DEPARTMENT OF ELECTRICAL AND ELETRONICS ENGINEERING

NECR-21

ALGEBRA AND CALCULUS (21MA1001)	
Course Objectives: 1. To familiarize the students with the theory of matrices and quadratic forms. 2. To analyze second order ordinary differential equations. 3. To explain the series expansions using mean value theorems and the concepts of multivariable calculus. 4. To summarize the procedure to solve the partial differential equations. 5. To explain the student with mathematical tools needed in evaluating multiple integrals and its applications.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	**Make use** the concepts of Matrices **to solve various Engineering problems. (BL-3)**
CO 2	**Identify** different types of higher order differential equations and their applications **in solving engineering problems. (BL-3)**
CO 3	**Apply** Mean value theorems, Multi variable calculus **to solve engineering problems. (BL-3)**
CO 4	**Apply** a range of techniques **for solutions of first order Linear and non-Linear Partial Differential Equations (PDE). (BL-3)**
CO 5	**Apply** the techniques of multiple integrals **for the area and volume of the region bounded by curves**. **(BL-3)**

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	3												
CO5	3	3												
1- Low, 2-Medium, 3- High														

IED PHYSICS (21PH1001)		
Course Objectives: 1. To understand optical phenomenon i.e. interference and diffraction related to their engineering applications. 2. To explain the concepts and difference between classical free electron theory and quantum theory. 3. To impart knowledge in basic concepts of free electron theory of metals and semiconductors. 4. To illustrate the concepts of superconductor and nanomaterials in functioning of electronic devices. 5. To familiarize the types of laser/optical fibres and their applications in communication engineering devices		
Course Outcomes: After successful completion of the course, the student will be able to:		BTL
CO 1	Explain the conecpts of interference, diffraction using Huygen's wave theory	2
CO 2	Comprehend the conecpts of matter waves, wave functions and their interpretation for understanding the matter at atomic scale	1
CO 3	Summarize the importance of free electron theories in determining the properties of metals and semiconductors	1
CO 4	Understand the concepts of superconductor and nanomaterials to familarize their applications in relevant fields	2
CO 5	Realize the importance of the lasers and optical fibres in engineering and medical applications	2

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	**3**	**2**												
CO2	**3**	**2**												
CO3	**3**	**2**											**1**	
CO4	**3**					**1**							**1**	
CO5	**3**	**1**				**1**							**1**	
1: Low, 2-Medium, 3- High														

BASIC ELECTRICAL CIRCUITS (21ES1003)

Course Objectives:

1. To study the basics of circuit analysis.
2. To study the magnetic circuits.
3. The concepts of real power, reactive power, complex power, phase angle and phase difference.
4. To understand frequency response in electrical circuits.
5. To understand the concept of graphical solution to electrical network.
6. To impart knowledge on solving circuit equations using network theorems.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Solve various electrical networks in presence of active and passive elements.(BL-3)
CO 2	Understand the fundamental behaviour of AC circuits and solve AC circuit problems.(BL-2)
CO 3	Explain the behaviour of the circuit at series & parallel resonance of circuit & the effect of resonance .(BL-2)
CO 4	Apply graph theory to formulate network equations.(BL-3)
CO 5	Solve electrical networks by using principles of network theorem.(BL-3)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1									3	3	1
CO2	3	3	3										2	
CO3	3	3	3										3	3
CO4	3	3	3										2	3
CO5	3	3	2											

1: Low, 2-Medium, 3- High

PROBLEM SOLVING AND PROGRAMMING	
Course Objectives: 1. To understand various steps in Program development. 2. To understand the basic concepts in C Programming Language. 3. To learn how to write modular and readable C Programs. 4. To learn the syntax and semantics of a C Programming language. 5. To learn structured programming approach for problem solving.	
Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Identify methods to solve a problem through computer programming. (BL - 3)
CO 2	Understand the use of basic elements of C language. (BL - 2)
CO 3	Understand the usage of various control statements and the modular approach for solving the problems. (BL - 2)
CO 4	Apply the Arrays and Pointers for solving problems. (BL - 3)
CO 5	Explain User-Defined Data Types and Files. (BL - 2)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3											1	
CO2	1	2	1										1	
CO3	1	2	3	2	2							2	2	2
CO4	3	3	2	2								1	2	
CO5	2	2	2	2								1	2	

1: Low, 2-Medium, 3- High

Applied Physics lab (21PH1501)

Course Objectives:

1. To provide student to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field. To prepare students for performing requirement analysis and design of variety of applications.
2. To enable the students to understand the concepts of interference and diffraction and their applications.
3. To educate students to recognize the applications of laser in finding the wavelength, slit width and its role in diffraction studies
4. To make the students to understand the important parameters of optical fibres and metals

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	learn important concepts of physics through involvement in the experiments by applying theoretical knowledge.
CO 2	understand the concepts of interference and diffraction and their applications.
CO 3	recognize the applications of laser in finding the wavelength, slit width and its role in diffraction studies
CO 4	understand the important parameters of optical fibres and metals

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1												
CO2	2	1												
CO3	2	1				1								
CO4	2	1				1								

1: Low, 2-Medium, 3- High

BASIC ELECTRICAL CIRCUIT LAB (21ES1506)	
Course Objectives: 1. Fundamentals of Ohm's law, Kirchhoff's current and voltage laws and its practical implementation. 2. Measurement of voltage, current, power and impedance of any circuit. 3. Analysis of a given circuit depending on types of elements.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Apply the KCL and KVL for circuit analysis and verify the results theoretically (BL= 3)
CO 2	Experimentally determine self inductance, mutual inductance and coefficient of coupling.(BL=3)
CO 3	Practically determine band width, Q-factor and verify with theoretical values. (BL=3)
CO 4	Able to draw locus diagrams, waveforms and phasor diagrams for lagging and leading networks.(BL-2)
CO 5	Apply suitable theorems for the given Electrical circuit and verify with theoretical values.(BL=3)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	1	1		1	2		1		2	2	2
CO2	2	2	2	1	1		1	2		1		2	2	2
CO3	2	2	2	1	1		1	2		1		2	2	2
CO4	2	2	2	1	1		1	2		1		2	2	2
CO5	2	2	1				1						2	3
1: Low, 2-Medium, 3- High														

ENGINEERING & ITWORK SHOP (21ES1505)	
Course Objectives: 1. To know basic workshop processes and adopt safety practices while working with various tools and equipments 2. To identify, select and use various marking, measuring, holding, striking and cutting tools & equipments. 3. To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system 4. To gain knowledge about the usage of tools like Word processors, Spreadsheets, Presentations 5. To learn about Networking of computers and use Internet facility for Browsing and Searching	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	**Understand** the safety aspects in using the tools and equipments.(BL-2)
CO2	**Apply** tools for making models in respective trades of engineering workshop.(BL-3)
CO3	**Apply** basic electrical engineering knowledge to makes imple housewiring circuits And check their functionality.(BL-3)
CO4	**Understand** to disassemble and assemble a Personal Computer and prepare the Computer ready to use(BL-2)
CO5	**Apply** knowledge to Interconnect two or more computers for information sharing (BL-3)

CO-PO Mapping														
	PO												PSO	
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2				3								1	3
CO2	2				3								1	3
CO3	2				3								1	3
CO4	2				3								1	3
CO5	2				3								1	3
1: Low, 2-Medium, 3- High														

PART-B IT WORKSHOP LAB

Course Objectives:

1. To provide Technical training on Productivity tools like Word processors, Spreadsheets, Presentations.
2. To make the students know about the internal parts of a computer, assembling, installing the operating system.
3. To teach connecting two or more computers.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Understand functionalities of a computer and operating system. (BL-2)
CO 2	Practice Word processors, Presentation and Spreadsheet tool. (BL-2)
CO 3	Connect computer using wired and wireless connections. (BL-2)

CO-PO Mapping

	PO												PSO	
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1													
CO2	1													
CO3	1													

1: Low, 2-Medium, 3- High

Problem Solving and Programming Lab (21ES1501)	
Course Objectives: 1. To work with the compound data types 2. To explore dynamic memory allocation concepts 3. To design the flowchart and algorithm for real world problems 4. To write C programs for real world problems using simple and compound data types 5. To employee good programming style, standards and practices during program development	
Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Translate algorithms into programs (In C language) (BL - 2)
CO 2	Code and debug programs in C program language using various constructs.(BL - 3)
CO 3	Solve the problems and implement algorithms in C. (BL - 3)
CO 4	Make use of different data types to handle the real time data (BL - 3)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	1	2											1	
CO2	2	2	2										2	1
CO3	2	2	3	1	2								2	2
CO4	2	2	3	1	1								2	2
1: Low, 2-Medium, 3- High														

Communication skills Lab (21EN1502)								
I-B.Tech								R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	2	36	1	40	60	100
Pre-requisite: English								
Course Outcomes: After successful completion of the course, Student will be able to:								
CO 1	**To develop knowledge, skills, and judgment** around human communication that facilitates their ability to work collaboratively with others.							
CO 2	**Develop their public speaking abilities** to speak both formally and informally.							
CO 3	**Understand the nuances of English language and skills** required for effective Participation in group activities.							

CO-PO Mapping													
CO	PO											PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1									2	3				
CO2									2	3				
CO3									2	3				
1: Low, 2-Medium, 3- High														

CHEMISTRY (21CH1001)

Course Objectives:

1. To impart technological aspects of modern chemistry and its applications.
2. Understand the chemistry behind electrochemical energy systems.
3. To train the students on the principles and applications of polymers.
4. To acquire knowledge of engineering materials and fuels.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Understand** the **fundamental concepts of chemistry to predict the structure and bonding of materials**.**(BL-2)**
CO 2	**Discuss** various kinds of **electro chemical cells**.**(BL-3)**
CO 3	**Compare** the **materials of various energy storage devices and emerging technologies**.**(BL-3)**
CO 4	**Demonstrate** the **mechanism and applications of different polymers in electronic devices**.**(BL-3)**
CO 5	**Explain calorific values, refining of petroleum and cracking of oils**.**(BL-2)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3													
CO2	3													
CO3	3						3							
CO4	3						3							
CO5	3						3							

1: Low, 2-Medium, 3- High

VECTOR CALCULUS COMPLEX VARIABLES & TRANSFORMS (21MA1003)

Course Objectives: This course aims to providing the knowledge for the student about on

1. To enlighten the learners in the concept of vector differentiation and integration.
2. To understand the concept the limit, continuity & differentiation of complex variable
3. To Evaluate the improper integrals by complex integration
4. To understand the concepts of Laplace transforms and Inverse Laplace transforms & its properties.
5. To understand the concepts of Fourier series, Fourier transforms and its properties.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	Interpret the different operators such as gradient, curl and divergence to find out point function (L-3)
CO 2	Understand the concept the limit, continuity & differentiation of complex variable (L-3)
CO 3	Evaluate the integral by using contour integration .(L-5)
CO 4	Apply the Laplace transform to convert time domain into frequency domain & Inverse Laplac transforms techniques to solve the differential equations. (L-3)
CO 5	Develop the Fourier Series to the given periodic functions (L-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	3												
CO5	3	3												

1- Low, 2-Medium, 3- High

https://youtu.be/VzGnb2K4RGQ

PYTHON PROGRAMMING AND DATA SCIENCE (21ES1005)	
Course Objectives: 1. To learn about Python programming language syntax, semantics, and the runtime environment 2. To be familiarized with general computer programming concepts like conditional execution, loops & functions 3. To learn about mutable and immutable types. 4. To learn about the data science related functions in NUMPY. 5. To solve data science problems using PANDAS.	
Course Outcomes: After successful completion of the course, Student will be able to	
CO 1	Demonstrate various **operators, data types and decision structures** in python. (BL - 3)
CO 2	Solve problems using **Functions and data structures** in Python (BL - 3)
CO 3	Implement the concept of **Files and Modules** (BL - 3)
CO 4	Implement Data Science queries using **NUMPY** module (BL - 3)
CO 5	Solve data manipulation task using **PANDAS** module (BL - 3)

CO-PO Mapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	1											1	
CO2	2	2											2	
CO3	2	1											2	
CO4	2	2											1	
CO5	2	2											1	1

1: Low, 2-Medium, 3- High

ENGLISH (21EN1001)

Course Objectives :

1. To explore the students to develop knowledge and awareness of English sentence structure, construction and improvement.
2. To develop the students in getting the information of word power and able them to fit for the competition.
3. To enhance the ability of writing the structural English among the students.
4. To demonstrate the ability to write error free written communication.
5. To distinguish main ideas from specific details and make use of contextual clues to inform meanings of un familiar words.

.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	**Acquire**in-depth knowledge on formulating appropriate sentences with Grammatical accuracy and also develop concept of word formation. .(BL2)
CO 2	**Use**coherent and unified paragraphs with adequate support and detail and can write a topic sentence, support and concluding sentence. (BL2)
CO 3	**Analyze**the concepts of various real time scenarios to represent in an effective model. (BL – 4)
CO 4	**Understand** the grammar rules for synthesisof sentences and use pre writing strategies to plan to write dialogues, reviews and edit the text effectively.(BL – 2)
CO 5	**Relate** the skills and sub skillsof reading effectively and provide knowledge on the structure and format of technical writing.(BL – 2)

CHEMISTRY LAB (COMMON TO CSE,ECE & EEE) (21CH1501)	
Course Objectives: The objective of the laboratory sessions is to enable the learners to get hands-on experience on the principles discussed in theory sessions and to understand the applications of these concepts in engineering.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	**Determine** the cell constant and conductance of solutions
CO 2	Perform quantitative analysis using instrumental methods
CO 3	Utilize the fundamental laboratory techniques for analyses such as titrations, separation purification and Spectroscopy
CO 4	Analyze and gain experimental skill.

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3													
CO2	3													
CO3	3													
CO4	3													
1: Low, 2-Medium, 3- High														

ENGINEERING GRAPHICS (21ES1503)

Course Objectives:

1. To impart skills on using drawing instruments
2. To convey exact and complete information of any physical object.
3. To Construct Engineering Curves.
4. To Learn and practice basic AutoCAD commands.
5. To Instruct the utility of drafting & modelling packages in orthographic and isometric drawings

Course Outcomes: At the end of the course, student will be able to:	
CO 1	Define the qualities of precision and accuracy in engineering drawing. (BL-1)
CO 2	Draw engineering curves with different methods(BL-3).
CO 3	Develop the orthographic projection of points and straight lines(BL-3)
CO 4	Construct the planes and simple solids.(BL-3).
CO 5	Understand and practice basic AUTOCAD commands (BL-2)

Python Programming and Data Science Lab (21ES1508)	
Course Objectives: 1. To gain knowledge on python program basics 2. To prepare students for building programs using control statements 3. To prepare students for solving the problems involving functions and files. 4. To gain knowledge Python Numpy module to solve complex mathematical problems involving matrices. 5. To gain Knowledge of data cleaning using Pandas.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Understanding and use of python- Basic Concepts**(BL -2)**
CO2	Solve the problems using python Iterative Statements**(BL -3)**
CO3	Understand the concepts of files, modules**(BL -2)**
CO4	Solve the Numerical problems that involve Matrices **(BL -3)**
CO5	Provide solutions for data cleaning tasks**(BL-3)**

CO-PO Mapping

CO	PO												PSO	
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1	2										1	
CO2	2	3	2	2									2	1
CO3	2	2	3	2	2								3	2
CO4	2	2	2	1	1								3	2

1-Low, 2-Medium, 3- High

English Language Lab (21EN1501)	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	**Understand how speech sounds are used** to create meaning. Apply their knowledge of English phonetics and phonology to improve their own pronunciation.
CO2	**Recognize and use pitch patterns** to signal complete and incomplete thought groups and Speak confidently and intelligibly within groups and before an audience.
CO3	**Learn, practice and acquire the skills** necessary to deliver effective, presentation with clarity and enable them to prepare resume with cover letter.

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1									2	3				
CO2									3	2				
CO3									3	3				
1: Low, 2-Medium, 3- High														

PROBABILITY STATISTICS AND NUMERICAL METHODS

Course Objectives: This course aims to providing the knowledge for the student about on

1. The theory of Probability Distributions is used to Determine the expected values and analysis the data.
2. The Statistical methods used to test the product under the specifications or not.
3. To solving an algebraic and transcendental equations by applying Various numerical methods.
4. To interpolating the values through the polynomials.
5. To evaluation of integral values through the numerical methods.
6. To solve ordinary differential equations through the numerical methods.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	Apply the probability distributions in life testing, expected failures for various engineering applications. (L-3)
CO 2	Test the data by applying large samples inferential techniques. (L-4)
CO 3	Test the data by applying small samples inferential techniques. (L-4)
CO 4	solve algebraic and transcendental equations and interpolate the trend value (L-3)
CO 5	To Solve ordinary differential equations by using numerical methods (L-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3				2								
CO2	3	3	2			2								
CO3	3	3				2								
CO4	3	3	2											
CO5	3	3				2								

1- Low, 2-Medium, 3- High

https://youtu.be/VzGnb2K4RGQ

DC MACHINES AND TRANSFORMERS (21EE2001)

Course Objectives:

1. To understand the constructional features of DC machines.
2. To understand the phenomena of armature reaction and commutation.
3. To understand the characteristics and parallel operation of dc machines.
4. To understand the methods for speed control of DC motors and applications of DC motors.
5. To understand the various types of losses that occurs in DC machines and how to calculate efficiency.
6. To understand the constructional features of a single phase transformer.
7. To understand the efficiency and voltage regulation of a transformer.
8. To understand the Autotransformers Construction & Comparison with two winding transformer.
9. To suggest a suitable three phase transformer connection for a particular operation.
10. To understand the tap changing of transformers.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Study construction, different phenomena like: armature reaction, commutation in DC machines.
CO 2	Understand about different types of dc generators and significance of OCC.
CO 3	Develop mathematical relations for torque developed by dc motor and learn about speed – torque characteristics of different types of DC motor. Gain knowledge of about different testing methods of dc machines.
CO 4	Identification of physical components of single phase transformer.
CO 5	Learn difference between two windings and auto transformers. Identification of three phase transformers circuits.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	2		2				1	1	2	2	1
CO2	2	2	2	2		2				1	1	2	1	2
CO3	2	2	2	2		2				1	1	2	2	1
CO4	2	3	3	2		2				1	1	2	2	1
CO5	3	3	3	3		2				1	1	2	1	2

1: Low, 2-Medium, 3- High

Electrical Circuit Analysis (21EE2002)

Course Objectives:

1. To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.
2. Knowing how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
3. To introduce the various two-port networks parameters for a given circuit.
4. To evaluation of poles and zeros of a given transfer function.
5. To study the different types of filters

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Understand the analysis of three phase balanced and unbalanced circuits.
CO 2	Solve the problems in DC transient response for the given circuit.
CO 3	Solve the problems in AC transient response for the given circuit.
CO 4	Analyze the given network using different two port network parameters.
CO 5	Explain about the fundamental and types of filters.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2									3	3
CO2	3	3	3	2									3	3
CO3	3	3	3	2									3	2
CO4	3	3	3	2									1	2
CO5	2	2	3	2									2	1

1: Low, 2-Medium, 3- High

POWER SYSTEM ARCHITECTURE (21EE2003)

Course Objectives:

1. To understand the structure, essential components and their layout in non renewable generating stations.
2. To understand the electrical power generation from renewable energy sources as sun, wind and ocean.
3. To understand the calculation of different transmission line parameters and their use.
4. To understand the various effects in transmission line.
5. To understand the modeling of transmission line.

Course Outcomes: On successful completion of the course, student will be able to:

CO 1	Describe the working principle and operation of Nonrenewable generating stations. **(BL-2)**
CO 2	Discuss the working principle and operation of various Renewable energy sources. **(BL-2)**
CO 3	Analyze and compute the transmission line parameters. **(BL-4)**
CO 4	Estimate the performance of a given transmission line **(BL-5)**
CO 5	Analyze the performance of transmission lines **(BL-4)**

CO-PO Mapping

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

1: Low, 2-Medium, 3- High

Universal Human Values (21EN1002)

Course Objectives:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes: On successful completion of the course, student will be able to:

CO 1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature) (BL-2)
CO 2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. (BL-2)
CO 3	They would have better critical ability. (BL-2)
CO 4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). (BL-2)
CO 5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. (BL-3)

CO-PO Mapping

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

1: Low, 2-Medium, 3- High

AC MACHINES (21EE2004)

Course Objectives:

1. To understand the Constructional details, principle of operation and the importance of slip in Induction motor operation
2. To understand the slip-torque characteristics and torque calculations of Induction motor
3. To understand the methods of starting and speed control of Induction motor
4. To understand the construction and principle of working of synchronous machines
5. To understand the different methods of predetermining the regulation of alternators
6. To understand the concepts and computation of load sharing among alternators in parallel.
7. To understand the performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement.
8. To understand the different types of single phase motors and special motors used in house hold appliances and control systems.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	To acquire the basic knowledge of construction, working and operation of induction motor.
CO 2	Identify different speed controlling techniques of Induction motor for the given application.
CO 3	To impart knowledge on Construction and performance of salient and non – salient type synchronous generators and determine how several alternators running in parallel share the load on the system.
CO 4	Analyze the performance characteristics of synchronous motors.
CO 5	To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines.

CO-PO Mapping

CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	1										2	2
CO2	3	2	2										2	2
CO3	3	2	2										2	2
CO4	3	2	1										2	2
CO5	3	2	1										2	2

1: Low, 2-Medium, 3- High

ENGINEERING ELECTROMAGNETICS (21EE2006)	
Course Objectives: 1. To review the fundamentals of the different coordinate systems, vector algebra and calculus 2. To teach the basic laws of electromagnetism 3. To learn to compute and visualize the electrostatic and magnetostatic fields for simple configurations 4. To analyse the time varying electric and magnetic fields and to understand Maxwell's equations 5. To understand the propagation of electromagnetic waves through different media	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Ability to identify appropriate coordinate systems and visualize and understand the practical significance of vector calculus
CO 2	Understanding of the basic laws of electrostatics, Ability to compute, visualize electrostatic fields along with practical applications
CO 3	Understanding of the basic laws of magnetostatics
CO 4	Ability to compute, visualize magneto static fields along with practical applications
CO 5	Understanding of Maxwell's equations in different forms and medium

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2									2	1
CO2	3	3	2	2									2	1
CO3	3	3	1	1									2	1
CO4	3	3	2	2									2	1
CO5	3	3	2	2									2	1
1: Low, 2-Medium, 3- High														

LINEAR CONTROL SYSTEMS (21EE2007)

Course Objectives:

1. To understand the merits and demerits of open and closed loop control systems
2. To understand the mathematical modeling of Electrical and mechanical control systems
3. To understand the step response of second order control systems
4. To plot Root locus for the given system transfer function
5. To understand the stability analysis from Bode plot, polar plots
6. To understand the state space analysis

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Determine the transfer function for the given electrical or mechanical systems and also determine the transfer function of a system using block diagram reduction techniques and Mason's gain formula
CO 2	Analyze the system behaviour in time domain and step response to various dampings.
CO 3	Determine the stability of given system by applying Routh's stability criteria.
CO 4	Analyze the stability of given system by means of Bode plot and polar plot
CO 5	Determine the state model and assessment of controllability & observability from the given transfer function.

CO-PO Mapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2												1
CO2	2	1												1
CO3	2	1												1
CO4	2	1	1											1
CO5	2	1	1											1

1: Low, 2-Medium, 3- High

DC MACHINES AND TRANSFORMERS LAB (21EE2501)

Course Objectives:

1. To familiarize students about OCC and internal, external characteristics of dc shunt generator.
2. To know the performance characteristics and speed control method of dc shunt motor
3. To know how to predetermine the efficiency of dc shunt motor.
4. To find efficiency, losses and regulation of single phase transformer.
5. To know how to find motor and generator efficiency by connecting to dc shunt machines back to back
6. To familiarize students about characteristics of dc series motor

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Determine the magnetization and load characteristics of a DC shunt generator
CO 2	Describe the efficiency and performance characteristics of DC motors
CO 3	Predetermination of transformer with different loads

CO-PO Mapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	2	2				3	2		3	3	3
CO2	2	3	3	1	2				2	2		3	3	3
CO3	3	3	3	1	2				2	2		3	3	3

1: Low, 2-Medium, 3- High

ELECTRICAL CIRCUIT ANALYSIS AND SIMULATION LAB (21EE2502)	
Course Objectives: The objectives are to study: 1. To design electrical systems. 2. To analyze a given network by applying various Network Theorems. 3. To measure three phase Active and Reactive power. 4. To understand the locus diagrams	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Analyze the three phase circuits for identification of utilization in Power system.
CO 2	Examine the transient response of series and parallel circuits with different combinations of R, L and C by using AC / DC supply.
CO 3	Identify the various parameters to analyze the transmission and distribution system in electrical engineering.
CO 4	Model the different types of filters for understand the pass band and attenuation of the various signals.

CO-PO & PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		1	2	2	2	2	2	2
CO2	3	3			2	2			2	2	2		2	2
CO3	3	3				2			2	2	2	2	2	2
CO4	3	3	3		2	2		1	2	2			2	2

1 – Low Level; 2 – Moderate Level; 3 – High Level

LINEAR CONTROL SYSTEMS & SIMULATION LAB (21EE2503)	
Course Objectives: The objectives are to study: 1.To provide practical knowledge for Time response of second order system 2. Determine of transfer functions of various systems and control of it by different Methodologies 3. The characteristics of Magnetic Amplifier, servo mechanisms which are helpful in automatic control systems 4. Determine the stability analysis of different system by using PSPICE and MATLAB 5. To study the closed loop performance for the given plant using P, PD, PI, PID Controllers. 6. The design of controllers/compensators to achieve desired specifications.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Get the knowledge of feedback control and transfer function of DC servo motor
CO 2	Model the system and able to design the controllers and compensators
CO 3	Get the knowledge about the effect of poles and zeros location for second order systems

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2			3				2	2		3	3	3
CO2	2	3	3	3	3				3	2		3	3	3
CO3	2	2	3	2	3				2	2		3	3	2
1: Low, 2-Medium, 3- High														

Digital Electronics & Logic Design (21EE2008)	
Course Objectives: To study the basic concepts of number systems and binary codes. To minimize Boolean expressions using map and Q-M method. To design combinational and sequential circuits. To familiarize Registers &counters using Flip-Flops. To understand the concept of memory organization	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Use number systems, binary codes and Boolean algebra to implement digital circuits. (BL-3)
CO 2	Apply minimization techniques on Boolean expressions. (BL-3)
CO 3	Design combinational circuits using logic gates. (BL-3)
CO 4	Analyze synchronous sequential circuits. (BL-4)
CO 5	Classify the memories & programmable logic devices. (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	1										1	
CO2	3	3	3	1									1	
CO3	3	3	3	1									1	1
CO4	3	1	2	1									2	1
CO5	2	2											1	1
1: Low, 2-Medium, 3- High														

POWER DISTRIBUTION & DISTRIBUTED GENERATION
(21EE2009)

Course Objectives:

1. To illustrate the Necessity of distributed generation
2. To Understand different renewable energy sources
3. To Understand the control aspects & Power quality issues of DG's
4. To understand the structure of Electrical distribution system and various factors
5. To understand the technical issues of substations such as location, ratings & Bus bar arrangements

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Compare the advantages & disadvantages** of various distributed generation**.**
CO 2	**Describe various Distributed Generation systems, Micro-grid** and storage devices
CO 3	**Illustrate the Economic and control aspects** of DGs
CO 4	**Analyze the different load characteristics, distribution factors & Modelling** of distribution system.
CO 5	**Design of Distribution Feeders, Voltage Drop and power loss** in D.C Distributors.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	2	2								3	2
CO2	2	3	2	2	2								3	2
CO3	3	3	2	2	2								3	2
CO4	2	2	2	2	2								3	2
CO5	2	2	2	2	2								3	2

1: Low, 2-Medium, 3- High

POWER ELECTRONICS (21EE2010)

Course Objectives:

1. To understand the various applications of Power electronic devices for conversion, control and conditioning of the electrical power and to get an overview of different types of power semiconductor devices and their dynamic characteristics.
2. To understand the operation, characteristics and performance parameters of controlled rectifiers
3. To study the operation, switching techniques and basics topologies of DC-DC switching regulators
4. To learn the different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Describe the operation** of power semiconductor devices
CO 2	**Illustrate the construction and operation** of silicon controlled rectifier
CO 3	**Analyze the various uncontrolled rectifiers and design suitable** filter circuits
CO 4	**Demonstrate** the operation of the DC-DC converters and inverters
CO 5	**Summarise the operation** of AC controllers.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	3										3	2
CO2	3	2	3										3	2
CO3	3	2	3										3	2
CO4	3	2	3										3	2
CO5	3	2	3										3	2

1: Low, 2-Medium, 3- High

AC MACHINES Lab (21EE2504)	
Course Objectives: 1. To find the performance of induction motor by calculating the efficiency. 2. To find direct and quadrature axis reactances of synchronous motor. 3. To find voltage regulation by using various methods on synchronous machine 4. To determine 'v' and 'inverted v' curves of synchronous motor. 5. To find the efficiency and power factor from circle diagram byconducting no load and blocked rotor test on 3-phase induction motor.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Find the performance characteristics of the 3-phase induction motor.
CO 2	Draw the direct and quadrature axis reactance and regulation of synchronous machine.
CO 3	To Know the Equivalent Circuit Parameters of a Single Phase Induction Motor
CO 4	To know how to draw circle diagram and determine the electrical parameters by using 3-phase squirrel cage induction motor.
CO 5	Know the voltage regulation of synchronous machine by using Synchronous Impedance Method.
CO 6	Know the voltage regulation of synchronous machine by using M.M.F.Method.
CO 7	Know the voltage regulation of synchronous machine by using ZPF.Method.
CO 8	Know the voltage regulation of synchronous machine by using ASA.Method.
CO 9	To know how to draw the V and Λ curves of synchronous motor
CO 10	Know the separation of losses of the 1-phase transformer.

Power Electronics and Simulation Lab (21EE2506)

Course Objectives:

The objectives are to study:

1. The characteristics of power electronic devices with gate firing circuits
2. Various forced commutation techniques
3. The operation of single-phase voltage controller, converters and Inverters circuits with R and RL loads
4. Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators

Course Outcomes:

At the end of the course, students will be able to

1. The student will analyze the characteristics of power semiconductor devices & P Spice Simulation.
2. To Perform Laboratory Experiments practically.
3. To carry out laboratory experiments on simulation & Kits.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3	2			2				2	2			3	2
CO2	2	3			2				2	2			3	2
CO3	3	3			2				2	2			3	2

1: Low, 2-Medium, 3- High

ADVANCED POWER SYSTEM ANALYSIS (21EE2011)	
Course Objectives: 1. Discuss the power system network matrices, formation of Y_{Bus} and Z_{Bus} 2. Calculation of power flow in a power system network using various techniques 3. Discuss the Short Circuit Analysis 4. Examine the Power system stability	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Discuss the Representation of power system matrices with formation of Y_{BUS}.
CO 2	Describe the Representation of power system matrices with formation of Z_{BUS}.
CO 3	Apply the concepts of algorithm for the given power system network.
CO 4	Analyse the symmetrical faults and unsymmetrical faults of a power system network.
CO 5	Develop the steady State, Dynamic and Transient Stabilities for a power system.

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	3	3								3	3
CO2	3	3	3	3	3								3	3
CO3	3	3	3	3	3								3	2
CO4	3	3	3	3	3								3	2
CO5	3	3	3	3	3								3	2
1: Low, 2-Medium, 3- High														

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION (21EE2012)	
Course Objectives: **1.** The basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy. **2.** The measurement of R, L, and C parameters using bridge circuits. 3.The principles of magnetic measurements. 4.The use of Current Transformers, Potential Transformers, andPotentiometers.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	**Describe** the concepts and principles of Measuring Instruments to measure voltage and current.
CO 2	**Analyze** the working principles of single and three phase wattmeters & energy meter to measure power and energy in circuits.
CO 3	**Demonstrate** the concepts and principles of AC and DC bridges to evaluate resistance, inductance and Capacitance for AC and DC Circuits.
CO 4	**Demonstrate** the operating principles of instrument transformers and potentiometer to measure unknown voltage, Current & Resistance in circuits.
CO 5	**Identify** the physical variables to describe operating principle of the transducers.

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2										3	2
CO2	3	3	2										3	2
CO3	3	3	2										3	2
CO4	3	3	2										3	2
CO5	3	3	2										3	2
1: Low, 2-Medium, 3- High														

SWITCH GEAR & PROTECTION (21EE2013)

Course Objectives:

1. To Learn in detail about Switch gear Protective equipments
2. To Learn about the technical aspects involved in the operation of Circuit Breakers
3. To Learn about Basic Requirements of Protective Relays
4. To Learn different types Relays & Applications

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Demonstrate** the operation of different types of Circuit Breakers
CO 2	**Describe** the operation & application of various types of protective relays.
CO 3	**Compare** the different types of comparators.
CO 4	**Analyze** the various protection schemes of various power system components like alternators, transformers and bus-bars.
CO 5	I**llustrate** the various methods of over voltage protection in power systems

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2											3	2
CO2	3	2											3	2
CO3	3	2											3	2
CO4	3	2											3	2
CO5	3	2											3	2

1: Low, 2-Medium, 3- High

ELECTRICAL MEASUREMENT & INSTRUMENTATION LAB

(21EE2507)

Course Objectives:

1. Measurement of coefficient of coupling between two coupled coils.
2. Accurate determination of inductance and capacitance using D.C and A.C Bridges
3. Calibration of various electrical measuring instruments.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Accurately determine the values of inductance and capacitance using a a.c bridges
CO 2	Compute the coefficient of coupling between two coupled coils
CO 3	Calibrate various electrical measuring instruments
CO 4	Accurately determine the values of very low resistances

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1	2	1					2	2				1
CO2	2	2	2	1				1	2	2				2
CO3	2	2	1	1				1	2	2				1
CO4	2	2	2	1	1			1	2	2				2

1: Low, 2-Medium, 3- High

POWER SYSTEM LAB (21EE2508)
Course Objectives: 1. To study the different methods of power system analysis. 2. To learn about the power system control. 3. To learn about the concepts of Power system stability.
Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Examine the power system analysis **(BL=4)**
CO 2	Identify characteristics of various Relays**(BL=3)**
CO 3	Understand various tests on Motors and Transformers **(BL=2)**

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	1	1				2	2		1	2	3
CO2	2	2	1	1	1				2	2		1	2	3
CO3	2	2	1	1	1				2	2		1	1	3
1: Low, 2-Medium, 3- High														

SOLID STATE ELECTRICAL DRIVES (21EE2014)

Course Objectives:

1. To understand steady state operation and transient dynamics of a motor load system.
2. To study and analyze the operation of the converter fed dc drive, both qualitatively and quantitatively.
3. To study and analyze the operation of the chopper fed dc drive, both qualitatively and quantitatively.
4. To study and understand the operation and performance of AC Induction motor drives.
5. To study and understand the operation and performance of AC Synchronous motor drives.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Describe the basic requirements of motor selection for different load profiles.
CO 2	Analyze the operation of the converter fed dc drive
CO 3	Demonstrate the operation of the chopper fed dc drive
CO 4	Illustrate the operation and performance of AC Induction motor drives
CO 5	Analyze the induction motor drive using inverter

CO-PO Mapping

CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	2	2								3	2
CO2	2	2	2	2	2								3	2
CO3	2	2	2	2	2								3	2
CO4	2	2	2	2	2								3	2
CO5	2	2	2	2	2								3	2

1: Low, 2-Medium, 3- High

POWER SYSTEM OPERATION & CONTROL (21EE2015)

Course Objectives:

1. To understand the importance of optimal power flow and power system.
2. To Describe the hydrothermal scheduling, and its constraints.
3. To listen about single area and two area load frequency control , modeling of turbines
4. To understand the Deregulation, Restructuring models.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Enumerate the Heat rate curves, Economic operations of power systems
CO 2	Describe the Hydrothermal power stations Scheduling
CO 3	Discuss the single area load frequency control, modelling of turbines , speed governing systems.
CO 4	Illustrate two area load frequency control , tie line and economic dispatch control for load frequency control.
CO 5	Discuss the deregulation and conditions of deregulation in a power systems.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	2		2								3	2
CO2	2	2	2		2								3	2
CO3	2	2	2	2	2								3	2
CO4	2	2	2	2	2								3	2
CO5	2	2	2		2								3	2

1: Low, 2-Medium, 3- High

POWER SYSTEM SIMULATION LAB (21EE2510)
Course Objectives: 1. To study the different methods of power system analysis. 2. To learn about the power system control. 3. To learn about the concepts Power system stability.
Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Examine the power system analysis- (BL-4)
CO 2	Construct the controllers of a power system. (BL-3)
CO 3	Analyze the various power system stabilities- (BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	1	2				2	2		1	2	3
CO2	2	2	1	1	2				2	2		1	2	3
CO3	2	2	1	1	2				2	2		1	1	3
1: Low, 2-Medium, 3- High														

INDUSTRIAL ELECTRICAL SYSTEMS (21EE4001)	
Course Objectives: 1. To make students understand the fundamental theory governing the photovoltaic devise and make them carry out preliminary system design. 2. To learn the fundamental knowledge about various fuel cell technologies.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the electrical wiring systems for residential, commercial and industrial consumers through symbols, drawings and SLD (BL-2)
CO 2	Justify the need of industrial electrical system components and industrial automation (BL-3)
CO 3	Analyze the size, rating and cost of electrical installations for residential and commercial applications (BL-4)
CO 4	Analyze the appropriate electrical system with protective equipments for industrial applications (BL-4)
CO 5	Understand the role of industrial automation (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2										2	1
CO2	3	2											3	2
CO3	3	2	2										2	2
CO4	3	2	2	2									3	3
CO5	2	2			2								2	1
1: Low, 2-Medium, 3- High														

POWER SYSTEM PLANNING (21EE4006)	
Course Objectives: 1. To make students understand the fundamental theory governing the power system planning and forecasting. 2. To make the students to understand the economics related to expansion of power system. 3. To learn the fundamental knowledge about transmission and distribution planning for future expansion. 4. To make the students to understand the reliability concept in power system to better operation of power system. 5. To make the students to make the planning with respect to electricity market based demand.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Discuss primary components of power system planning, planning methodology for optimum power system expansion and show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools. (BL-2)
CO 2	Discuss methods to mobilize resources to meet the investment requirement for the power sector and understand economic appraisal to allocate the resources efficiently and appreciate the investment decisions to power generation and planning for system energy in the country (BL-2)
CO 3	Analyze the operating states of transmission system, their associated contingencies and the stability of the system and discuss principles of distribution planning, supply rules, network development and the system studies. (BL-4)
CO 4	Discuss reliability criteria for generation, transmission, distribution and reliability evaluation and analysis, grid reliability, voltage disturbances and their remedies (BL-2)
CO 5	Discuss planning and implementation of electric –utility activities, market principles and the norms framed by CERC for online trading and exchange in the interstate power market. (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2	2	1	2		2	2	2		2	2	1
CO2	2	3	2	1	2	2		2				2	3	2
CO3	3	2	2	2	2	2		1	2	2		2	2	2
CO4	3	2	2	2	1	2		2				2	3	3
CO5	3	2	2	2	2	2		2	2	2		2	2	1
1: Low, 2-Medium, 3- High														

Reactive Power Compensation and Management (21EE4011)	
Course Objectives: • To identify the necessity of reactive power compensation • To describe load compensation • To select various types of reactive power compensation in transmission systems • To contrast reactive power coordination system • To characterize distribution side and utility side reactive power management.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Distinguish the importance of load compensation in symmetrical as well as un symmetrical loads (BL-3)
CO 2	Observe various compensation methods in transmission lines (BL-2)
CO 3	Construct model for reactive power coordination (BL-3)
CO 4	Understand the demand side reactive power management (BL-2)
CO 5	Understand the user side reactive power management (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2		2					2		2	1
CO2	3	3	2	2		2					2		3	2
CO3	3	3	2	2		2					2		2	2
CO4	3	3	2	2		2					2		3	3
CO5	3	3	2	2		2					2		2	1
1: Low, 2-Medium, 3- High														

POWER QUALITY (21EE4016)	
Course Objectives: 1. Power quality issues and standards. 2. The sources of power quality disturbances and power transients that occur in power systems. 3. The sources of harmonics, harmonic indices, Devices for controlling harmonic distortion. 4. The principle of operation of DVR and UPQC.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Address power quality issues to ensure meeting of standards (BL-2)
CO 2	Apply the concepts of compensation for sags and swells using voltage regulating devices (BL-3)
CO 3	Assess harmonic distortion and its mitigation. (BL-4)
CO 4	Understand the power measurement data according to standards (BL-2)
CO 5	Analyze the power quality improvement with custom power devices (BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2									2	1
CO2	3	3	2	2									3	2
CO3	3	3	2	2	2								2	2
CO4	3	3	2	2	2								3	3
CO5	3	3	2	2	2								2	1
1: Low, 2-Medium, 3- High														

SMART GRID TECHNOLOGIES (21EE4021)	
Course Objectives: • To understand various aspects of smart grid • To study various smart transmission and distribution technologies • To appreciate distribution generation and smart consumption • To know the regulations and market models for smart grid	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand technologies for smart grid (BL-2)
CO 2	Understand the smart transmission system and its technologies (BL-2)
CO 3	Understand the smart distribution system and its technologies (BL-2)
CO 4	Realize the distribution generation and smart consumption (BL-3)
CO 5	Know the regulations and market models for smart grid (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	2		2	2						2	1
CO2	3	3	3	2		2	2						3	2
CO3	3	3	3	2		2	2						2	2
CO4	3	3	3	2		2	2	2					3	3
CO5	3	3	3	2		2	2	2					2	1
1: Low, 2-Medium, 3- High														

System Modelling and Identification (21EE4002)	
Course Objectives: 1.To Understand the Modelling of Dynamic Systems 2 To Understand the Stability margins, correlation of frequency domain and time domain 3. To Understand the Concepts of linear sampled data systems 4. To Understand the computation Z-transform 5. To Understand the compensation in Z domain and W plane	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Learn the design of Modelling of Dynamic Systems
CO 2	Analyze the Stability margins, correlation of frequency domain and time domain
CO 3	Analyse linear sampled data systems
CO 4	Learn the computation Z-transform
CO 5	Understand the compensation in Z domain and W plane

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	1										1	1
CO2	3		1										1	1
CO3	1	2												1
CO4	1	2	1										1	1
CO5	1		2											2
1: Low, 2-Medium, 3- High														

ADVANCED CONTROL SYSTEMS (21EE4007)	
Course Objectives: 1. To Understand state feedback control and state observer 2. To Understand the phase plane analysis 3. To Understand the Analysis of describing functions with non-linearities 4. To Understand the design of optimal controller 5. To Understand the design of optimal estimator including Kalman Filter, Lyapunov's Stability	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Learn the design of state feedback controller and state observer
CO 2	Analyze the linear and nonlinear systems using phase plane method.
CO 3	Analyse nonlinear systems using describing function method..
CO 4	Learn the optimal control problem
CO 5	Understand the Solution of Kalman Filter by duality principle, Direct method of Lypanov for Linear and Nonlinear continuous time autonomous systems.

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	1										1	2
CO2	3		1										1	1
CO3	1	2												1
CO4	2	2	3										1	2
CO5	2		1											2
1: Low, 2-Medium, 3- High														

Digital Signal Processing (21EE4012)

Course Objectives:

1. To Understand Discrete-time signals and systems & properties
2. To Understand z- Transform, inverse z- Transform & properties
3. To Understand the design of low pass, high pass, band pass & stop band IIR digital filters
4. To Understand Computer aided design of Equiripple Linear phase FIR filters
5. To Understand arithmetic round off errors, Low sensitivity digital filters

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Understand Discrete-time signals and systems & properties
CO 2	Analyze the z- Transform, inverse z- Transform & properties
CO 3	Understand the design of low pass, high pass, band pass & stop band IIR digital filters
CO 4	Learn Computer aided design of Equiripple Linear phase FIR filters
CO 5	Understand arithmetic round off errors, Low sensitivity digital filters.

CO-PO Mapping

CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	1										1	2
CO2	1		3										1	2
CO3	2	2												1
CO4	2	1	3										1	2
CO5	2		1											2

1: Low, 2-Medium, 3- High

MULTIVARIABLE CONTROL SYSTEMS (21EE4017)	
Course Objectives: 1. To Understand Multivariable Connections, Multivariable Representation 2. To Understand Performance Specification in Multivariable Systems 3. To Understand Stability of Multivariable Feedback 4. To Understand Controllability and Observability and Realization in Multivariable Systems 5. To Understand Multivariable Control System Design	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Learn the Multivariable Connections, Multivariable Representation
CO 2	Analyze the Performance Specification in Multivariable Systems.
CO 3	Analyse Stability of Multivariable Feedback
CO 4	Learn the Controllability and Observability and Realization in Multivariable Systems
CO 5	Understand the Multivariable Control System Design

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	1										1	2
CO2	3		1										1	1
CO3	1	2												1
CO4	2	2	3										1	2
CO5	2		1											2
1: Low, 2-Medium, 3- High														

REAL TIME CONTROL SYSTEMS (21EE4022)	
Course Objectives: 1. To Understand Real - time systems 2. To Understand Hierarchical representation of complex DES 3. To Understand Real - time Operating Systems, Interrupts 4. To Understand Real – time Programming. 5. To Understand Real - time process and applications	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Analyze the Characteristic features of RT applications and develop features from Non - RT and Off - line system
CO 2	Understand the Hierarchical representation and analyzing Logical properties
CO 3	Derive the Example of checking safety and timing properties and also understand the Requirements and features of real - time Computing Environments
CO 4	Understand and analyze the Real – time Programming for real-time systems.
CO 5	Analyze the Real - time process, Applications and understand the Distributed Real - time systems

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2									1	2
CO2	3	3	2	2									1	1
CO3	3	3	2	2										1
CO4	3	3	2	2									1	2
CO5	3	3	2	2										2
1: Low, 2-Medium, 3- High														

MACHINE MODELING AND ANALYSIS (21EE4003)	
Course Objectives: Able to understand the 1. Able to analyze the Basic Concepts of Modeling Electrical machines. 2. To understand Mathematical model of the DC Motor. 3. Able to analyze the dynamic modeling and phase transformation. 4. To understand the Modeling of Induction Machine. 5. To understand the Dynamic Analysis of Synchronous Machine.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the basic concepts of AC/ DC machine modeling. (BL-2)
CO 2	Understand the Mathematical model of the DC Machine. (BL-2)
CO 3	Analyze the Reference frame theory model of Electrical machine.(BL-3)
CO 4	Analyze the steady state and dynamic state operation of three-phase induction machine.(BL-3)
CO 5	Analyze the modeling and simulation of three phase synchronous machine .(BL-3)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	2		2							1	3
CO2	2	2	2										2	3
CO3	2	2	2			2							2	3
CO4	3	2											2	3
CO5	2	3				2							1	3

1: Low, 2-Medium, 3- High

Electrical Machine Design (21EE4008)	
Course Objectives: 1. To discuss the properties of electrical, magnetic and insulating materials used in the design of electrical machines. 2. To design armature and field systems for D.C. machines. 3. To design core, yoke, windings and cooling systems of transformers. 4. To design stator and rotor of induction machines. 5. To design stator and rotor of synchronous machines and study their thermal behavior.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the basic principles of machine design. (BL-2)
CO 2	Analyze the performance design DC motor. (BL-4)
CO 3	Analyze the performance design winding and core of transformer. (BL-4)
CO 4	Analyze the performance design winding and core of rotating electrical machine. (BL-4)
CO 5	Analyze the short circuit ratio and its effects on performance of synchronous machines. (BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2													
CO2	2	3	3	3	3								3	
CO3	2	3	3	3	3								3	
CO4	2	3	3	3	3								3	
CO5	2	3	3	3	3								3	
1: Low, 2-Medium, 3- High														

Programmable Control Devices and Applications (21EE4013)	
Course Objectives: 1. Understand the basic functions and types of PLCs. 2. Get exposure of Easy Veep software, its applications. 3. Classification of PLCs and applications 4. Programming using PLCs . 5. Troubleshooting aspects using PLCs.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand different types of PLCs (BL-2)
CO 2	Understand the usage of Easy Veep software (BL-1)
CO 3	Understand the hardware details of Allen Bradley PLC . (BL-2)
CO 4	Programming of PLCs . (BL-2)
CO 5	Know about few applications of PLCs in different fields of Science and Technology . (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2						2						2	3
CO2	2												2	2
CO3	3		1										1	2
CO4	2												1	
CO5	2												2	1
1: Low, 2-Medium, 3- High														

HYBRID ELECTRICAL VEHICLES (21EE4018)	
Course Objectives: 1. To understand Importance of Hybrid Electric Vehicles 2. To Know the various drive-train topologies 3. To Learn the operation and configurations of DC & AC Drives 4. To Know the importance of various Energy storage systems and Energy management strategies 5. To provide knowledge about supervisory control of EVs	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the models to describe hybrid vehicles and their performance (BL-2)
CO 2	Classify various hybrid drive-train topologies(BL-1)
CO 3	Understand the various configurations of DC & AC Motor drives. (BL-2)
CO 4	Understand the different possible ways of energy storage and different strategies related to Energy management strategies. (BL-2)
CO 5	Understand the mode of operation and control Architecture. (BL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2						2						2	3
CO2	2												2	2
CO3	3		1										1	2
CO4	2												1	
CO5	2												1	
1: Low, 2-Medium, 3- High														

AUTOMOTIVE ELECTRICAL ENGINEERING (21EE4023)	
Course Objectives: 1. To understand the various types of Batteries and their ratings 2. To understand the starting condition and its behavior 3. To understand the various charging systems in Automobiles 4. To learn different Lighting systems in Automobiles 5. To learn electronic engine management system in Automobiles 6. To understand the various electrical and non electrical sensors	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Compute the efficiency of Batteries through various test's
CO 2	Understand the working of different starter drive units and their maintenance and the concept of vehicle charging system with its auxiliaries
CO 3	Understand the dazzling of head light and its preventive methods
CO 4	Understand the electronic dashboard instruments & onboard diagnostic system
CO 5	Understand the various sensors used in Automobiles

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3		1				2						2	2
CO2	2	1	1											
CO3	2		1										1	
CO4	2	1	2										2	2
CO5	2	1	1										1	2
1: Low, 2-Medium, 3- High														

RENEWABLE ENERGY CONVERSION SYSTEMS (21EE4004)	
Course Objectives: 1. To create awareness about various Electric Energy Conversion Systems. 2. Learn the fundamental concepts about solar energy conversion systems and devices 3. To understand the solar thermal conversion systems for high temperature applications. 4. To learn Thermal and Bio-energy conversion systems 5. To Understand the various technologies that are used in WECS 6. To Understand the Fuel cell technology	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand various Electric Energy Conversion Systems (BTL-2)
CO 2	Analyze the solar thermal conversion system (Also for high temperature applications) (BTL-4)
CO 3	Analyze the Photovoltaic & Bio-Energy Conversion Systems (BTL-4)
CO 4	Illustrate the existing Wind Energy Conversion System (BTL-2)
CO 5	Extend the knowledge about working principle of various Fuel cell technology (BTL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	1	1										1	
CO2	2	2											1	2
CO3	2	1											1	1
CO4	2	1	1											2
CO5	1	1	1										1	2
1: Low, 2-Medium, 3- High														

SOLAR AND FUEL CELL ENERGY SYSTEMS (21EE4009)	
Course Objectives: 1. To make students understand the fundamental theory governing the photovoltaic devise and make them carry out preliminary system design. 2. To learn the fundamental knowledge about various fuel cell technologies.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the need of radiation of sun and discuss the various performance characteristics of solar radiation.(BL-2)
CO 2	Discuss the photovoltaic effect, PV Cell efficiency and its limits along with the concepts of fabrication technology for solar cell (BL-2)
CO 3	Predict the performance of solar photovoltaic device and analyze its performance. (BL-2)
CO 4	Carry out the application of photovoltaic system as power system. (BL-3)
CO 5	Analyze the performance of fuel cells under different operating conditions and also defend appropriate fuel cell technology for a given application. (BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	1			2	2						2	1
CO2	3	3	3			2	2				2		3	2
CO3	2	2	1			2	2				2		2	2
CO4	2	2				2	2	2			2		3	3
CO5	2	3	2			2	2				2		2	1
1: Low, 2-Medium, 3- High														

WIND & BIOMASS ENERGY SYSTEM (21EE4014)	
Course Objectives: 1. To acquire the knowledge on wind power generation 2. To Understand the concept of wind turbine design 3. To Discuss the Current trends in worldwide applications of wind power 4. To Understand the various methods Bio- Chemical Conversion systems 5. To Discuss the various applications of biomass	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the present wind energy scenario (BL-2)
CO 2	Explain the various wind energy technologies. (BL-3)
CO 3	Identify various applications of wind energy .(BL-2)
CO 4	Explain the various biomass conversion technologies and testing of performance of biogas. (BL-2)
CO 5	Understand the Bio-Energy Systems with Efficient Applications. (BL-2)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2									2	1
CO2	3	1	1	2									3	2
CO3	3	3	2	1									2	2
CO4	2	2	3	2									3	3
CO5	1	2	1		2								2	1

1: Low, 2-Medium, 3- High

UTILIZATION OF ELECTRICAL ENERGY (21EE4019)	
Course Objectives: 1. To Summarize various electric drives and traction motors with applications 2. To Understand the concepts of Mechanics of Train movement and associated calculations 3. To Explain the laws of illumination and their application for various lighting schemes 4. To understand the different methods of electric heating and electric welding 5. To identify how to utilize the solar radiation into electrical energy for different applications and to understand the basic principles of wind energy conversion	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Utilize the suitable electric drives for different applications(BL=3)
CO 2	Analyze the Speed-Time Curves of Different Services(BL=4)
CO 3	Identify the energy saving based on Illumination system (BL=3)
CO 4	Understand the utilization of electrical energy for heating and welding purposes(BL=2)
CO 5	Illustrate the effective usage of solar and wind energy for electrical applications(BL=2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2												1	3
CO2	3	2												3
CO3	3	2		2									2	2
CO4	2			1	1								1	2
CO5	2	2	1				2						1	3
1: Low, 2-Medium, 3- High														

ENERGY AUDIT & DEMAND SIDE MANAGEMENT (21EE4024)	
Course Objectives: **1.** To learn about energy consumption and situation in India **2.** To learn about Energy Management. **3.** To learn about Energy Measuring Instruments. **4.** To understand the Demand Side Management (DSM). **5.** To understand the cost effectiveness for DSM.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the importance of energy audit and the basic ideas of conduction an energy audit (BTL-2)
CO 2	Analyze various techniques of energy management and conservation (BTL-4)
CO 3	Understand energy efficient methods and power factor improvement techniques (BTL-2)
CO 4	Analyze demand side management concepts through case study (BTL-4)
CO 5	Understand various Cost effectiveness test for demand side management programs (BTL-2)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1		1	2		2			2	1			1	1
CO2	1	2	1	1		1	1		2		1		2	1
CO3		1		1		1							2	1
CO4	1	2				1			1				1	1
CO5	1	1	2			1			1				1	1
1: Low, 2-Medium, 3- High														

ADVANCED POWER ELECTRONICS (21EE4005)	
Course Objectives: 1. To explain the concepts of power electronic switches 2. To demonstrate the applications and analysis of switches in DC-DC converter and various single phase converters 3. To analyze the operation of single phase, three phase and multipulse converters 4. To analyze the power quality improvement techniques 5. To analyze the allocations of FACTS devices	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Explain basic Concept of Switches and their controlling process (B-2)
CO 2	Demonstrate the device physics, Application and Analysis of Switches in DC-DC converters and Single Phase Converter (B-2)
CO 3	Analyze the operation Single Phase Converter, Three Phase Converter, Multipulse Converter and Effect of Source Inductance and PWM Rectifiers (B-4)
CO 4	Analyze the Power Quality Improvement Techniques in electrical systems (B-4)
CO 5	Analyze the applications of FACTS Devices in electrical system (B-4)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2											2	3
CO2	3	2											2	3
CO3	3	2											2	3
CO4	3	2	2										2	2
CO5	3	2	2										2	3
1: Low, 2-Medium, 3- High														

ADVANCED ELECTRICAL DRIVES (21EE4010)	
Course Objectives: 1. To understand steady state operation and transient dynamics of a motor load system. 2. To acquire knowledge of fuzzy logic and neural network concepts in various drives	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Analyze the Power electronic converters for electrical drives.(BL-4)
CO 2	Analyze the field oriented control of machines.(BL-4)
CO 3	Understand the vector control of electrical drives.(BL-2)
CO 4	Understand the sensor less control of AC drives.(BL-2)
CO 5	Analyze the direct torque control of Induction Machines.(BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	3		2								1	2
CO2	2	2	3		2								1	2
CO3	2	2	2		2								1	2
CO4	2		3		2									2
CO5	2	2	2		2									2
1: Low, 2-Medium, 3- High														

HVDC and FACTS (21EE4015)	
Course Objectives: 1. To introduce the extra high voltage AC and DC transmission 2. To introduce the HVDC transmission system with types, control and protection. 3. To discuss about the design factors of lines and cables. 4. To provide knowledge on FACTS controllers. 5. To introduce the reactive power control techniques. 6. To study the characteristics, modelling and operating schemes of different types of shunt and series switched reactive power generating devices.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Find the applications of different types of HVDC links.(BL-2)
CO 2	Apply converters for HVDC transmission for control of converters.(BL-3)
CO 3	Understand the concept of filters to mitigate harmonics, concept of reactive power requirements.(BL-2)
CO 4	Understand the working principles of FACTS devices.(BL-2)
CO 5	Analyze the performance of Series, Shunt and combined FACTS controllers.(BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2										3	2
CO2	3		3										2	2
CO3	2	2	2										2	2
CO4	2	3	2										3	2
CO5	2	2	3										3	2
1: Low, 2-Medium, 3- High														

ADVANCED POWER CONVERTERS (21EE4020)	
Course Objectives: 1. To analyze the dc-dc voltage regulators 2. To describe the operation of resonant converters 3. To describe the operation of multi level converters and multi pulse converters with switching strategies for high power 4. To understand Principle of Operation DC power supplies 5. To analyze the AC power supplies	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Evaluate different dc-dc voltage regulators**(BL-3)**
CO 2	Analyze resonant converters**(BL-3)**
CO 3	Evaluate various multi-level inverter configurations **(BL-3)**
CO 4	Select appropriate phase shifting converter for a multi-pulse converter**(BL-3)**
CO 5	Analyze the various DC power supplies **(BL-3)**

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2											2	3
CO2	3	2	2										3	3
CO3	1	1	1										2	3
CO4	2	2											2	2
CO5	1	3											2	3
1: Low, 2-Medium, 3- High														

ADVANCED POWER SEMICONDUCTOR DEVICES AND PROTECTION (21EE4025)

Course Objectives:

OBJECTIVES:

1. To improve power semiconductor device structures for adjustable speed motor controlapplications.
2. To understand the static and dynamic characteristics of current controlled powersemiconductor devices
3. To understand the static and dynamic characteristics of voltage controlled powersemiconductor devices
4. To enable the students for the selection of devices for different power electronicsApplications
5. To understand the control and firing circuit for different devices.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Analyze power switching devices **(BL-4)**
CO 2	Design of current controlled devices and their parameters**(BL-3)**
CO 3	Analyze the voltage controlled devices and their parameters **(BL-2)**
CO 4	Understand new power semiconductor devices**(BL-2)**
CO 5	Design of protecting circuit**(BL-3)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2											2	2
CO2	3	2	2										2	2
CO3	3	2											2	2
CO4	3	2											2	2
CO5	3	2	2										2	2

1: Low, 2-Medium, 3- High