

**DEPARTMENT  
OF  
ELECTRONICS  
AND  
COMMUNICATION  
ENGINEERING**

# **2021 REGULATION**

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### 2021 REGULATION

#### PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

<b>PEO 1</b>	To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics and Communication Engineering
<b>PEO 2</b>	To gain adequate knowledge to become good professional in electronic and communication engineering associated industries, higher education and research.
<b>PEO 3</b>	To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.
<b>PEO 4</b>	To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified
<b>PEO 5</b>	To inculcate in the students a professional and ethical attitude and an ability to visualize the engineering issues in a broader social context.

#### PROGRAM OUTCOMES (POs)

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### PROGRAM SPECIFIC OUTCOMES (PSOs)

<b>PSO1</b>	Design, develop and analyze electronic systems through application of relevant electronics, mathematics and engineering principles
<b>PSO2</b>	Design, develop and analyze communication systems through application of fundamentals from communication principles, signal processing, and RF System Design & Electromagnetic.
<b>PSO3</b>	Adapt to emerging electronics and communication technologies and develop innovative solutions for existing and newer problems.

# LIST OF COURSES

## REGULATION 2021

### ELECTRONICS AND COMMUNICATION ENGINEERING

#### SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE
1	IP3151	Induction Programme
<b>THEORY</b>		
2	HS3152	Professional English - I
3	MA3151	Matrices and Calculus
4	PH3151	Engineering Physics
5	CY3151	Engineering Chemistry
6	GE3151	Problem Solving and Python Programming
7	GE3152	Heritage of Tamils
<b>PRACTICALS</b>		
8	GE3171	Problem Solving and Python Programming Laboratory
9	BS3171	Physics and Chemistry Laboratory
10	GE3172	English Laboratory

#### SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE
<b>THEORY</b>		
1	HS3252	Professional English - II
2	MA3251	Statistics and Numerical Methods
3	PH3254	Physics for Electronics Engineering
4	BE3254	Electrical and Instrumentation Engineering
5	GE3251	Engineering Graphics
6	EC3251	Circuit Analysis
7	GE3252	Tamils and Technology
8		NCC Credit Course Level 1 <sup>#</sup>
<b>PRACTICALS</b>		
9	GE3271	Engineering Practices Laboratory
10	EC3271	Circuits Analysis Laboratory
11	GE3272	Communication Laboratory / Foreign Language

#### SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE
<b>THEORY</b>		

1	MA3355	Random Processes and Linear Algebra
2	CS3353	C Programming and Data Structures
3	EC3354	Signals and Systems
4	EC3353	Electronic Devices and Circuits
5	EC3351	Control Systems
6	EC3352	Digital Systems Design
<b>PRACTICALS</b>		
7	EC3361	Electronic Devices and Circuits Laboratory
8	CS3362	C Programming and Data Structures Laboratory
9	GE3361	Professional Development
<b>SEMESTER IV</b>		
<b>THEORY</b>		
<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
1	EC3452	Electromagnetic Fields
2	EC3401	Networks and Security
3	EC3451	Linear Integrated Circuits
4	EC3492	Digital Signal Processing
5	EC3491	Communication Systems
6	GE3451	Environmental Sciences and Sustainability
7		NCC Credit Course Level 2
<b>PRACTICALS</b>		
8	EC3461	Communication Systems Laboratory
9	EC3462	Linear Integrated Circuits Laboratory
<b>SEMESTER V</b>		
<b>THEORY</b>		
<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
1	EC3501	Wireless Communication
2	EC3552	VLSI and Chip Design
3	EC3551	Transmission lines and RF Systems
4	CEC334	Analog IC Design
5	CEC366	Image Processing
6	CEC331	4G/5G Communication Networks
7		Mandatory Course-I
<b>PRACTICALS</b>		
8	EC3561	VLSI Laboratory
<b>SEMESTER VI</b>		
<b>THEORY</b>		
<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
1	ET3491	Embedded Systems and IOT Design

2	CS3491	Artificial Intelligence and Machine Learning
3		Open Elective– I
4		Professional Elective V
5		Professional Elective VI
6		Professional Elective VII
7		Mandatory Course-II
8		NCC Credit Course Level 3
<b>SEMESTER VII / VIII</b>		
<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>
<b>THEORY</b>		
1	GE3791	Human Values and Ethics
2		Elective - Management
3		Open Elective – II
4		Open Elective – III
5		Open Elective – IV
<b>PRACTICALS</b>		
6	EC3711	Summer internship
<b>SEMESTER VIII /VII</b>		
<b>PRACTICALS</b>		
1	EC3811	Project Work / Internship

## COURSE OUTCOME FOR ELECTRONICS AND COMMUNICATION ENGINEERING

<b>DEGREE</b>	<b>U.G</b>
<b>PROGRAMME</b>	<b>B.E.– ELECTRONICS AND COMMUNICATION ENGINEERING</b>
<b>ACADEMIC YEAR</b>	<b>2022-23</b>
<b>REGULATION</b>	<b>2021</b>

SEMESTER-01		
<b>1.Course Code and Name :HS3152 - PROFESSIONAL ENGLISH - I</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	To use appropriate words in a professional context	K2
2	To gain understanding of basic grammatic structures and use them in right context	K2
3	To read and infer the denotative and connotative meanings of technical texts	K2
4	To write definitions, descriptions, narrations and essays on various topics	K3
<b>2.Course Code and Name : MA3151 -MATRICES AND CALCULUS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students will be able to		
1	Use the matrix algebra methods for solving practical problems.	K3
2	Apply differential calculus tools in solving various application problems.	K3
3	Able to use differential calculus ideas on several variable functions.	K3
4	Apply different methods of integration in solving practical problems.	K3
5	Apply multiple integral ideas in solving areas, volumes and other practical problems	K3
<b>3.Course Code and Name : PH3151 -ENGINEERING PHYSICS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
After completion of this course, the students should be able to		

1	Understand the importance of mechanics.	K2
2	Express their knowledge in electromagnetic waves	K2
3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers	K2
4	Understand the importance of quantum physics.	K2
5	Comprehend and apply quantum mechanical principles towards the formation of energy bands	K2

#### 4.Course Code and Name :CY3151 -ENGINEERING CHEMISTRY

	CO Statements	Knowledge Level
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At the end of the course, the students will be able

1	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	K2
2	To identify and apply basic concepts of nano science and nanotechnology in designing the synthesis of nano materials for engineering and technology Applications.	K2
3	To apply the knowledge of phase rule and composites for material selection Requirements.	K2
4	To recommend suitable fuels for engineering processes and applications.	K2
5	To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	K2

#### 5.Course Code and Name : GE3151 -PROBLEM SOLVING AND PYTHON PROGRAMMING

	CO Statements	Knowledge Level
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Upon completion of the course, students will be able to

1	Develop algorithmic solutions to simple computational problems.	K2
2	Develop and execute simple Python programs.	K3
3	Write simple Python programs using conditionals and loops for solving problems.	K3
4	Decompose a Python program into functions	K3
5	Represent compound data using Python lists, tuples, dictionaries etc.	K3
6	Read and write data from/to files in Python programs.	K2

#### 6.Course Code and Name : GE3171 -PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

	CO Statements	Knowledge Level
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On completion of the course, students will be able to

1	Develop algorithmic solutions to simple computational problems	K2
2	Develop and execute simple Python programs	K3
3	Implement programs in Python using conditionals and loops for solving problems..	K3
4	Deploy functions to decompose a Python program.	K3
5	Process compound data using Python data structures..	K3

6	Utilize Python packages in developing software applications.	K3
<b>7.Course Code and Name : BS3171-PHYSICS AND CHEMISTRY LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
The students should be able to		
<b>PHYSICS LABORATORY</b>		
1	Understand the functioning of various physics laboratory equipment.	K2
2	Use graphical models to analyze laboratory data.	K3
3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	K3
4	Access, process and analyze scientific information.	K3
5	Solve problems individually and collaboratively.	K3
<b>CHEMISTRY LABORATORY</b>		
6	Understand the functioning of various physics laboratory equipment.	K3
7	To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	K2
8	To determine the amount of metal ions through volumetric and spectroscopic techniques	K3
9	To analyze and determine the composition of alloys.	K3
10	To learn simple method of synthesis of nanoparticles	K3
11	To quantitatively analyses the impurities in solution by electro analytical techniques	K3
<b>8.Course Code and Name : GE3172 -ENGLISH LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	To listen to and comprehend general as well as complex academic information	K1
2	To listen to and understand different points of view in a discussion	K2
3	To speak fluently and accurately in formal and informal communicative contexts	K2
4	To describe products and processes and explain their uses and purposes clearly and accurately	K3
5	To express their opinions effectively in both formal and informal discussions	K2
<b>SEMESTER 02</b>		
<b>1.Course Code and Name : HS3252-PROFESSIONAL ENGLISH – II</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, learners will be able		
1	To compare and contrast products and ideas in technical texts.	K2
2	To identify cause and effects in events, industrial processes through technical texts	K2

3	To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	K2
4	To report events and the processes of technical and industrial nature.	K3
5	To draft effective resumes in the context of job search.	K3
<b>2.Course Code and Name : MA3251 -STATISTICS AND NUMERICAL METHODS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course, students will be able to		
1	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K3
3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K3
4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	K3
5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	K3
<b>3.Course Code and Name : PH3254 -PHYSICS FOR ELECTRONICS ENGINEERING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, the students should be able to		
1	Know basics of crystallography and its importance for varied materials Properties.	K2
2	Gain knowledge on the electrical and magnetic properties of materials and their applications types of semiconductors.	K2
3	Understand clearly of semiconductor physics and functioning of semiconductor devices	K2
4	Understand the optical properties of materials and working principles of various optical devices	K2
5	Appreciate the importance of nanotechnology and nano devices	K2
<b>4.Course Code and Name : BE3254 -ELECTRICAL AND INSTRUMENTATION ENGINEERING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
After completing this course, the students will be able to		
1	Explain the working principle of electrical machines	K2
2	Analyze the output characterizes of electrical machines	K3
3	Choose the appropriate electrical machines for various applications	K2
4	Explain the types and operating principles of measuring instruments	K2
5	Explain the basic power system structure and protection schemes	K2

<b>5.Course Code and Name :GE3251 -ENGINEERING GRAPHICS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On successful completion of this course, the student will be able to		
1	Use BIS conventions and specifications for engineering drawing.	K2
2	Construct the conic curves, involutes and cycloid	K3
3	Solve practical problems involving projection of lines.	K5
4	Draw the orthographic, isometric and perspective projections of simple solids.	K2
5	Draw the development of simple solids.	K6
<b>6.Course Code and Name :EC3251-CIRCUIT ANALYSIS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On successful completion of this course, the student will be able to		
1	Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.	K4
2	Apply suitable network theorems and analyze AC and DC circuits	K3
3	Analyze steady state response of any R, L and C circuits	K4
4	Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.	K4
5	Analyze the coupled circuits and network topologies	K4
<b>7.Course Code and Name : GE3271-ENGINEERING PRACTICES LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon completion of this course, the students will be able to		
1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	K2
2	Wire various electrical joints in common household electrical wire work.	K2
3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	K2
4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	K4
<b>8.Course Code and Name: EC3271 -CIRCUITS ANALYSIS LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, the student will be able to		
1	Design RL and RC circuits.	K2
2	Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems.	K2
<b>9.Course Code and Name: GE3272-COMMUNICATION LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>

1	Speak effectively in group discussions held in formal/semi formal contexts.	K1
2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions	K2
3	Write emails, letters and effective job applications.	K2
4	Write critical reports to convey data and information with clarity and precision	K3
5	Give appropriate instructions and recommendations for safe execution of tasks	K2
<b>SEMESTER 03</b>		
<b>1.Course Code and Name : MA3355-RANDOM PROCESSES AND LINEAR ALGEBRA</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course, students will be able to		
1	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.	K3
2	Demonstrate accurate and efficient use of advanced algebraic techniques	K3
3	Apply the concept of random processes in engineering disciplines.	K3
4	Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon.	K3
5	Understand the basic concepts of one and two dimensional random variables and apply them to model engineering problems.	K3
<b>2.Course Code and Name : CS3353-C PROGRAMMING AND DATA STRUCTURES</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
1	Develop C programs for any real world/technical application.	K2
2	Apply advanced features of C in solving problems	K2
3	Write functions to implement linear and non-linear data structure operations.	K2
4	Suggest and use appropriate linear/non-linear data structure operations for solving a given problem	K2
5	Appropriately use sort and search algorithms for a given application	K2
6	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.	K2
<b>3.Course Code and Name : EC3354-SIGNALS AND SYSTEMS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, the student will be able to		
1	Determine if a given system is linear/causal/stable	K2
2	Determine the frequency components present in a deterministic signal	K3
3	Characterize continuous LTI systems in the time domain and frequency domain	K6
4	Characterize continuous LTI systems in the time domain and frequency domain	K3
5	Compute the output of an LTI system in the time and frequency domains	K2

**4.Course Code and Name : EC3353-ELECTRONIC DEVICES AND CIRCUITS**

	CO Statements	Knowledge Level
At the end of the course the students will be able to		
1	Explain the structure and working operation of basic electronic devices	K2
2	Design and analyze amplifiers.	K3
3	Analyze frequency response of BJT and MOSFET amplifiers	K2
4	Design and analyze feedback amplifiers and oscillator principles.	K2
5	Design and analyze power amplifiers and supply circuits	K2

**5.Course Code and Name : EC3351 CONTROL SYSTEMS**

	CO Statements	Knowledge Level
Upon successful completion of the course the student will be able to		
1	Compute the transfer function of different physical systems	K3
2	Analyze the time domain specification and calculate the steady state error	K3
3	Illustrate the frequency response characteristics of open loop and closed loop system response.	K3
4	Analyze the stability using Routh and root locus techniques.	K3
5	Illustrate the state space model of a physical system and discuss the concepts of sampled data control system.	K3

**6.Course Code and Name : EC3352-DIGITAL SYSTEMS DESIGN**

	CO Statements	Knowledge Level
At the end of the course the students will be able to		
1	Use Boolean algebra and simplification procedures relevant to digital logic.	K3
2	Design various combinational digital circuits using logic gates	K3
3	Analyze and design synchronous sequential circuits.	K3
4	Analyze and design asynchronous sequential circuits.	K3
5	Build logic gates and use programmable devices	K3

**7.Course Code and Name : EC3361-ELECTRONIC DEVICES AND CIRCUITS LABORATORY**

	CO Statements	Knowledge Level
At the end of the laboratory course, the student will be able to understand the		
1	Characteristics of PN Junction Diode and Zener diode.	K4
2	Design and Testing of BJT and MOSFET amplifiers.	K4
3	Operation of power amplifiers.	K4

**8.Course Code and Name : CS3362-C PROGRAMMING AND DATA STRUCTURES LABORATORY**

CO Statements		Knowledge Level
At the end of the course, the students will be able to		
1	Use different constructs of C and develop applications	K2
2	Write functions to implement linear and non-linear data structure operations.	K2
3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem.	K3
4	Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval.	K3
5	Implement Sorting and searching algorithms for a given application	K3
<b>9.Course Code and Name : GE3361- PROFESSIONAL DEVELOPMENT</b>		
CO Statements		Knowledge Level
On successful completion the students will be able to		
1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	K2
2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	K2
3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.	K2
<b>SEMESTER 04</b>		
<b>1.Course Code and Name : EC3452-ELECTROMAGNETIC FIELDS</b>		
CO Statements		Knowledge Level
At the end of the course the students will be able to		
1	Relate the fundamentals of vector, coordinate system to electromagnetic Concepts.	K2
2	Analyze the characteristics of Electrostatic field	K2
3	Interpret the concepts of Electric field in material space and solve the boundary conditions	K3
4	Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions.	K3
5	Determine the significance of time varying fields	K4
<b>2.Course Code and Name : EC3401-NETWORKS AND SECURITY</b>		
CO Statements		Knowledge Level
Upon successful completion of the course the student will be able to		
1	Explain the Network Models, layers and functions	K3
2	Categorize and classify the routing protocols.	K3
3	List the functions of the transport and application layer.	K4

4	Evaluate and choose the network security mechanisms.	K3
5	Discuss the hardware security attacks and countermeasures	K2
<b>3.Course Code and Name : EC3451-LINEAR INTEGRATED CIRCUITS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students will be able to		
1	Design linear and nonlinear applications of OP – AMPS	K2
2	Design applications using analog multiplier and PLL	K3
3	Design ADC and DAC using OP – AMPS.	K3
4	Generate waveforms using OP – AMP Circuits	K3
5	Analyze special function ICs	K2
<b>4.Course Code and Name : EC3492-DIGITAL SIGNAL PROCESSING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course students will be able to		
1	Apply DFT for the analysis of digital signals and systems	K3
2	Design IIR and FIR filters.	K3
3	Characterize the effects of finite precision representation on digital filters.	K2
4	Design MultiMate filters	K2
5	Apply adaptive filters appropriately in communication systems	K4
<b>5.Course Code and Name : EC3491-COMMUNICATION SYSTEMS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course students will be able to		
1	Gain knowledge in amplitude modulation techniques.	K2
2	Understand the concepts of Random Process to the design of communication Systems.	K3
3	Gain knowledge in digital techniques	K3
4	Gain knowledge in sampling and quantization	K3
5	Understand the importance of demodulation techniques	K1
<b>6.Course Code and Name : GE3451-ENVIRONMENTAL SCIENCE AND ENGINEERING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
The students should be able to		
1	Summarize the importance of environment, biodiversity, ecosystem and how to solve environmental related problems.	K2
2	Describe the causes, effect and control measures of air pollution, water pollution, soil pollution, noise pollution, radioactive pollution and thermal pollution with their relevant case studies.	K2

3	Discuss the various renewable and non-renewable resources and energy conservation processes.	K2
4	Explain the social issues and solutions for sustainable environment with relevant Acts and case studies.	K2
5	Review the impact of human population in the environment and its remedial measures.	K2

**7.Course Code and Name : EC3461 -COMMUNICATION SYSTEMS LABORATORY**

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the laboratory course, the student will be able to understand the		
1	Design AM, FM & Digital Modulators for specific applications.	K2
2	Compute the sampling frequency for digital modulation.	K2
3	Simulate & validate the various functional modules of Communication system	K2
4	Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes.	K2
5	Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of Communication system.	K2

**8.Course Code and Name : EC3462-LINEAR INTEGRATED CIRCUITS LABORATORY**

	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course the students will be able to		
1	Analyze various types of feedback amplifiers	K2
2	Design oscillators, tuned amplifiers, wave-shaping circuits and multi vibrators	K2
3	Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave shaping circuits and multi vibrators, filters using SPICE Tool.	K2
4	Design amplifiers, oscillators, D-A converters using operational amplifiers.	K2
5	Design filters using op-amp and performs an experiment on frequency response.	K2

**SEMESTER 05**

**1.Course Code and Name : EC3501-WIRELESS COMMUNICATION**

	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course the student will be able to		
1	Understand The Concept And Design Of A Cellular System	K2
2	Understand Mobile Radio Propagation And Various Digital Modulation Techniques.	K2
3	Understand The Concepts Of Multiple Access Techniques And Wireless	K2

	Networks	
4	Characterize a wireless channel and evolve the system design specifications	K2
5	Design a cellular system based on resource availability and traffic demands	K2
<b>2.Course Code and Name : EC3552-VLSI AND CHIP DESIGN</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course the student will be able to		
1	In depth knowledge of MOS technology	K2
2	Understand Combinational Logic Circuits and Design Principles	K2
3	Understand Sequential Logic Circuits and Clocking Strategies	K2
4	Understand Memory architecture and building blocks	K2
5	Understand the ASIC Design Process and Testing	K2
<b>3.Course Code and Name :EC3551-TRANSMISSION LINES AND RF SYSTEMS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
1	Explain the characteristics of transmission lines and its losses.	K2
2	Calculate the standing wave ratio and input impedance in high frequency Transmission lines.	K2
3	Analyze impedance matching by stubs using Smith Charts.	K2
4	Comprehend the characteristics of TE and TM waves.	K2
5	Design a RF transceiver system for wireless communication	K2
<b>4.Course Code and Name : CEC334 ANALOG IC DESIGN</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
Upon successful completion of the course the student will be able to		
1	Design amplifiers to meet user specifications.	K6
2	Analyse the frequency and noise performance of amplifiers.	K4
3	Design and analyse feedback amplifiers and one stage op amps .	K6
4	Analyze stability of op amp	K4
5	Testing experience of logic circuits	K4
<b>5.Course Code and Name : CEC366 IMAGE PROCESSING</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
At the end of the course, the students should be able to		
1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.	K2
2	Operate on images using the techniques of smoothing, sharpening and enhancement.	K3
3	Understand the restoration concepts and filtering techniques.	K2

4	Learn the basics of segmentation, features extraction, compression and recognition methods for colour models.	K2
5	Comprehend image compression concept	K3
<b>6.Course Code and Name : CEC331 4G/5G COMMUNICATION NETWORKS</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
1	To understand the evolution of wireless networks.	K2
2	To learn the concepts of 5G networks.	K2
3	To comprehend the 5G architecture and protocols.	K1
4	To understand the dynamic spectrum management.	K2
5	To learn the security aspects in 5G networks.	K2
<b>7. Course Code and Name: EC3561 VLSI LABORATORY</b>		
	<b>CO Statements</b>	<b>Knowledge Level</b>
On completion of the course, students will be able to		
1	Write HDL code for basic as well as advanced digital integrated circuit	K2
2	Import the logic modules into FPGA Boards	K2
3	Synthesize Place and Route the digital Ips	K3
4	Design, Simulate and Extract the layouts of Digital & Analog IC Blocks using EDA tools	K3
5	Test and Verification of IC design	K4