

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 1 st and 2 nd 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 semiconductors, Drift Current, conductivity equations and	6

	Semiconductor	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. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 9 th ed, 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, 7 th ed, Dhanpat Rai & Co. 2018.
4.	Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 11 th ed, Prentice Hall of India, 2014.
5.	Jacob Millman, Millman's Electronic Devices and Circuits (SIE), 4 th ed, McGraw Hill Education, 2015.

Course Description
Lecture wise Breakup

Course Code	15B17EC271	Semester -: Odd (specify Odd/Even)	Semester-: III Session 2023-2024 Month- : July- 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, and transistor.	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 subtractor 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 response of first and second order passive circuits. Also, student will learn about Op-amp and its applications like adder and subtractor 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", 9 th ed, John Wiley & Sons, 2013.
2.	D. Roy Choudhary and Shail B. Jain, "Linear Integrated Circuit," 2 nd Edition, NALP, 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	18B11EC214	Semester Odd (specify Odd/Even)	Semester III Session 2023-2024 Month from July. to Dec.
Course Name	Signals & Systems		
Credits	4	Contact Hours	3+1

Faculty (Names)	Coordinator(s)	Dr. Madhu Jain, Dr. Abhishek Kashyap
	Teacher(s) (Alphabetically)	Dr. Rahul Kaushik, Dr. Kuldeep Baderia, Dr. Ritu Raj, Dr Sajaiveer Singh

COURSE OUTCOMES: At the end of the course, students will be able to		COGNITIVE LEVELS
C210.1	Recall the mathematical representation, classification, applications and analyze both continuous-time (CT) and discrete-time (DT) signals and systems.	Remembering Level (C1)
C210.2	Interpret the response of CT and DT LTI systems in time domain.	Understanding Level (C2)
C210.3	Apply the use of different frequency domain transforms to examine and explain the spectral representation of the CT and DT signals and systems.	Applying Level (C3)
C210.4	Analyze Laplace transform and Z-transform for the response and behavior of the CT and DT systems.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Signals and their classifications	Signal: definition, Classifications of Signals (Continuous-time & Discrete-time, Analog & Digital, Energy & Power, Deterministic & Random, Periodic & Aperiodic, Even and Odd etc.)	4
2.	Systems and their classifications	Classifications of Systems Classifications of Systems (Linear & Nonlinear, Time invariant & Time varying, Causal & Non-causal, Memory & Memory less, Stable & unstable system), LTI Systems (continuous-time and discrete-time)	5
3.	Response of LTI system	Impulse response of a system, Response of LTI system, Convolution (Integral and Sum).	5
4.	Fourier analysis of Continuous time signal and system	Continuous Transforms Fourier series, Convergence of Fourier series, Continuous-time Fourier Transform, properties of Fourier series and Transform, Frequency domain analysis of continuous time LTI system	7
5.	Fourier analysis of Discrete time signal and system	Discrete Transforms Fourier series, Convergence of Fourier series, Discrete-time Fourier Transform, properties of Discrete-time Fourier series and Transform, Frequency domain analysis of discrete-time LTI system	7

6.	Laplace Transform	Laplace Transform, Concept of ROC and Transfer function, pole-Zero plot, properties Laplace Transform, solution of differential equations using Laplace Transform, System function, Laplace approach to analysis the LTI system, stability analysis	7
7.	Z-transform	Z- Transform, Concept of ROC, properties Z- Transform, solution of difference equations using Z- Transform, System function, pole-Zero plot , Z- Transform approach to analysis the Discrete-time LTI system, stability analysis of Discrete-time LTI system	6
8.	Introduction to Digital Filters: FIR & IIR	Digital filters:- definition and frequency response of basic filtering function like BP, HP, LP, BR, AP Definition and representation of IIR and FIR digital filter	1
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: This course's primary learning purpose is for students to be able to analyze various signal types, their transformations, and their implementation. This course also covers the design and response of several types of signal transform. The opinions of students were acquired through a course exit survey conducted at the completion of the course.

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.	A.V. Oppenheim, A.S. Willsky & S.H. Nawab, Signals & Systems, 2nd edition, PHI,2004.
2.	H.P. Hsu, Schaum's outlines of theory and problems of signals and systems. McGraw Hill; 1995.
3.	S. Haykin& B. Van Veen, Signals and Systems, 2nd edition, John Wiley & sons, 2004.
4.	M. Mandal, Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge, 2007.
5.	M. J. Roberts, Signals and Systems, Tata Mcraw-Hill, 2003.
6.	TarunRawat, Signals and Systems, Oxford University Press, 2010.
7.	J. G. Proakis & D. G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, Fourth edition, PHI, 2007.

Detailed Syllabus Lab-wise Breakup

Course Code	18B15EC214	Semester ODD (specify Odd/Even)	Semester: III Session: 2023-2024 Month: July to December
Course Name	Signals and Systems Lab		
Credits	1	Contact Hours	2

Faculty (Names)	Coordinator(s)	B. Suresh, Saurabh Chaturvedi
	Teacher(s) (Alphabetically)	Bhawna Gupta, Kuldeep Baderia, Madhu Jain, Rahul Kaushik, Vijay Khare, Ritesh Sharma, Ritu Raj, Saurabh Chaturvedi, Megha Agarwal, Bajrang Bansal,

COURSE OUTCOMES: At the end of the course, students will be able to		COGNITIVE LEVELS
C270.1	Demonstrate MATLAB for generation of continuous time signals & discrete time signals and SIMULINK for realization of systems described by differential & difference equations	Understanding Level (C2)
C270.2	Apply the coding skills of MATLAB for convolution of continuous time signals and discrete time signals for DFT and IDFT.	Applying Level (C3)
C270.3	Analyze different LTI systems with frequency domain representation of continuous time and discrete time periodic and aperiodic signals.	Analyzing Level (C4)
C270.4	Determine Laplace transform of continuous time signals and Z-transform of discrete time signals.	Evaluating Level (C5)

Module No.	Title of the Module	List of Experiments	CO
1.	Understanding of MATLAB and its use in continuous time and discrete time signals	Introduction to MATLAB and its various applications.	C270.1
2.	Study and classification of continuous time signals	Introduction to continuous time (CT) signals.	C270.1
3.	Study and classification of discrete time signals	Introduction to discrete time (DT) signals.	C270.1
4.	Study of parts of signals	Introduction to even and odd parts of signals.	C270.1
5.	Study of plotting of different signals using MATLAB	Write MATLAB codes for generating and plotting various combinations of the two signals and perform time scaling, time shifting, time reversal and multiple transformations.	C270.1
6.	Study and calculation of power and energy of	Write MATLAB codes for finding the signal energy and power of signals.	C270.1

	signals using MATLAB		
7.	Apply the concepts of MATLAB in finding the convolution sum of signals	To calculate the convolution sum of two discrete time signals.	C270.2
8.	Apply the concepts of MATLAB in finding the convolution sum of signals	To calculate the convolution integral of two continuous time signals.	C270.2
9.	Analyze different LTI systems with frequency domain representation	Realization of LTI system and verify it.	C270.3
10.	Analyze frequency domain representation of continuous time and discrete time periodic signals	Determine frequency domain representation of CT and DT periodic signals.	C270.3
11.	Analyze different LTI systems with frequency domain representation of continuous time and aperiodic signals	Determine frequency domain representation of CT and DT aperiodic signals.	C270.3
12.	Analyze and realize discrete Fourier transform and inverse discrete Fourier transform	Write your own MATLAB function to compute discrete Fourier transform (DFT) and inverse discrete Fourier transform (IDFT) for the spectral analysis of signals.	C270.3
13.	Determine Laplace transform of continuous time signals	Find out output $y(t)$ of the system where input is $x(t)$ and impulse response is $h(t)$ using Laplace transform. Also, find the ROC of the transform.	C270.4
14.	Determine Z-transform of discrete time signals	Find out output $y[n]$ of the system where input is $x[n]$ and impulse response is $h[n]$ using Z-transform. Also, find the ROC of the transform. Verify answer using MATLAB commands <code>ztrans</code> and <code>iztrans</code> . Check stability of the system using MATLAB.	C270.4
15.	Introduction to SIMULINK	Introduction to SIMULINK and to realize systems described by differential and difference equations.	C270.4
16.	Understanding of MATLAB and its use in signals	Virtual Lab: 1. Signals and their properties	C270.1
17.	Understanding of MATLAB and its use in systems	Virtual Lab: 2. System and their properties	C270.3
18.	Understanding of MATLAB and its use in frequency domain	Virtual Lab: 3. Fourier analysis of signals	C270.3

	representation of signals		
Evaluation Criteria			
Components		Maximum Marks	
Viva 1 (Mid Sem. Viva)		20	
Viva 2 (End Sem. Viva)		20	
Assessment Components		20	
Attendance		15	
Lab Record		15	
Virtual Lab Experiments		10	
Total		100	
<p>Project-Based Learning: Every Student will learn analyzing different LTI systems with frequency domain representation of continuous time and discrete time periodic and aperiodic signals. Moreover, small groups of students are required to develop one Simulink model to realize systems described by differential and difference equations.</p>			

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.	J .G. Proakis and D. G. Manolakis, <i>Digital Signal Processing: Principles, Algorithms, and Applications</i> , Third Edition, Prentice Hall, 1999.
2.	A. V. Oppenheim and R. W. Schaffer, <i>Discrete-Time Signal Processing</i> , Second Edition, Prentice Hall, 1999.
3.	Sanjit K. Mitra, <i>Digital Signal Processing: With DSP Laboratory Using MATLAB: A Computer-Based Approach</i> , Second Revised Edition, TMH, 2001.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC215	Semester: Odd (specify Odd/Even)	Semester: 3rd Session 2023-24 Month from: July to December
Course Name	Digital Circuit Design		
Credits	4	Contact Hours	4

Faculty (Names)	Coordinator(s)	Dr. Garima Kapur and Dr. Priyanka Kwatra
	Teacher(s) (Alphabetically)	Dr. Ajay Kumar, Dr. Bhartendu Chaturvedi, Dr. Mandeep Singh Narula, Prabhanshu Yadav

COURSE OUTCOMES - At the end of the course, students will be able to:		COGNITIVE LEVELS
C271.1	Remember conversion of various number systems and binary codes.	Remembering Level (C1)
C271.2	Understand Boolean algebra and its minimization techniques. Understand fundamentals of programmable logic devices and digital logic families.	Understanding Level (C2)
C271.3	Applying basic concepts of Boolean Algebra to construct combinational and sequential logic circuits. Applying timer IC to classify wave shaping circuits.	Applying Level (C3)
C271.4	Analysis of sequential circuits using flip- flops. Develop skills to analyze Finite state machines using logic circuits.	Analysing Level (C4)
C271.5	Design Finite state machines using concepts of combinational and sequential circuits.	Evaluating Level (C5)

Module No.	Title of the Module	List of Experiments	CO
1	Introduction to Digital Systems, Binary Codes and Boolean Algebra	Digital systems, Importance, Analog vs. digital world; Conversion of bases, Representation of negative numbers, 9's and 1's complements, 10's and 2's complements, Arithmetic using 1's and 2's complements; Hexadecimal code, BCD, Excess-3 code, Gray code and Alphanumeric code; Basic theorems and properties of Boolean algebra; Digital logic gates.	4
2	Boolean Function Representation and Minimization Techniques	Canonical and standard forms; Prime implicants and essential prime implicants; Minimization of Boolean functions using Karnaugh map and Quine-McCluskey technique; Two-level gate implementation.	5
3	Combinational logic circuits	Binary adders and subtractors: Half adder, full adder, half subtractor, full subtractor, full adder using half adder, parallel adder, adder cum subtractor, look ahead carry adder; Circuit delay calculation; Magnitude comparator; Decoder and encoder; Multiplexer and demultiplexer; Binary multiplier; Code converters.	10

4	Sequential logic circuits	Latches and flip-flops: SR, JK, master-slave JK, T and D; Conversion of flip-flops; Synchronous and asynchronous counters; Registers and shift registers; Counters using shift registers; State diagram; Analysis of sequential circuits using flip-flops.	10
5	State machines	Finite state machine of sequential circuits - Moore and Mealy machines.	5
6	Programmable logic devices	RAMs- DRAM, SRAM and ROM. PLDs: PLAs, PALs and PROMs.	3
7	Introduction to digital logic families	Parameters of logic families, Types- DTL, RTL, TTL, CMOS.	3
8	Wave shaping circuits	Linear wave shaping circuits, Schmitt trigger, Square wave generator, IC-555 based Multi vibrators.	2
Total Lectures			42

Evaluation Criteria

Components	Maximum Marks
Mid Sem Viva	20
End Sem Viva	20
Day-to-day performance	30
Attendance	15
Lab Record	15
Total	100

Project based learning: Digital Circuit Design is a fundamental course in Electronics and Communication Engineering. In this course, a description of the effective and innovative logic circuit design is presented, which can be utilized to design various logic circuits. The project-based exercises using Boolean logic functions, constructing a truth table, assembling the logic gates, counters design and FSM are also included.

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.	M. Morris Mano, "Digital logic and computer design," 5th ed., Pearson Prentice Hall, 2013.
2.	M. Morris Mano and Michael D. Ciletti, "Digital Design with an Introduction to the Verilog Hdl," 5 th Edition, Pearson Education, 2013.
3.	R. P. Jain, "Modern Digital Electronics," 4 th Edition, Tata McGraw-Hill Education, 2009.
4.	A. Anand Kumar, "Fundamentals of Digital Circuits," PHI; 4th Revised edition, 2016.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC215	Semester: Odd (specify Odd/Even)	Semester: 3rd Session 2023-24 Month from: July to December
Course Name	Digital Circuit Design Lab		
Credits	1	Contact Hours	2

Faculty (Names)	Coordinator(s)	Dr. Archana Pandey and Dr. Abhijeet Upadhyaya
	Teacher(s) (Alphabetically)	Dr. Abhay, Dr. Ashish Goel, Dr. Garima Kapur, Dr. Gaurav Khanna, Dr. Hemant, Dr. Jasmine Saini, Dr. Kapil Dev, Dr. Ritu Raj, Dr. Saurabh Chaturvedi, Dr. Shruti Kalra,

COURSE OUTCOMES - At the end of the course, students will be able to:		COGNITIVE LEVELS
C271.1	Remember the truth tables of logic gates and verify the same using important digital ICs	Remembering Level (C1)
C271.2	Understand the universal behaviour of NAND and NOR gates and implement the basic logic gates using universal gates	Understanding Level (C2)
C271.3	Apply the concepts of logic gates to realize various combinational logic circuits such as comparator and decoders	Applying Level (C3)
C271.4	Analyze the behaviour of sequential logic circuits such as Flip-flops and counters	Analyzing Level (C4)
C271.5	Design wave shaping circuits for a given specification	Evaluating Level (C5)

Module No.	Title of the Module	List of Experiments	CO
1.	Nomenclature and specifications of digital ICs	Introduction to Digital Circuit Design Lab: Nomenclature of Digital ICs, specifications, study of the data sheet, concept of V_{CC} and ground, verification of the truth tables of logic gates using ICs.	C271.1
2.	Implementation of basic logic gates	(a) To understand and implement basic logic gates AND, OR, NOT using NAND and NOR gates (b) To implement Ex-OR gate using NOR gates only (c) To implement the Boolean expression(s) using NAND gates	C271.2
3.	Combinational Logic circuits	To realize 4-bit Binary to Gray and Gray to Binary Code Converters applying the concepts of logic gates	C271.3
4.	Combinational Logic circuits	To realize a Half Adder, Full Adder and Half Subtractor applying the concept of logic gates	C271.3
5.	Combinational Logic circuits	To realize a 2-bit Multiplier applying applying the concept of logic gates	C271.3
6.	Combinational Logic circuits	To realize and implement 2-bit Magnitude Comparator using logic gates.	C271.3
7.	Combinational Logic circuits	To realize 4:1 Multiplexer using NAND gates.	C271.3
8.	Combinational Logic circuits	To realize 2:4 Decoder using basic logic gates and to realize Half Adder using 2:4 Decoder as a block.	C271.3
9.	Seven-segment display	Display decimal digit between 0-9 on seven segment using BCD Decoder IC-7447.	C271.3

10.	Sequential Logic circuits	To analyze and verify the truth table of SR, Gated SR, Gated D Latch using logic gates and of JK flip flop using IC-74LS76.	C271.4
11.	Sequential Logic circuits	To analyze a Ripple Counter (Asynchronous) using JK flip flop IC-74LS76 and display the output on seven segment.	C271.4
12.	Sequential Logic circuits	To design and implement counting sequence 0, 7, 1, 6, 2, 5, 0, 7.... (Repeating) using IC-74LS76.	C271.5
13.	Wave shaping circuits	Using IC-555 in Astable mode to generate a rectangular pulse of 1ms period with duty cycle 75%.	C271.5

Evaluation Criteria

Components	Maximum Marks
Mid Sem Viva	20
End Sem Viva	20
Day-to-day performance	30
Attendance	15
Lab Record	15
Total	100

Project Based Learning: The main learning objective of this Lab course is that students should be able to analyze and design simple combinational and sequential circuits by means of logic gates. Students' opinions have been obtained by means of course exit survey at the end of the course.

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.	M. Morris Mano, Digital logic and computer design, 5th ed., Pearson Prentice Hall, 2013.
2.	R. P. Jain, "Modern Digital Electronics," 4 th Edition, Tata McGraw-Hill Education, 2009.
3.	A. Anand Kumar, "Fundamentals of Digital Circuits," PHI; 4th Revised edition, 2016.

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	<i>Explain</i> the basic micro and macro economics concepts.	Understanding Level(C2)
C206.2	<i>Apply</i> the basics of national income accounting and business cycles to Indian economy.	Apply Level (C3)
C206.3	<i>Examine</i> the various business forecasting methods.	Apply Level (C3)
C206.4	<i>Analyze</i> the theories of demand, supply, elasticity and consumer choice in the market.	Analyze Level (C4)
C206.5	<i>Analyze</i> the theories of production, cost, profit and break even analysis	Analyze Level (C4)
C206.6	<i>Evaluate</i> 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, <i>Managerial Economics</i> , 4th ed., Pearson Education 2001.
2.	D. Salvatore, <i>Managerial Economics in a Global Economy</i> , 8 th ed., Oxford University Press, 2015.
3.	S. Damodaran, <i>Managerial Economics</i> , 2 nd ed., Oxford University Press, 2010.
4.	M. Hirschey, <i>Managerial Economics</i> , 12 th ed., Cengage India, 2013.
5.	P.A. Samuelson, W.D. Nordhaus, S. Nordhaus, <i>Economics</i> , 18 th ed., Tata Mc-Graw Hill, 2006.
6.	S.K. Misra & V. K. Puri, <i>Indian Economy</i> , 38 th ed., Himalaya Publishing House, 2020.

Course Description

Course Code	15B11MA301	Semester Odd	Semester III Session 2023-2024 Month from July 2023- Dec 2023
Course Name	Probability and Random Processes		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)		
	Teacher(s) (Alphabetically)		
COURSE OUTCOMES:			COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:			
C201.1	recall the concepts of probability theory and probability distributions.	Remembering Level (C1)	
C201.2	explain random variables, probability distributions and reliability models.	Understanding Level (C2)	
C201.3	solve the problems concerning random variables, their distributions, reliability models and random processes.	Applying Level (C3)	
C201.4	examine random process models and solve the related problems.	Analyzing Level (C4)	
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5
2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Erlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	7
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
Total number of Lectures			42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	100

Project based learning: Each student in a group of 4-6 will apply the concept of probability distributions of random variables and reliability models arising in different real-life situations.

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.	Veerarajan, T., Probability, Statistics and Random Processes, 3 rd Ed. Tata McGraw-Hill, 2008.
2.	Papoulis, A. & Pillai, S.U., Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	Ross, S. M., Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	Palaniammal, S., Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	Prabha, B. and Sujata, R., Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.

Detailed Syllabus
Lecture-wise Breakup

Course Code	22B15HS211	Semester: Odd	Semester: III Session: 2023-24 Month: July-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.

Format for Project:

Title Page:

- Title of the Report
- Names of the Group Members
- Name of the Educational Institution
- Date of Submission

Table of Contents:

- List of Sections and Subsections with Page Numbers

Report Format

1. Introduction
 2. Industry Overview
 3. Required Skills and Qualification
 4. Ethical Dilemmas in the field
 5. Interviews with professionals (if any)
 6. Solution of Ethical Dilemmas
 7. Conclusion
- References

Interview Format

1. Introduction:
2. Background Questions (such as their current position, years of experience, and educational qualifications.)
3. Skills and Qualifications
4. Ethical Challenges
5. Solutions to Ethical Challenges
6. Closing. (Thank the interviewee for their time and valuable insights)

Lab Test -1

Evaluation Criteria for Group Discussion

1. **Active Participation:** Evaluate how actively each group member contributes to the discussion.
2. **Content Knowledge:** Assess the depth and accuracy of the participants' understanding of the topic being discussed.
3. **Critical Thinking:** Evaluate the ability of participants to analyze and evaluate different perspectives, arguments, and evidence presented during the discussion. Look for logical reasoning and well-supported arguments.

4. **Communication Skills:** Assess how effectively participants communicate their thoughts and ideas. This includes speaking clearly, listening attentively to others, and respecting diverse viewpoints.

5. **Time Management:** Evaluate how well the group manages their time during the discussion. They should ensure that all relevant points are discussed without going off-topic or dominating the conversation.

Lab test-2

Evaluation Criteria of Role play

1. **Understanding of Concepts:** Evaluate how well the student understands the key concepts related to the role-play scenario. Assess their ability to apply theoretical knowledge to practical situations.
2. **Communication Skills:** Assess the student's communication skills, including verbal and non-verbal communication, active listening, and clear expression of ideas.
3. **Problem-Solving Abilities:** Observe how the student approaches and handles challenges presented in the role-play scenario. Evaluate their ability to think critically and make decisions under pressure.
4. **Teamwork and Collaboration:** If the role-play involves multiple participants, assess the student's ability to work as part of a team and collaborate with others effectively.
5. **Creativity and Originality:** Look for creativity in the student's performance, including innovative solutions, unique approaches, and imaginative thinking.
6. **Confidence and Poise:** Assess the student's confidence and poise while performing the role-play.

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

Detailed Syllabus
Lecture-wise Breakup

Subject Code	19B13BT211	Semester: ODD	Semester: III Session: 2023-24 Month from: July to Dec
Subject Name	Environmental Studies		
Credits	0	Contact Hours	3
Faculty (Names)	Coordinator(s)	1. Dr. Krishna Sundari S	
	Teacher(s) (Alphabetically)	1. Dr. Krishna Sundari S 2. Dr. Garima Mathur 3. Dr. Ekta Bhatt 4. Dr. Rachana	

Cos (NBA code)	Description	Cognitive levels
CO205.1	Explain diversity of environment, ecosystem resources and conservation	Understand Level (C2)
CO205.2	Identify various pollution related hazards, their safe management, associated environmental regulations and policies	Apply Level(C3)
CO205.3	Apply modern techniques for sustainable Urban planning and Disaster management	Apply Level(C3)
CO205.4	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analysing Level(C4)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	The Multidisciplinary nature of environment, Biodiversity	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity, Case studies.	8
2.	Natural resources, Energy consumption & conservation	Water, Land, Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Global Conventions on Energy, Kyoto protocol, Case studies.	8
3.	Pollution, hazardous waste management	Air, Water & Land, chemical, noise pollution, sources & causes, effects, Electronic waste, nuclear hazards, Case studies.	8
4.	Urban planning, human communities, Disaster management	Sustainable building, Disaster Management and Contingency Planning, human population, resettlement, rehabilitation environmental movements, environmental ethics, Critical issues concerning Global environment Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc Case studies.	8
5.	Environmental Policies, Laws, Regulations & ethics	Regulation of technology and innovation, Policy and laws, Different Acts such as: Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Case studies.	4

6	Field Work/	Explore the current environment related occurrences at national and international level, Study of successful sustainable measures, a know-how of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems.	6
Total number of Lectures			42

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.	Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6 th ed. Jones & Barlett Publishers.
2.	Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India
3.	Textbook of Environmental Studies for UG Courses - Erach Bharucha, University Press
4.	Issues of the Journal: Down to Earth, published by Centre for Science and Environment

EVALUATION:

Mid Semester Examination - 30 marks (To be held along with T-2 Exam)

End Semester Examination - 40 marks

Teachers Assessment (TA) - 30 marks; PROJECT BASED COMPONENT: FIELD ACTIVITY

Structure of Grading Academic Performance: Mandatory to Pass, grade will be awarded