204.4
		To plot output characteristic of a BJT in Common Base Configuration.	C204.4

7.	First order filters	To plot frequency and phase response of First order low pass and high pass filter.	C204.2

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 response of 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	15B11HS211	**Semester : ODD** **(specify Odd/Even)**	**Semester** : III **Session 2021-22** Month from: Aug-December
Course Name	Economics		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Manas Ranjan Behera (JIIT62) Dr. Anshu Banwari (J128)
	Teacher(s) (Alphabetically)	Dr. Mukta Mani Dr. Shirin Alavi Dr. Kanupriya Misra Bakhru Dr. Akarsh Arora Dr. Sakshi Varshney

COURSE OUTCOMES		**COGNITIVE LEVELS**
C206.1	*Explain* the basic micro and macro economics concepts.	Understanding Level (C2)
C206.2	*Analyze* the theories of demand, supply, elasticity and consumer choice in the market.	Analyze Level (C4)
C206.3	*Analyze* the theories of production, cost, profit and break even analysis	Analyze Level (C4)

C206.4	*Evaluate* the different market structures and their implications for the behavior of the firm.	Evaluation Level (C5)
C206.5	*Examine* the various business forecasting methods.	Analyze Level (C4)
C206.6	*Apply* the basics of national income accounting and business cycles to Indian economy.	Apply Level (C3)

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 Method	4
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.