

ACADEMIC YEAR 2019-2020

DEPARTMENT OF ELECTRONICS & COMMUNICATION

S1 ECE (2019 Batch)- KTU 2019 Scheme

SL NO	COURSE CODE	SUBJECT NAME	STAFF HANDLED
1	MA101	Linear Algebra And Calculus	Sangeetha S
2	PHT 100	Engineering Physics A	Sasi B
3	EST 110	Engineering Graphics	Sasi K S
4	EST 120	Basics Of Civil And Mechanical Engineering	John P George
5	HUN 101	Life Skills	Sreeti Gangadharan
6	PHL 120	Engineering Physics Lab	Sasi B
7	ESL 120	Civil And Mechanicalworkshop	Neeraja Chandrasekhar

S3 ECE (2018 Batch)

Sl no	Course code	Subject name	Staff handled
1	MA 201	Linear Algebra & Complex Analysis	Ms.Lijimol
2	EC201	Network Theory	Ms.Samitha
3	EC203	Solid State Devices	Mr.Prajeesh
4	EC205	Electronic Circuits	Mr.Anup
5	EC207	Logic Circuit Design	Mr.Sujith S Pillai
6	HS200	Business Economics	Mr.Geetha Vimal
7	EC231	Electronic Devices & Circuits	Mr.Prajeesh
8	EC233	Electronic Design Automation Lab	Ms.Malu

S5 ECE (2017 Batch)

Sl no	Course code	Subject name	Staff handled
1	EC301	Digital Signal Processing	Ms.Samitha T
2	EC303	Applied Electromagnetic Theory	Mr. Anup Vasavan
3	EC305	Microprocessors & Microcontrollers	Mr.Ratheesh
4	EC307	Power Electronics & Instrumentation	Mr. Amjith S
5	EC365	Biomedical Engineering	Mr.SonySethukumar

6	HS300	Principals of Management	Ms.Soubhagya Sasikumar
7	EC341`	Design Project	Mr. Ponnambili S
8	EC333	Digital Signal Processing Lab	Ms.Samitha T
9	EC335	Power Electronics & Instrumentation Lab	Ms.Amjith S

S7 ECE (2016 Batch)

Sl no	Course code	Subject name	Staff handled
1	EC401	Information Theory & Coding	Ms. Madhavi Vikram
2	EC403	Microwave & Radar Engineering	Ms. Malu U
3	EC405	Optical Communication	Ms.Soubhagya Sasikumar
4	EC407	Computer Communication	Ms.Sreelekshmi B
5	EC409	Control Systems	Ms.Arathi Babu
6	EC465	Mems	Mr.Sujith
7	EC451	Seminar & Project Preliminary	Ms.Sony Sethukumar
8	EC431	Communication Systems Lab(Optical & Microwave)	Ms. Sony Sethukumuar

EVEN SEMESTER

S2 ECE (2019 Batch)- KTU 2019 Scheme

Sl no	Course code	Subject name	Staff handled
1	CYT 100	Engineering Chemistry	Renju R
2	EST 100	Engineering Mechanics	Sasi K S
3	EST 130	Basics Of Electrical And Electronics Engineering	Prajeesh R
4	CYL 120	Engineering Chemistry lab	Renju R
5	ESL 130	Electrical And Electronics Workshop	Rahul P Raj
6	MAT102	Vector Calculus, Differential Equation And Transforms	Sangeetha S
7	HUN10	Professional Communication	Sreeti Gangadharan
8	EST102	Programming In C	Amitha R

S4 ECE (2018 Batch)

Sl no	Course code	Subject name	Staff Handled
1	MA204	Probability Random Process	Ms. Ambilimol V P
2	EC202	Signals And Systems	Mr.Prajeesh
3	EC206	Computer Organization	Mr.Ratheesh
4	HS210	Life Skills	Ms. Chinchu S
5	EC204	Analog Integrated Circuits	Ms.Ponnambili
6	EC208	Analog Communication Engineering	Ms. Anup Vasavan
7	EC230	Logic Circuit Lab Circuits Lab	Mr.Sujith S Pillai
8	EC232	Analog Integrated Circuits Lab	Ms.Malu U

S6 ECE (2017 Batch)

Sl no	Course code	Subject name	Staff handled
1	EC302	Digital Communication	Mr.Sony Sethukumar
2	EC304	Vlsi	Ms.Malu
3	EC306	Antenna & Wave Propagation	Mr.Sujith
4	EC308	Embedded Systems	Ms.Soubhagya Sasikumar
5	EC312	Object Oriented Programming	Ms.Sreelekshmi B
6	EC370	Digital Image Processing	Ms.Samitha
7	EC332	Communication Engg Lab (Analog & Digital)	Ms.Prajeesh R
8	EC334	Microcontroller Lab	Ms.Samitha T
9	EC352	Comprehensive Exam	Ms.Ponnambili S

S8 ECE (2016 Batch)

Sl no	Course code	Subject name	Staff handled
1	EC402	Nano Electronics	Ms.Chinchu S
2	EC404	Advanced Communication Systems	Mr.Anup
3	EC464	Low Power Vlsi Design	Ms.Malu U
4	EC492	Project	Ms.Sony Sethukumar
5	CE482	Environmental Impact Assessment	Mr.Sony Sethukumar

S1 ECE (2019 Batch)- KTU 2019 Scheme

SL NO	COURSE CODE	SUBJECT NAME	STAFF HANDLED
1	Ma101	Linear Algebra And Calculus	Sangeetha S
2	Pht 100	Engineering Physics A	Sasi B
3	Est 110	Engineering Graphics	Sasi K S
4	Est 120	Basics Of Civil And Mechanical Engineering	John P George
5	Hun 101	Life Skills	Sreeti Gangadharan
6	Phl 120	Engineering Physics Lab	Sasi B
7	Esl 120	Civil And Mechanicalworkshop	Neeraja Chandrasekhar

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
MA 101: LINEAR ALGEBRA AND CALCULUS**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To give the definition of an infinite series and explain what is meant by the sequence of partial sums. Relate the convergence or divergence of the series to the sequence of partial sums.	Evaluate the limit of a sequence of numbers (infinite series) and determine whether the series converges.
2	Compute partial derivatives of functions of several variables. Apply the theorem on mixed partial derivatives.	Understand the meaning of partial derivatives and calculate partial derivatives.
3	Use concepts of calculus to the model real-world problems	Compute dot product, cross product, length of vectors. Compute partial derivatives, derivatives of vector-valued functions, gradient functions.
4	Evaluate volumes of bounded solids and areas of bounded regions by using the ideas of double and triple integrals.	To change a double integral to polar coordinate. Compute (relatively simple) triple integrals
5	Apply the concept of line integral to work and circulation. Know the definition and properties of conservative vector fields and their relationship to gradient fields.	Determine if a vector field is conservative and find a potential function if conservative. Evaluate line integrals in the plane and in space, including line integrals of vector fields.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
PHT 100: ENGINEERING PHYSICS A**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To acquire knowledge about desalination of brackish water and treatment of municipal water.	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
2	To gain the knowledge of conducting polymers, bio-degradable polymers and fibre reinforced plastics.	Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution. Design economically and new methods of synthesis nano materials.
	To learn significance of green chemistry and green synthesis.	Have the knowledge of converting solar energy into most needy electrical.
4	To understand mechanism of corrosion and preventive methods.	Apply their knowledge for protection of different metals from corrosion. To prevents the monuments from getting corroded.
5	To have an idea and knowledge about the Chemistry of Fuels.	Recent trends in electrochemical energy storage devices.
6	To study different types of spectroscopy.	Learn how to use different spectroscopy techniques for analysis purpose of simple molecules.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
EST110: ENGINEERING GRAPHICS**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To apply the principles of mechanics to practical engineering problems.	Understand the fundamental concepts of mechanics.
2	To identify appropriate structural system for studying a given problem and isolate it from its environment.	Students would be able to apply and demonstrate the concepts of resultant and equilibrium of force system.
3	To develop simple mathematical model for engineering problems and carry out static analysis.	Students would be able to determine the properties of planes and solids.
4	To develop simple mathematical model for engineering problems and carry out static analysis.	Understand the concepts of moment of inertia.
5		Students would be able to apply fundamental concepts of dynamics to practical problems.
6		Understand the basic elements of vibration.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
EST 120: BASICS OF CIVIL AND MECHANICAL ENGINEERING**

SI No	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To impart a basic knowledge in Electrical Engineering with an understanding of fundamental concepts.	Gain preliminary knowledge in basic concepts of Electrical Engineering.
2	To impart the basic knowledge about the Electric and Magnetic circuits.	Discuss the working of various dc and ac machines
3	To inculcate the understanding about the AC fundamentals.	To predict the behaviour of any electrical and magnetic circuits.
4	To understand the working of various Electrical Machines.	To identify the type of electrical machine used for that particular application.
5		To wire any circuit depending upon the requirement.
6		Understand working principle of various analogue electrical measuring instruments.

COURSE OBJECTIVES AND COURSE OUTCOME FOR

HUN101: LIFE SKILLS

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To have an increased awareness among students on issues in areas of sustainability.	Able to appreciate and explain the different types of environmental pollution problems and their sustainable solutions
2	To have an insight into global environmental issues.	To be aware of problem related to global environmental issues
3	To establish a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, societal, and economic problems.	Able to apply the concepts of sustainability in their respective area of specialization
4	To understand the role of engineering in achieving sustainable world	To understand the need of waste disposal and management

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
PHL 120: ENGINEERING PHYSICS LAB**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To inculcate the essentials of civil engineering field to the students of all branches	The students will be able to illustrate the fundamental aspects of civil engineering
2	To provide the students an illustration of the significance of the civil engineering profession satisfying societal needs.	The students should able to plan a building
3		Students will be able to explain about surveying for making horizontal and vertical measurements.
4	.	They will able to illustrate the uses of various building materials and construction of different components of a building.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
ESL 120: CIVL AND MECHANICAL WORKSHOP**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To make students familiarize with the practical aspects of volumetric analysis of water samples and determine the parameters like alkalinity, chlorides and hardness.	To equip the students to apply the knowledge of Chemistry and take up Chemistry related topics as parts of their project works during higher semester of the course.
2	To improve the knowledge of different types of titrations used in volumetric analysis	To impart sound knowledge in the different fields of theoretical chemistry so as to apply it to the problems in engineering field. (b) To develop analytical capabilities of students so that they can characterize, transform and use materials in engineering and apply knowledge gained in solving related engineering problems
3	To make students develop in terms of practical skills required for analytical projects.	To develop abilities and skills that are relevant to the study and practice of Chemistry.
4	To study flash and fire point	To familiarize the students with different application oriented topics like new generation engineering material different instrumental methods etc.
5		To enable the students to acquire the knowledge in the concepts of chemistry for engineering applications.

S3 ECE

MA201: LINEAR ALGEBRA & COMPLEX ANALYSIS COURSE

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Identify complex-differentiable functions	Determine whether a given function is differentiable, analytic and if so find its derivative. To find harmonic conjugate
2	Use conformal mapping	Upon completion Conformal Mapping students will master concepts and theories of conformal mappings of simply connected and multiply connected domains.
3	Compute complex line integrals	Find parametrizations of curves, and compute complex line integrals directly. Use antiderivatives to compute line integrals. Use Cauchy's integral theorem and formula to compute line integral. Express complex-differentiable functions as power series.
4	Use the residue theorem.	Identify the isolated singularities of a function and determine whether they are removable, poles, or essential. Use the residue theorem to compute complex line integrals and real integrals.
5	Learn to solve systems of linear equations and application problems requiring them. Learn about and work with vector spaces and subspaces.	Demonstrate ability to manipulate matrices and to do matrix algebra. Demonstrate ability to solve systems of linear equations. Demonstrate ability to work within vector spaces and to distil vector space properties.
6	Learn to find and use eigenvalues and eigenvectors of a matrix.	Find the characteristic equation, eigenvalues and corresponding eigenvectors of a given matrix.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
NETWORK THEORY (EC 201)**

Sl.No.	Course Outcomes	Subject Learning Outcomes Or Course Outcomes
		On Completion Of Course Student Will Be Able To:
1	To make the students capable of analyzing any linear time invariant electrical network	Learn the basic elements of networks , network topology, how to solve an electrical network, to simplify networks using theorems.
2	To study time domain, phasor and Laplace transform methods of linear circuit analysis	Learn to apply Laplace Transform in electronics circuits.
3	To study the transient response of networks subject to test signals.	Learn the transient analysis & S-Domain analysis for analysis & application
4	To study the network functions for the single port and two ports	Discuss the significance of Poles and Zeros, properties of driving point and transfer functions.
5	To study the two port networks.	Learn the parameters of two-port network, coupled circuit and application in electrical field
6	To develop understanding of the concept of resonance, coupled circuits.	Learn the parameters of two-port network, coupled circuit resonance and application in electrical field.
7		Explain the impedance, admittance, transmission and hybrid parameters.

COURSE OBJECTIVES AND COURSE OUTCOMES FOR

EC203 SOLID STATE DEVICES COURSE

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To provide an insight into the basic semiconductor concepts.	Graduates will be able to define and understand the concepts in semiconductor physics.
2	To provide a sound understanding of current semiconductor devices and technology to appreciate its applications to electronics circuits and system	Graduates will be able to describe and apply the generation and recombination processes in semiconductors.
		Graduates will be able to explain the structure, creation of electric field and working of PN junction semiconductor diodes.
4		Graduates will be able to illustrate the minority carrier distribution across PN junction semiconductor diodes.
5		Graduates will develop skills and can do research in new concepts and devices.
6		Graduates can summarize concepts that studied relating different modes of operation and the various current components in BJTs and analyze energy band diagram of PN junction diodes, BJTs, metal semiconductor junctions and MOS capacitors.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
EC 205: ELECTRONIC CIRCUITS**

SI No.	Course Objectives	Course Outcomes
1	To explain the basic wave shaping circuits using R, L and C	Can evaluate R-L-C dc circuits and complete response of R-L and R-C transient circuits.
2	To explain the DC analysis of BJT circuits	Design DC biasing circuits.
3	To discuss single stage RC coupled amplifier	Design and analyze single stage amplifiers and their frequency response, its gain band width product and effect of coupling and bypass capacitors in amplifiers.
4	To develop the basic understanding of amplifier designing and its analysis using hybrid model	Explain classification of amplifiers and analyze the CE, CB, CC amplifiers using small signal hybrid model and derive the voltage gain, current gain, input impedance and output impedance.
5	Discuss multistage amplifiers	Analyze the multistage amplifier its gain and frequency response
6	To make students aware of amplifier operation at high frequency and its frequency responses.	Acquired knowledge about transistor at high frequency.
7	Learn the wideband amplifiers and various broad banding techniques	Acquire knowledge wideband amplifiers and broad banding techniques.
8	To make students learn about different types of feedback amplifiers and oscillators	Design and analyze the different types of feedback amplifiers.
		Explain the condition for oscillations in oscillators, design and analyze different types of oscillators.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
EC207 LOGIC CIRCUITS DESIGN**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To work with a positional number systems and numeric representations	Compare various positional number systems and binary codes
2	To introduce basic postulates of Boolean algebra and show the correlation between Boolean expression	Apply Boolean algebra in logic circuit design
3	To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits	Design combinational and sequential circuits
4	To study the fundamentals of HDL	Design and implement digital systems using basic programmable blocks
5	To design and implement combinational circuits using basic programmable blocks.	Formulate various digital systems using HDL. Capability to deal with different logic families.
6	To design and implement synchronous sequential circuits	Design Mealy Moore machine systems.

HS200: BUSINESS ECONOMICS COURSE

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To familiarize the prospective engineers with elementary Principles of Economics and Business Economics.	Make investment decisions based on capital budgeting methods in alignment with micro economic theories.
2	To acquaint the students with tools and techniques that are useful in their profession in Business Decision Making which will enhance their employability;	Make investment decisions based on capital budgeting methods in alignment with macro economic theories.
3	To apply business analysis to the “firm” under different market conditions.	Analyse the profitability of the firm, economy of operation.
4	To apply economic models to examine current economic scenario and evaluate policy options for addressing economic issues.	Determination of price under various market situations with good grasp on the effect of trade cycles in business.
5		Gain knowledge of elementary accounting concepts used for preparing balance sheet And interpretation of balance sheet.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
ELECTRONIC DEVICES AND CIRCUITS**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce to the students the fundamental concepts of electronic devices and circuits for engineering applications	Explain, illustrate, and design the different electronic circuits using electronic components
2	To develop the skill of analysis and design of various analog circuits using electronic devices	Design circuits using operational amplifiers for various applications
3	To provide comprehensive idea about working principle, operation and applications of electronic circuits	
4	To equip the students with a sound understanding of fundamental concepts of operational amplifiers	
5	To expose to the diversity of operations that operational amplifiers can perform in a wide range of applications	
6	To expose to a variety of electronic circuits/systems using various analog ICs	

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
DESIGN AND AUTOMATION LAB**

Sl no	Course Objective	Course Outcome
		On completion of course the student will be able to
1	To familiarize the student how to simulate the digital and electronic circuit signals and system using the software which are available for modern design methodology for the rapid design and verification of complex electronic system	An ability to apply knowledge of computer, science and engineering o the analysis of electrical and electronic engineering problems
		An ability to system which include both hardware and software
		An ability to find formulate and solve engineering problem
		An ability to use modern engineering techniques

S5ECE

EC301 DIGITAL SIGNAL PROCESSING

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To provide an understanding of the principles, algorithms and applications of DSP	the principle of digital signal processing and applications.
2	To study the design techniques for digital filters	the utilization of DSP to electronics engineering
3	To give an understanding of Multi-rate Signal Processing and its applications	
4	To introduce the architecture of DSP processors	

EC303 :APLLIED ELECTROMAGNETIC THEORY

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce basic mathematical concepts related to electromagnetic vector fields.	To develop a solid foundation and a fresh perspective in the analysis and application of electromagnetic fields.
2	To impart knowledge on the basic concepts of electric and magnetic fields	To analyse the propagation of electromagnetic waves in different media.
3	To develop a solid foundation in the analysis and application of electromagnetic fields, Maxwell's equations and Poynting theorem	To analyze the characteristics of transmission lines.
4	To become familiar with propagation of signal through transmission lines and waveguides.	To solve the different transmission line problems using Smith chart

EC305 : MICROPROCESSOR & MICROCONTROLLER

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To understand fundamental operating concepts of microprocessors and microcontrollers	Distinguish various types of processor architectures.
2	To communicate with various devices using controller.	Describe architectures, memory organization of 8085 microprocessor and 8051.
3	To design a microcontroller based system with the help of the interfacing devices.	Develop programming skills in assembly for interfacing peripheral devices with 8051
4	To program the controller to make various peripherals work for specified application	

EC307 POWER ELECTRONICS & INSTRUMENTATION

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To provide an insight on the concepts of Power Electronics and Electronic instruments	To understand the concepts of Power Electronics and the various applications
2	To study the applications of Power electronics such as Switched mode regulators and inverters.	To get an insight on various electronic instruments, their configuration and measurements using them.
3	To develop understanding of the concept of Transducers and Digital instruments.	To understand the principle of operation of Transducers

EC365 BIOMEDICAL INSTRUMENTATION

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce student to basic biomedical engineering technology	To understand the concepts of Power Electronics and the various applications.
2	To understand the anatomy & physiology of major systems of the body in designing equipment for medical treatments.	To get an insight on various electronic instruments, their configuration and measurements using them.
3	To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.	To understand the principle of operation of Transducers

EC333 DIGITAL SIGNAL PROCESSING LAB

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To enable the students to explore the concepts of design, simulation and implementation of various systems using MATLAB/SciLab/OCTAVE and DSP kit.	Design, simulate and realize various systems related to DSP.

EC335 POWER ELECTRONICS & INSTRUMENTATION LAB

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To design and implement basic power electronic circuits	Design and demonstrate basic power electronic circuits
2	To study the working of transducers	Use transducers for application.
3	To train the usage of Digital Instruments	Function effectively as an individual and in a team to accomplish the given task.

S7 ECE

EC401 INFORMATION THEORY & CODING

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce the concept of information	Apply the knowledge of Shannon's source coding theorem and Channel coding theorem for designing an efficient and error free communication link.
2	To understand the limits of error free representation of information signals and the transmission of such signals over a noisy channel	Analyze various coding schemes
3	To design and analyze data compression techniques with varying efficiencies as per requirements	Design an optimum decoder for various coding schemes used.
4	To understand the concept of various theorems proposed by Shannon for efficient data compression and reliable transmission	
5	To give idea on different coding techniques for reliable data transmission	

EC 403 MICROWAVE & RADAR ENGINEERING

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce the various microwave sources, their principle of operation and measurement of various parameters	The students will be able to understand the basics of microwave engineering and radar systems.
2	To study the various microwave hybrid circuits and formulate their S matrices.	
3	To understand the basic concepts, types, working of radar and introduce to radar transmitters and receivers.	

EC 405 OPTICAL COMMUNICATION

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce the concepts of light transmission through optical fibers, optical sources and detectors.	Know the working of optical source and detectors.
2	To compare the performance of various optical transmission schemes.	Compare the performance of various optical modulation schemes.
3	To impart the working of optical components and the principle of operation of optical amplifiers.	Apply the knowledge of optical amplifiers in the design of optical link.
4	To give idea on WDM technique	Analyse the performance of optical amplifiers.

EC 407 COMPUTER COMMUNICATION

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To give the basic concepts of computer network and working of layers, protocols and interfaces in a computer network.	Different types of network topologies and protocols.
2	To introduce the fundamental techniques used in implementing secure network communications and give them an understanding of common threats and its defences.	The layers of the OSI model and TCP/IP with their functions.
3		The concept of subnetting and routing mechanisms.
4		The basic protocols of computer networks, and how they can be used to assist in network design and implementation.

EC 409 CONTROL SYSTEMS

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To introduce the elements of control system and its modelling	Represent mathematically a systems and deriving their transfer function model.
2	To introduce methods for analyzing the time response, the frequency response and the stability of systems.	Analyse the time response and frequency response of the systems for any input
3	To design control systems with compensating techniques.	Find the stability of system
4	To introduce the state variable analysis method.	Design a control system with suitable compensation techniques
5	To introduce basic concepts of digital control systems	Analyse a digital control system.

EC 465 MEMS

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To understand the operation of major classes of MEMS devices/systems	Understand the working principles of micro sensors and actuators
2	To give the fundamentals of standard micro fabrication techniques and processes	Understand the application of scaling laws in the design of micro systems
3	To understand the unique demands, environments and applications of MEMS devices	Understand the typical materials used for fabrication of micro systems
4		Understand the principles of standard micro fabrication techniques
5		Appreciate the challenges in the design and fabrication of Micro systems

EC431 COMMUNICATION SYSTEMS LAB(OPTICAL & MICROWAVE)

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To provide practical experience in design, testing, and analysis of few electronic devices and circuits used for microwave and optical communication engineering.	Measurement of E-plane and H-plane characteristics
2		Study of Vector Network Analyser
3		Study of losses in Optical fiber

EVEN SEMESTER

S2 ECE (2019 Batch)- KTU 2019 Scheme

Sl no	Course code	Subject name	Staff handled
1	CYT 100	Engineering Chemistry	Renju R
2	EST 100	Engineering MECHANICS	Sasi K S
3	EST 130	Basics Of Electrical And Electronics Engineering	Prajeesh R
4	CYL 120	Engineering Chemistrylab	Renju R
5	ESL 130	Electrical And Electronics Workshop	Rahulp Raj
6	MAT102	Vector Calculus, Differential Equation And Transforms	Sangheetha S
7	HUN10	Professional Communication	Sreeti Gagadharan
8	EST102	Programming In C	Amitha R

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
CYT100: ENGINEERING CHEMISTRY**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Dynamics of mechanical and electrical oscillation using Fourier series and integrals; time and frequency representations for driven damped oscillators, resonance; one-dimensional waves in classical mechanics and electromagnetism; normal modes.	Solve for the solutions and describe the behavior of a damped and driven harmonic oscillator in both time and frequency domains. Damped and Forced Oscillations oscillating system problems.
2	The fundamental principles of photonics that complement the topics in the optics and laser courses and to help students develop problem-solving skills applicable to real-world photonics problems.	Define and explain the propagation of light in conducting and non-conducting media.
3	Introduce basic concepts and principles of acoustics.	Define and explain the physics governing laser behaviour and light matter interaction ting and non-conducting media.
4		Apply wave optics and diffraction theory to a range of problems
5		Explain and calculate the physical effects of acoustic reflections, absorption, scattering, diffusion, diffraction, and propagation losses.
6		Use advanced theoretical, numerical, and experimental techniques to model and analyze acoustical elements in musical instruments, the human voice, room acoustics, and audio.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
EST100: ENGINEERING MECHANICS**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Increase ability to communicate with people.	To hand letter will improve.
2	Learn to sketch and take field dimensions.	To perform basic sketching techniques will improve.
3	Learn to take data and transform it into graphic drawings.	To draw orthographic projections and sections.
4	Learn basic Auto Cad skills.	To use architectural and engineering scales will increase.
5	Learn basic engineering drawing formats	To produce engineered drawings will improve
6	Prepare the student for future Engineering positions	To convert sketches to engineered drawings will increase.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
EST130: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To get basic idea about types, specification and common values of passive components.	Student can identify the active and passive electronic components.
2	To familiarize the working and characteristics of diodes transistors, MOSFET and some measuring instruments.	Student can setup simple circuits using diodes, transistors and other electronic components.
3	To understand working of diodes in circuits and in rectifiers.	Student will get fundamental idea about basic communication and entertainment electronics.
4	To understand the concept of mobile networks.	Student will get fundamental idea about mobile operation.
5		Student will get fundamental idea about different electronic circuits.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
CYL120: ENGINEERING CHEMISTRY LAB**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Dynamics of mechanical and electrical oscillation using Fourier series and integrals; time and frequency representations for driven damped oscillators, resonance; one-dimensional waves in classical mechanics and electromagnetism; normal modes.	Solve for the solutions and describe the behavior of a damped and driven harmonic oscillator in both time and frequency domains. Damped and Forced Oscillations oscillating system problems.
2	The fundamental principles of photonics that complement the topics in the optics and laser courses and to help students develop problem-solving skills applicable to real-world photonics problems.	Define and explain the propagation of light in conducting and non-conducting media.
3	Introduce basic concepts and principles of acoustics.	Define and explain the physics governing laser behaviour and light matter interaction ting and non-conducting media.
4		Apply wave optics and diffraction theory to a range of problems
5		Explain and calculate the physical effects of acoustic reflections, absorption, scattering, diffusion, diffraction, and propagation losses.
6		Use advanced theoretical, numerical, and experimental techniques to model and analyze acoustical elements in musical instruments, the human voice, room acoustics, and audio.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
ESL130: ELECTRICAL AND ELECTRONICS WORKSHOP**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To get basic idea about types, specification and common values of passive components.	Student can identify the active and passive electronic components.
2	To familiarise the working and characteristics of diodes transistors, MOSFET and some measuring instruments.	Student can setup simple circuits using diodes, transistors and other electronic components.
3	To understand working of diodes in circuits and in rectifiers.	Student will get fundamental idea about basic communication and entertainment electronics.
4	To understand the concept of mobile networks.	Student will get fundamental idea about mobile operation.
5		Student will get fundamental idea about different electronic circuits.

COURSE OBJECTIVES AND COURSE OUTCOME FOR

MAT 102 - VECTOR CALCULUS, DIFFERENTIAL EQUATION AND TRANSFORMS

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To put it briefly, the point of this class is to take your existing knowledge of calculus and apply it towards the construction and solution of mathematical models in the form of differential equations.	Distinguish between linear, partial and ordinary differential equations. State the basic existence theorem for 1st order ODE's and use the theorem to determine a solution interval
2	Solve non-homogeneous linear equations with constant coefficients using the methods of undetermined coefficients and variation of parameters.	Recognize and solve a non homogeneous differential equation. Find particular solutions to initial value problems.
3	Introduce the Fourier series and its application to the solution of partial differential equation.	Find the Fourier series representation of a function of one variable.
4	To provide the student with the concept and the understanding of basics in Partial Differential Equations.	Knowledge in the Technic, methodology of solving Partial Differential Equations. A basic understanding in the Transforms which are useful in solving engineering problems.
5	This course introduces ideas of wave equation and heat equation which are widely used in the 36 modeling and analysis of a wide range of physical phenomena and has got applications across all branches of engineering.	At the end of the course students will have acquired basic knowledge of differential equations and methods of solving them and their use in analyzing typical mechanical or electrical systems.

**COURSE OBJECTIVES AND COURSE OUTCOME FOR
HUN 102: PROFESSIONAL COMMUNICATION**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To excite the student on creative design and its significance	To appreciate different elements involved in design and to apply them when they called for.
2	To make the student aware of the processes involved in design	Aware of product centred and user centred aspects that makes in the design process.
3	To make the student understand the interesting interaction of various segments of humanities, sciences and engineering in the evolution of a design	To be aware of different stages in design process and results of incorporating other fields with engineering stream
4	To get an exposure as to how to engineer a design.	Understand different stages in manufacturing of a designed product

COURSE OBJECTIVES AND COURSE OUTCOME FOR

EST102: PROGRAMMING IN C

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Competency in an engineering or science profession via promotion to positions of increasing responsibility, publications, and/or conference presentations.	An ability to apply knowledge of mathematics, science, and engineering.
2	Adaptability to new developments in science and technology by successfully completing or pursuing graduate education in engineering or related fields, or participating in professional development and/or industrial training courses.	An ability to design and conduct experiments, as well as to analyze and interpret data.
3		An ability to identify, formulate, and solve engineering problems
4		Understanding of professional and ethical responsibility
5		The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
6		A recognition of the need for, and an ability to engage in life-long learning

S4 ECE

MA 202 Probability and Random Processes

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	Understand concepts of probability, conditional probability and independence.	Be familiar with some of the commonly encountered random variables, in particular the Gaussian random variable.
2	Understand random variables and probability distributions.	Be able to obtain the distributions of functions of random variables
3	Understand moment generating and characteristic functions.	Be able to relate probability theory to real statistical analysis.
4	Understand and apply large deviation theory and Chernoff's bounds.	Understand the classifications of random processes and concepts such as strict stationarity, wide-sense stationarity and ergodicity.
5	Understand and apply Poisson, birth-death and renewal processes.	

EC202 SIGNALS AND SYSTEMS

Sl.No.	Course Objectives	Course Outcomes
		On completion of the course the student will be able to
1.	Understanding the fundamental characteristics of Signals and Systems	Classify systems based on their properties and determine the response of an LTI system using convolution
2	Understanding signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide	Analyze the spectral characteristics of continuous time and discrete time periodic and aperiodic signals using Fourier analysis
3	Development of the mathematical skills to solve problems involving convolution, sampling and modulation	Analyze system properties based on impulse response and Fourier analysis
4.		Apply the Laplace transform and Z-transform for analysis of continuous time and discrete time signals and systems
		Understand the process of sampling and the effect of under sampling

COURSE OBJECTIVES AND COURSE OUTCOMES FOR

EC 206 COMPUTER ORGNISATION

Sl. No.	Course objective	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To impart knowledge in computer architecture	To understand the functional units of computer.
2	To impart knowledge in machine language programming	To understand assembly instructions and machine level programming.
	To develop understanding in IO accessing techniques and memory structures.	Discuss various addressing modes, types of instructions and the process of executing a program.
4	To understand the characteristics and techniques involved with different types of memory.	To understand the design of single cycle and multicycle datapath.
5		To learn the addressing of IO devices and IO interfaces.
6		To learn the characteristics and techniques involved in different types of memory.

HS200: BUSINESS ECONOMICS COURSE

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To familiarize the prospective engineers with elementary Principles of Economics and Business Economics.	Make investment decisions based on capital budgeting methods in alignment with micro economic theories.
2	To acquaint the students with tools and techniques that are useful in their profession in Business Decision Making which will enhance their employability;	Make investment decisions based on capital budgeting methods in alignment with macro economic theories.
3	To apply business analysis to the “firm” under different market conditions.	Analyse the profitability of the firm, economy of operation.
4	To apply economic models to examine current economic scenario and evaluate policy options for addressing economic issues.	Determination of price under various market situations with good grasp on the effect of trade cycles in business.
5		Gain knowledge of elementary accounting concepts used for preparing balance sheet and interpretation of balance sheet.

**COURSE OBJECTIVES AND COURSE OUTCOMES FOR
EC204 ANALOG INTEGRATED CIRCUITS COURSE**

Sl. No.	Course Objectives	Subject Learning Outcomes or Course Outcomes
		On completion of course the students will be able to:
1	To understand the basic principles of analog integrated circuits. To equip the students with a sound understanding of fundamental concepts of operational amplifiers.	Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.
2	To understand some applications of analog integrated circuits. To know the diversity of operations that the op amp can perform in a wide range of applications.	Elucidate and design the linear and non-linear applications of an opamp and special application ICs.
3	To understand the basic principles of integrated circuit fabrication, current and voltage converters and design of oscillators.	Able to design and analyze oscillators, converters and general purpose opamp circuits.
4	To understand the basic principles of integrated circuit fabrication and design of filters and waveform generators.	Able to design and analyze filters and waveform generators.
5	To study the different types of ICs and its applications. To introduce a few special functions integrated circuits.	Able to design, classify and comprehend the working principle of data converters. Able to design Voltage regulators, multivibrators using special application IC 555, PLL and its application in communication
6	To impart basic concepts and types of data converters	Able to design ADC and DAC converters

**COURSE OBJECTIVE AND COURSE OUTCOME FOR
EC 208 ANALOG COMMUNICATION**

Sl no	Course Objective	Course Outcome
		On completion of course the student will be able to
1	Understand the fundamental ideas of communication system and noises and its effect in communication systems	Interpret the need for modulation and basics elements in communication system discuss the various types of noise in communication system
2	To understand the different analog amplitude modulation schemes.	Explicate parameters to determine the performance of a amplitude modulated communication system and various modulation schemes
3	To understand the SSB analog modulation schemes	Discuss various method for SSB transmission and reception .Also discussed various modified SSB transmission methods
4	To study different types of radio transmitters and receivers	Explain the principle and working of analog transmitters and receivers.
5	To explain the various communication methods used in analog signal transmission using phase modulation method	Discuss various types of phase modulation methods in analog system , it's various parameters to determine it's performance and how its transmission occurs
6	To explain the various communication methods used in analog signal reception using angle modulation method and to impart basic knowledge on public telephone systems.	Discuss various types of phase modulation methods in analog system and how its reception occurs. Know the basic idea of telephone systems

**COURSE OBJECTIVE AND COURSE OUTCOME FOR
EC232: ANALOG INTEGRATED CIRCUITS LAB**

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To study the working of standard digital ICs and basic building blocks	Realization of functions using basic and universal gates (SOP and POS forms).
2	To design and implement combinational circuits	Design and Realization of different digital circuits using gates
3	To design and implement sequential circuits	Study of Flip Flops, synchronous and asynchronous counters
4		Realization of counters using IC's, MUX and DEMUX circuits.

**COURSE OBJECTIVE AND COURSE OUTCOME FOR
EC230: LOGIC CIRCUITS DESIGN LAB**

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits	Realization of functions using basic and universal gates
2	To study the working of standard digital ICs and basic building blocks	Design and Realization of different digital circuits using gates
3	To design and implement combinational circuits	Study of Flip Flops, synchronous and asynchronous counters
4	To design and implement sequential circuits	Realization of counters using IC's, MUX and DEMUX circuits.

S6 ECE

DIGITAL COMMUNICATION

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To understand the concept of Digital representation of analog source	Illustrate the Digital representation of analog source
2	To understand the Performance comparison various pulse modulation schemes	Compare the performance of various Digital Pulse Modulation Schemes
3	To discuss Inter Symbol Interference (ISI) problem in digital communication and to derive the Nyquist Criteria for zero ISI in data Transmission	Construct signal space representation of signal using Gram Schmidt orthonormalisation procedure
4	To analyse the error probability for different modulation schemes like BPSK, BFSK, QPSK etc.	Compare the error probability for different digital modulation schemes like BPSK, BFSK, QPSK etc.
5	To understand various Multiple Access Techniques	Understand various Diversity Techniques

VLSI

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To give the knowledge about IC Fabrication Techniques	The students will be able to design and analyse various MOSFET and CMOS logic circuits.
2	To impart the skill of analysis and design of MOSFET and CMOS logic circuits.	

ANTENNA & WAVE PROPOGATION

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To learn the basic working of antennas.	The basic working of antennas
2	To study various antennas, arrays and radiation patterns of antennas	Various antennas, arrays and radiation patterns of antennas
3	To understand various techniques involved in various antenna parameter measurements.	Various techniques involved in various antenna parameter measurements
4	To understand the propagation of radio waves in the atmosphere.	The propagation of radio waves in the atmosphere.

EMBEDDED SYSTEMS

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To have a thorough understanding of the basic structure and design of an Embedded System	Understand the basics of an embedded system
2	To study the different ways of communicating with I/O devices and standard I/O interfaces	Develop program for an embedded system.
3	To study the basics of RTOS for Embedded systems.	Design, implement and test an embedded system
4	To study the programming concepts of Embedded Systems	

OBJECT ORIENTED PROGRAMMING

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To introduce the Object Oriented Programming paradigm using C++ and Java as the languages.	A thorough understanding of the features of OOP like class construction, polymorphism and inheritance of C++ and Java.
2	To learn simple Android application development from the fundamentals.	An understanding of advanced features of C++ such as templates, abstract classes and virtual functions
3		Knowledge of advanced features of Java such as multithreading, packages and error management.
4		Skills in designing android application development

DIGITAL IMAGE PROCESSING

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To understand the fundamentals of image processing and various transforms used in image processing	Learn the basic elements of image processing and various image transforms.
2	To study image processing techniques like image enhancement and image restoration.	Discuss spatial domain methods and frequency domain methods of image enhancement and degradation model for restoration..
3	To study image processing techniques like image segmentation and image representation.	Learn the lossless and lossy compression, point, line and edge detection, descriptors..
4	To study morphological image processing.	Discuss different morphological operations.

COMMUNICATION ENGINEERING LAB(ANALOG & DIGITAL)

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To provide experience on design, testing and analysis of few electronic circuits used in communication engineering	The students will be able to understand the basic concepts of circuits used in communication systems.

MICROCONTROLLER LAB

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To understand Assembly Language/embedded C programming of Microcontroller	Program Micro controllers.
2	To interface simple peripheral devices to a Microcontroller.	Interface various peripheral devices to Micro controller.
3	To equip student groups to design and implement simple embedded systems.	Function effectively as an individual and in a team to accomplish the given task.

S8 ECE

EC402 NANO ELECTRONICS

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To introduce the concepts of nanoelectronics.	The students will be able to understand basic concepts of nanoelectronic devices and nano technology.

EC404 ADVANCED COMMUNICATION SYSTEMS

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To impart the basic concepts of various communication system.	The students will be able to understand the basics and technology of advanced communication system

EC464 LOW POWER VLSI DESIGN

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	• To identify the power dissipation mechanisms in various MOS logic styles	Identify the sources of power dissipation in digital IC systems
2	To familiarize suitable techniques to reduce power dissipation	Understand the impact of power on system performance and reliability
3		Understand leakage sources and reduction techniques
4		Recognise advanced issues in VLSI systems, specific to the deep-submicron silicon technologies

CE 482 ENVIRONMENTAL IMPACT ASSESSMENT

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To study the various types of environmental pollution	To have a basic knowledge of various pollution sources and their impacts
2	To study the impact due to various types of pollutants and their assessment techniques	

EC492 PROJECT

SI NO:	COURSE OBJECTIVE	COURSE OUTCOMES
1	To apply engineering knowledge in practical problem solving	Think innovatively on the development of components, products, processes or technologies in the engineering field
2	To foster innovation in design of products, processes or systems	Apply knowledge gained in solving real life engineering problems