GURU NANAK INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Departmental Vision

DV : To impart **quality education and excel in research** to create **centre of excellence** in the field of Electronics & Communication Engineering to produce **outstanding professionals** to become **future leaders** and **responsible citizens**.

Departmental Mission

DM1: To impart **high quality education** with **innovative teaching-learning methodologies**

DM2: To impart knowledge **on innovative field of engineering** and provide opportunity to work in **a team** on **interdisciplinary projects** for **empowering ability** to become **successful professionals**

DM3: To carry out **high quality research** through **collaboration** and **interaction** with **research organizations** and **industries**

DM4: To **motivate** to follow **professional ethics** and **encourage** to work for the **sustainable growth of the society**

Program Educational Objectives (PEOs)

PEO I: To build up the concept of **core electronics subjects** with a strong foundation in the **engineering fundamentals** to **solve, analyze and design** the **real-life engineering problems**.

PEO II: To impart training on **emerging technologies** and provide opportunity to work in a **team** on **interdisciplinary projects** to inculcate **leadership quality**

PEO III: To foster **interdisciplinary learning environment** to succeed in their **profession, higher education, research** and **entrepreneurial development .**

PEO IV: To imbibe **ethical attitude and life-long learning capability**

Program Outcomes

Engineering Graduates will be able to

PO 1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3. **Design/development of solutions**: 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.
PO 4. Conduct investigations of complex problems: 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.
PO 5.Modern tool usage: 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.

PO 6.The engineer and society: 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.
PO 7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10.Communication: 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.
PO 11.Project management and finance: 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.
PO 12. Life-long learning: 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 Outcome (PSO)

Graduates of ECE program will be able:

PSO 1: To acquire deep analytical knowledge of Electronics and Communication Engineering to meet requirements of global consumers in Devices and communication sector and contribute to the society through govt. and Non Govt. Sectors.

PSO 2: To develop integrated systems in the field of Electronics and Communication by applying modern tools and skills to meet the challenges in Industry.

PSO 3: To apply innovation in the field of communication for designing IoT based systems along with AI and ML

SEMESTER I

Paper Name: Mathematics–I

Paper Code: M101

Total Contact Hours:40

Credit:4

Course outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO 1: Recall the distinctive characteristics of matrix algebra, differential calculus, integral calculus and vector analysis.

CO2: Understand the theoretical working of matrix algebra, differential calculus, integral calculus and vector analysis.

CO3: Apply the principles matrix algebra, differential calculus, integral calculus and vector analysis for the solutions of the problems.

CO4: Analyze the application of matrix algebra, differential calculus, integral calculus and vector analysis.

CO5: Evaluate the result for application to the problems on matrix algebra, differential calculus, integral calculus and vector analysis.

CO –PO-PSO Mapping

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO 1	PSO2	PSO
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	-	2	-
CO4	2	3	2	-	-	-	-	-	-	-	-	1	2	-	2
CO5	3	2	1	-	-	-	-	-	-	-	-	1	1	-	-

Paper Name: Chemistry

Paper Code: CH 101
Total Contact Hours: 40
Credit: 4

Course Outcome

On successful completion of the learning session of the course, the learner will be able to:

CO1: Able to remember fundamental concepts of Engineering Chemistry and define relevant terminologies.

CO2: Able to understand principles of thermodynamics, kinetics and physical properties of molecules.

CO3: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries and technical fields.

CO4: Able to analyze and explain the defects in crystalline solids and protective measures of corrosion of metals in industries.

CO5: Able to assess qualitative and quantitative parameters of applied and industrial chemistry.

CO –PO-PSO Mapping

	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1											2	2	
CO2	3	2	1										1	2	
CO3			2		2							1		1	
CO4	2		1		2								2	1	
CO5	2						3					1	1	2	

Paper Name: Basic Electrical Engineering

Paper Code: EE 101

Total Contact Hours: 41

Credit:4

Course Outcomes:

On successful completion of the learning session of the course, the learner will be able to:

CO1: Understand Basic Electrical circuits, Power distribution and Safety measures.

CO2: Analyze and apply DC network theorems.

CO3: Analyze and apply the concept of A Circuits of single-phase and three-phase.

CO4: Assess basic principles of Transformers and Rotating Machines

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1						3	3	2	
CO2	2	3	3	3	-	-							3	2	
CO3	2	3	1	3	-	-							3	3	
CO4	3	3	2	2	-	2						3	3	1	

Paper Name: Communicative English

Paper Code: HU101

Total Contact Hours: 26

Credits: 2

Course Outcomes:

On successful completion of the learning session of the course, the learner will be able to:

CO1: Able to Define , identify describe the basics of communication theory and its application

CO2: Able to recognize ,recall and make use of English Vocabulary And its varied usage

CO3: Able todevelopandapplyreadingandwritingskillsinanacademicandglobalbusiness context

CO4: Able to identify , explain and use the grammatical structures and forms in English

CO5: Able to analyze, classify and elaborate the forms and formats of business writing

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												3	1		2
CO2												3	2		2
CO3						3					1	3	2		3
CO4						3						3	2		2
CO5						3					1	3	2		3

Paper Name: Engineering Mechanics

Paper Code: ME101

Total Contacts Hours: 45

Credit:4

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO1.Understand free body diagram and calculate the reactions necessary to ensure static equilibrium.

CO 2. Study the effect of friction in static and dynamic conditions.

CO3.Understand the different surface properties, properties of masses and material properties.

CO4.Analyze And Solve different problems of kinematics and kinetics.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2					1				1	1	
CO2	3	3	2	2					1			1			
CO3	3	2	3	2	1				1			1	2	2	
CO4	3	3	3	3					1				2	3	

Paper Name: Lang. Lab. and Seminar Presentation

Paper Code: HU191

Total Contact Hours: 26

Credit:1

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO 1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

CO 2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

CO 3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

CO 4: Able to analyze communication behaviors.

CO 5: Able to adapt to multifarious socio-economical and professional are as with the help of effective communication and interpersonal skills.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2									2		1	
CO2	1		1	2								2			
CO3	1		2	2								2		1	
CO4												2			
CO5	1								3			2			

Paper Name: Chemistry Lab

Paper Code: CH191

Total Contact hour: 36

Credit:2

Course Outcome

On successful completion of the learning session of the course, the learner will be able to:

CO1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CO2: Able to work as an individual also as a team member

CO3: Able To Analyze Different Parameters Of water considering environmental issues

CO4: Able To Synthesise Nano And Polymer Materials.

CO5: Capable to design innovative experiments applying the fundamentals of chemistry

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1			2				1	2	
CO2	3	2							3				2	1	
CO3		2				2	3					1		1	
CO4	2	2			2	1							2	1	
CO5	2	2	2		1							1	1	2	

Paper Name: Basic Electrical Engineering LAB

Paper Code: EE191

Total Contact Hours: 36

Credit: 2

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO1: Understand common electrical components and their ratings.

CO 2: How to apply Circuit connection by wires of appropriate ratings.

CO3: Understand the usage of common electrical measuring instruments

CO4: Understanding And Applying The Basic characteristics of transformers and electrical machines

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		1					3				3	2	
CO2	3	3	1	1					3					2	
CO3	2	2							3				3	3	
CO4	2	2							3				3	3	

Paper Name: Engineering Drawing & Graphics
Paper Code: ME191
Total Contact Hours: 36
Credit:2

Course Outcomes:

On successful completion of the learning session of the course, the learner will be able to:

CO1. Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

CO2.Know about engineering scales, Dimensioning and various geometric curves necessary to understand design of machine elements.

CO3.Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

CO4. Become familiar with computer aided drafting useful to share the design model to different sections of industries as well as for research development.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		1	2		1			3			1	3	1	
CO2	3		2	2		1			3	1		1	3	2	
CO3	2	2	2	1		1			3			1	3	3	
CO4	1		2	2	2	1			3	1		1	3	3	

SEMESTER II

Paper Name: Mathematics-II

Paper Code: M201

Total Contact Hours: 40

Credit:4

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO 1: Recall the distinctive characteristics of improper integral, Laplace Transform, ordinary differential equation, graph theory.

CO 2: Understand The Theoretical Working Of Improper Integral, Laplace Transform, ordinary differential equation, Graph Theory.

CO 3: Apply The Principles Of Improper Integral, Laplace Transform, ordinary differential equation, graph theory.

CO4: Analyze the application of improper integral, Laplace Transform, ordinary differential equation, graph theory.

CO5: Evaluate The result for application to the problems on improper integral, Laplace Transform, ordinary differential equation, graph theory.

CO6: Design Graph To Solve Different Real Life Problems

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	-	-	-	-	-	-	-	2	1	-	-
CO3	3	2	3	2	-	-	-	-	-	-	-	2	1	3	-
CO4	2	3	2	2	-	-	-	-	-	-	-	1	3	1	2
CO5	3	2	2	1	-	-	-	-	-	-	-	1	1	1	
CO6	3	2	3	2	-	-	-	-	-	-	-	2	1	1	3

Paper Name: Physics -I

Paper Code: PH 201

Total Contact Hours: 41

Credit:4

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO 1 Describe different types of mechanical resonance and its electrical equivalence

CO 2 Explain basic principles of Laser, Optical fibers and Polarization of light

CO 3 Apply superposition principle to explain the phenomena of interference and diffraction

CO 4 Analyze different crystallographic structures according to their coordination number and packing factors

CO5 Justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics

CO –PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO 3
CO1	3											2	3	3	
CO2	3											2	3	3	
CO3	3	2										2	3	1	
CO4	2	3										2	3	2	
CO5	1	3										2	3	2	

Paper Name: Basic Electronics Engineering

Paper code: EC201

Total Contact Hours: 40

Credits:4

Course Outcomes:

On successful completion of the learning session of the course, the learner will be able to:

CO1: Study PN junction diode, ideal diode, diode models and its circuit analysis, application of diodes and special diodes.

CO2: Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp Circuits to perform operations such as Integration, differentiation on electronic signals.

CO3: Study the concepts of both positive and negative feedback in electronic circuits.

CO4: Develop the capability to analyze and design simple circuit containing non-Linear elements such as transistors using the concepts load lines,operating points and incremental analysis.

CO5: Learn how the primitives of Boolean algebra are used to describe the processing of binary signals.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	1	1	-	-	1	1	3	1	
CO2	2	2	3	3	1	-	2	2	1	2	-	1	3	1	
CO3	3	3	2	2	-	2	2	1	2	1	-	2	3	2	
CO4	2	3	1	1	-	-	-	-	1	1	2	1	3	2	
CO5	3	2	1	2	-	-	-	-	-	-	-	1	3	1	

Paper Name : Computer Fundamentals & Principle of Computer Programming

Paper Code: CS201

Total No. of Lectures:40

Credits:4

Course Outcome:

On successful completion of the learning session of the course, the learner will be able to:

CO1 Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.

CO2 Write, Compile and Debug programs in C language and use different data types for writing the programs.

CO3 Design programs connecting decision structures, loops and functions.

CO4 Explain The difference between call by value and call by address.

CO5 Understand The Dynamic behavior of memory by the use of pointers.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1	2				2	3	2	3	3
CO2	2	2	3	2	3		3					3	2	2	3
CO3	2	3	2	2	2		1					3	2	3	2
CO4	3	2	2	2	3		1					3	2	2	2
CO5	2	2	2	2	1	1	2				2	3	3	3	3

Paper Name: Engineering Thermodynamics & Fluid Mechanics

Paper Code: ME 201

Total Contact Hours: 48

Credits:4

Course Outcome:

Upon successful completion of this course, the student will be able to:

CO1 Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

CO2 Understand basic concepts Heat Engine, Entropy from Second law of Thermo dynamics.

CO3 Know the Thermodynamic Characteristics Of a pure substance and its application in power cycles (Simple Rank in e cycles, Air Standard cycles)

CO 4 Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2		2	1	1	1		1	2	1	1	
CO2	3	3	2	2		2	2		1		1	2			
CO3	2	2	1	1		2	1					1	2	2	
CO4	3	3	2	2		2	1				1	1	2	2	

Paper Name: Computer Fundamentals & Principle of Computer Programming Lab

Paper Code: CS 291

Total Contact Hours: 36

Credit:2

Course Outcome:

Upon successful completion of this course, the student will be able to:

CO1. Understand the working of different operating systems like DOS, Windows, Linux.

CO2.Write, Compile and Debug programs in C language.

CO3.Design programs connecting decision structures, loops.

CO4.Exercise user defined functions to solve real time problems.

CO5. Inscribe C programs using Pointers to access arrays, strings, functions, structures and files.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2								3	1	1
CO2	3	3	2	3	2							2	2	3	1
CO3	2	2		1	1								2		2
CO4	2	3		3	1					1	2		3		1
CO5	2	2	2	2	2									1	

Paper Name: Physics I Lab

Paper Code: PH 291

Total Contact Hours: 40

Credit:4

Course Outcome:

Upon successful completion of this course, the student will be able to:

CO1 Demonstrate experiments allied to their theoretical concepts

CO2 Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer

CO3 Analyze and participate as an individual and as a member or leader in groups in laboratory sessions actively.

CO4 Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.

CO5 Develop critical thinking skills to solve for real life challenges.

CO –PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO 1	2								3					2	
CO 2				3					3				2	1	
CO 3	2								3				1	1	
CO 4				3					3				1	1	
CO 5	2			3					3				1		

Paper Name: Basic Electronics Engineering Lab

Paper Code: EC291

Total Contact Hours: 36

Credit:2

Course Outcomes:

Upon successful completion of this course, the student will be able to:

CO1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.

CO 2: Analyze the characteristics of Junction Diode, Zener Diode, BJT & amp; FET and different types of rectifier Circuits.

CO 3: Determination of input-off set voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

CO 4:Able to know the application of Diode, BJT & OPAMP.

CO 5:Familiarization and basic knowledge of Integrated Circuits

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3				3		3	1	3	1	
CO2	3	3	2	1	3				3		1	2	3	1	
CO3	3	2	2	2	1				3		1	1	1	2	
CO4	2	2	1	2	3				3			1	3	2	
CO5	3	1	2	2	3				3			1	3	1	

Paper Name: Workshop Practice

Paper Code: ME292

Total Contact Hours: 36

Credit:2

Course Outcome:

Upon successful completion of this course, the student will be able to:

CO 1 Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

CO 2 Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisel set can performing Operations like such as Marking, Cutting etc used in manufacturing processes.

CO 3 Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.

CO 4 Get hands on practice of in Welding and various machining processes which give A lot of confidence to manufacture physical prototypes in project works.

CO –PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	1	2	-	1	-	2	3	-
CO2	3	-	-	-	-	-	-	2	2	-	-	-	-	3	-
CO3	2	-	-	-	-	-	-	1	2	-	-	-	-	2	-
CO4	3	-	-	-	1	-	-	3	2	-	-	2	2	2	-

SEMESTER III

Paper Name: Mathematics III
Paper Code: M301
Contact: 44
Credit:4

Course Outcome:
On successful completion of the learning sessions of the course, the learner will be able to:

CO 1: Recall the underlying principle and properties of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, partial differential equation and ordinary differential equation.

CO 2: Exemplify the variables, functions, probability distribution and differential equations and find their distinctive measures using the underlying concept of Fourier series, Fourier transform, Probability distribution of a random variable, Calculus of complex variable, partial differential equation and ordinary differential equation.

CO 3: Apply Cauchys integral theorem and the residue theorem to find the value of complex integration, and compute the probability of real world uncertain phenomena by identifying probability
distribution that fits the phenomena.

CO 4: Solve partial differential equation using method of separation of variables and ordinary differential Equation using techniques of series solution and special function (Legendre's and Bessel's).

CO 5: Find the Fourier series and Fourier transform of functions by organizing understandings of
underlying principles and also evaluate the integral using Parseval's identity.

CO –PO-PSO Mapping

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

Paper Name: Numerical Methods

Paper Code: M(CS) 301

Contact:32
Credit:3

Course Outcome:
On successful completion of the learning sessions of the course , the learner will be able to:

CO1: Recall the distinctive principles of numerical analysis and the associated error measures.

CO2: Understand the theoretical workings of numerical techniques.

CO3: Apply numerical methods used to obtain approximate solutions to intractable mathematical problems such as interpolation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

CO4: Select appropriate numerical methods to apply to various types of problems in engineering and science inconsideration of the mathematical operations involved, accuracy requirements, and available computational resources.

CO –PO-PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO1**	**PSO 2**	**PSO3**
CO1	**3**	**2**	**1**										**2**		
CO2	**3**	**3**	**2**	**1**								**2**			
CO3	**3**	**2**	**3**	**2**								**2**	**1**	**2**	
CO4	**2**	**3**	**2**	**2**								**1**	**2**	**1**	**2**

Paper Name: Solid State Devices

Paper Code: EC301

Contact: 3P

Credits:3

Lectures:40

Course Outcome:

On successful completion of the learning sessions of the course , the learner will be able to:

CO1: Able to describe the Energy band diagram, charge carrier transport phenomenon and recombination-generation process of different types of semiconductor materials.

CO2: Able to study the Characteristics & Current flow of semiconductor devices like BJT, JFET, MOSFET, MESFET, HEMT & Metal-Semiconductor Junction & Hetero Junction Devices.

CO3: Able to analyze the design parameters of MOSFET i.e- Channel length & width, depletion width, surface field and potential, ON resistance, trans conductance, equivalent circuits, amplification factors, capacitances, noise margins, scaling & short channel effects MOSFET.

CO4: Able to Illustrate rectifying properties of different types of junction diode, Importance of reverse current in optical detectors, photodiodes, solar cells, Tunnel diode, LED & Thyristors.

CO –PO-PSO Mapping

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	3	3		-	-	2	-	-	-	-	3	3	2	
CO2	3	3	3	3	-	2	-			-	2	3	3	2	
CO3	3	3	3	3		-	-	2		2		3	3	3	
CO4	3	3	3		2	-	-		3		-	3	3	2	

Paper Name: Circuit Theory & Networks

Paper Code: EC302

Contact :(3L+1T)/Week (Total=42)

Credit:4

Course Outcomes

On successful completion of the learning sessions of the course , the learner will be able to:

CO1: Anayse series and parallel resonance circuit based on parameters : resonance frequency , band-width , upper & lower cut-off frequency, quality factor and impedance

CO2: Determine current, voltage and power at different branch for DC and AC circuit using various networks theorems and methods

CO3: solve branch current and branch voltage with

CO4:Apply Laplace Transform technique for the determination of current, voltage and power in a magnetically coupled and transient circuit

CO5: estimate parameters of two port network

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	1	2	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	1	2	-	-	-	-	-	-	-	3	2	-
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	2	-
CO5	3	3	3	2	2	-	-	-	-	-	-	-	3	1	-

Paper Name: Data Structures

Paper Code: CS(ECE) 301

Contact: 3

Credit Point: 3

No. of Lectures: 36

Course Outcome

On completion of the course students will be able to

CO1: Understand the Big-O notation and apply arrays and linked list to represent the row major, column major and sparse matrix.

CO 2: Interpret stack and queue to classify the infix to postfix and prefix notations.

CO3: Design binary search tree, threaded binary tree, max & min heap, AVL tree and greedy algorithm to represent and access the data from memory.

CO 4 : Evaluate data using BFS , DFS . Prim's and Kruskal's Algorithm

CO5: Able to apply searching and sorting on the data using Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort, Radix sort, Sequential search, Binary search and Interpolation Search.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	1						3	3	3	3
CO2	2	2	3	2	3							3	3	2	3
CO3	2	3	2	2	2							3	3	3	2
CO4	3	2	2	2	3							3	3	2	2
CO5	2	2	2	2	1	1						3	3	3	3

Paper Name: Numerical Methods Lab

Paper Code: M(CS) 391

Contacts : 3

Credits : 2

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Recall the distinctive principles of numerical analysis and the associated error measures.

CO2: Understand the theoretical workings of numerical techniques.

CO3: Apply numerical methods used to obtain approximate solutions to intractable mathematical problems such as interpolation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

CO4: Select appropriate numerical methods to apply to various types of problems in engineering and science inconsideration of the mathematical operations involved, accuracy requirements, and available computational resources.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3					2			1	1		
CO2	3	2	2						2			1	1		
CO3	3	2	2						2			2		2	
CO4	3	3	2						2			1	3	1	2

Paper Name: Circuit Theory and Networks Lab

Paper Code: EC392

Contact: 3P/Week

Credit: 2

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Students able to analyse series parallel resonance circuit and transient response in RC, RL and RLC circuit using MATLAB tools

CO2: Students able to validate networks theorems

CO3 : Students able to test the effect of inductance on speed of system

CO4: Students able to determine two port parameters, Laplace transform of different time domain functions and partial fraction expansion in s domain

CO5: Students able to originate periodic, exponential, sinusoidal, damped sinusoidal, step, impulse, and ramp signals using MATLAB

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3				2			3	3		
CO2	3	3	2	2	3	1			2			3	1		
CO3	3	3	3	2	3				2			3	3	2	
CO4	3	3	3	3	3	1			2			3	3	1	
CO5	3	3	3	3	3				2			3	1	1	

Paper Name: Data Structures Lab

Paper Code: CS(ECE) 391

Contact : 3

Credit : 2

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

CO1: Apply single and double linked list to represent data.

CO2: Apply stack and queue to analyse infix and postfix notation. CO3: Create binary search tree to represent data for manipulation.

CO4: Realize the insertion, merge, quick, selection sort to implement sorting technique to analyse data sequence.

CO5: Apply the linear and binary search on a sequence to find the location of a data.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	1	3	3								3	3	2	1
CO2	3	2	3	1									1		2
CO3	1	3	3	2								3	1	2	3
CO4	2	1	3	1									1		1
CO5	3	3	3	3									2		2

Paper Name: Physics –II

Paper Code: PH (ECE) 401

Total Contact Hours: 33

Credit: 3

Course Outcome

On successful completion of the course the students will be able to

CO1: Understand basic laws of electromagnetism using vector calculus.

CO2: Apply Schrodinger equation to solve quantum mechanical problems.

CO3: Explain the behavior of electromagnetic waves.

CO4: Able to discriminate between different statistics.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1										1	3	2	
CO2	3	2										2	3	3	
CO3	2	3										1	3	1	
CO4	1	2	2	3								1	3	3	

Paper Name: Signals & Systems

Paper Code: EC401

Contacts:3L

Credits:3

Total Contact:35

Course Outcome:

On successful completion of the course the students will be able to

CO 1: Identify the classification of signals in terms of periodic-aperiodic, even – odd, energy-power, Deterministic-random, complex exponential, sinusoidal signals, unit impulse and unit step.

CO2: Determine the mathematical operation on signals and systems using time scaling, time shifting, linearity, causality, time invariance, stability, convolution theorem and Fourier series coefficient with Dirichlet's conditions.

CO3: Discriminate different spectrum analysis techniques and its analysis and characteristics on LTI system using Fourier transform.

CO4: Analyze the Z-transform with the help of properties of ROC, Poles and Zeros , inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion.

CO5: Understand the application of sampling theorem, types of sampling, reconstruction of a signal from its samples, aliasing effect and the effect of random variable with its properties like distribution & density functions, mean values & moments, concepts of correlation, random processes.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	2	3	2	-
CO2	3	3	2	1	-	-	-	-	-	-	-	2	3	2	-
CO3	3	3	2		-	-	-	-	-	-	-	2	3	2	-
CO4	3	3	2	1	-	-	-	-	-	-	-	2	3	2	-
CO5	3	3	2	1	-	-	-	-	1	-	-	2	3	1	-

Paper Name: Analog Electronic Circuits

Paper Code: EC402

Contact: L+1T

Credit:4

Course Outcome:

On successful completion of the course the students will be able to

CO1: Understand D.C power supplies.

CO2: Define and Understand transistor amplifier circuit.

CO3: Examine the effects of different feedback mechanism in amplifier circuit.

CO4: Analyze signal generator Circuit.

CO5: Analyze and evaluate power amplifier circuit.

CO6: Review linear and non linear applications of OPAMP(I.C-741).

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2		2		3			3	3	2	
CO2	3	3	3	3	2	2	2		3			3	3	2	
CO3	3	3	3	3	2		2		3	2		3	3	2	
CO4	3	3	3	3	2		2		3			3	3	2	
CO5	2	3	3	3	2		2		3			3	3	1	
CO6	3	3	3		2								3	2	

Paper Name: Digital Electronic & Circuits

Paper Code: EC403:

Contacts:3l+1t=4

Credits:4

Lectures: 40hours

Course Outcome:

On successful completion of the course the students will be able to:

CO1: Understand how to solve problems related to number systems conversions and Boolean algebra and outlining logic circuits using logic gates to their simplest forms using De Morgan's Theorems; Karnaugh Maps.

CO2: Implement of combinational circuits

CO3:Apply State Diagrams Tables in various synchronous and asynchronous sequential circuits

CO4: Analyze EDAC ADC technique and corresponding circuits

CO5: Solve logic family interfaces, switching circuits memory storage devices for planning and executing projects.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	3	1	2			1	1		2	3	1	
CO2	3	3	1	3	1	2			1	1		1	3	2	
CO3	3	3	1	3	1	2			1	1		2	3	3	
CO4	3	3	1	3	1	2			1	1		1	3	2	
CO5	3	3	1	3	1	2			1	1		2	3	2	

Paper Name: Analog Communication
Paper Code: EC404
Total Contact Hours: 40
Credit:4

Course Outcome :

On successful completion of the course the students will be able to:

CO.1 Able to understand the generation of amplitude modulation and its representation in time and frequency domain.
CO.2 Able to evaluate the effect of DSB-SC, SSB and VSB in terms of modulation index and bandwidth efficiency.
CO.3 Able to apply the demodulation techniques of amplitude modulated signal.
CO.4 Able to remember the generation and detection of frequency modulation techniques.
CO.5 Able to analyse the noise performance of AM and FM signals.
CO.6 Able to create the performance of PAM, PWM and PPM Techniques

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3			1						3	3	2	
CO2	3	3		3		2						3	3	2	
CO3	3	3	3	3		2						3	2	2	
CO4	3	3	3	2								3	3	2	
CO5	3	3		3		2						2	3	1	
CO6	3	3	3			2						3	3	2	

Paper Name: Physics–II

Lab Paper Code: PH (ECE) 491

Total Contact Hours: 33

Credit:2

Course Outcome

On successful completion of the course the students will be able to:

CO1:Able to understand the motion of electrons in crossed electric and magnetic field.

CO2:Able to explain the photoelectric effect.

CO3: Able to demonstrate the Hall effect in conductors and semi-conductors.

CO4:Able to measure the band gap for semiconductors.

CO –PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	**2**											**1**	**2**	**1**	
CO2	**2**	**1**		**3**									**2**	**2**	
CO3			**2**									**1**	**2**	**1**	
CO4									**3**				**1**	**2**	

Paper Name: Analog Electronic Circuits Lab

Paper Code: EC492

Course Outcome:

On successful completion of the course the students will be able to:

CO1: Students will be able to construct hal-fwave , full-wave and bridge rectifier circuits and voltage regulator circuit.

CO2: Students will be able to design transistor based single stage R-C coupled voltage amplifier, differential amplifier and different classes of power amplifier circuit with given specification.

CO3: Students will be able to design transistor based RC oscillator (Wien bridge and RC phase shift oscillator) circuit.

CO4: Students will be able to construct a stable and mono-stable mode timer circuit using IC 555.

CO5: Students will be able to design Integrator, differentiator and low pass & high pass active filter circuit using Op-Amp (I.C-741)

CO –PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2		2		3	-		2	3	3	
CO2	3	3	3	3	2		2	-	3	2		2	2	2	
CO3	3	3	3	3	2		2	-	3	-		3	2	3	
CO4	3	3	3	3	2		2	-	3	-		3	2	2	
CO5	3	3	3	3	2		2	-	3	-		3	1	1	

Paper Name: Digital Electronic & Circuits Laboratory

Paper Code : EC493

Contacts: 3P

Credits: 2

Course Outcome:

On successful completion of the course the students will be able to:

CO1: Gain knowledge the fundamental concepts and techniques used in digital electronics.

CO2: Understand and examine the structure of various number systems, De-Morgan's law, Boolean algebra and its application in digital design.

CO3: Apply the timing properties (input setup and hold times, minimum clock period, output propagation delays) and design various combinational and sequential circuits using various metrics : switching speed, throughput /latency, gate count and area, energy dissipation and power.

CO4: Understand different digital circuits using Programmable Logic Devices.

CO5: Analyze how to interface digital circuits with ADC &DAC.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1			2	2					3	2	
CO2	3	3	3	1			2		2				3	2	
CO3	3	3	3	3			2	2					3	2	
CO4	3	3	3	3			2	2					3	2	
CO5	3	3	3	3			2	2	2				3	1	

Paper Name: Technical report writing & language practice

Paper Code: HU481

Contact Hours/Week (P): 2

Credit: 2

Course Outcomes:

By the end of the course the student should be able to

CO1: Understand and make use of a wide taxonomy of listening skills & sub-skills forcomprehending & interpreting data in English

CO2: Speak in English, using appropriate vocabulary and pronunciation in contextualizedsituations

CO3: Understand and put into effective practice the pragmatics of Group Discussion

CO4: Understand and write a detailed technical report as per organizational needs

CO5: Understand and interact in professional presentations and interviews

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2					2	3						
CO2		2							3			2			
CO3			2					2	3		3				
CO4		2						2	3		2				
CO5			3					2	3		2	2			

Paper Name: Analog Communication

Lab Paper Code: EC 494

Total Contact Hours: 30

Credit:2

Course outcome:

After successful completion of this course, students should be able to:

CO1 Analyze the effect in terms of power efficiency and modulation index of DSB-WC,DSB-SC,SSB modulation techniques.

CO2 Evaluate the performance in terms of BW of the demodulated signals.

CO3 Remember the power and bandwidth efficiency of FM signal.

CO4 Create the PLL using VCO to measure the capture and locking range.

CO5 Understand selectivity, sensitivity and fidelity of a superhetrodyne receiver.

CO6 Apply modulation And Demodulation Of PAM, PWM technique.

CO –PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		1				2			3	3	2	
CO2	3	3		3	3		2				2	3	3	2	
CO3	3	3	3	3	2				2			3	3	2	
CO4	3	3	3	3	3		2				2	3	3	2	
CO5	3	3		3	3							3	3	1	
CO6	3	3	3				2	2	2			3			

SEMESTER V

Paper Name: Environmental SciencE

Paper Code: HU 501

Contact: 24

Credit: 2

Course Outcome(s)

After successful completion of this course, students should be able to:

CO1: understand the natural environment and its relationships with human activities.

CO2: apply the fundamental knowledge of science and engineering to assess environmental and health risk.

CO3: To develop guidelines and procedures for health and safety issues, obeying the environmental laws and regulations.

CO4: Acquire skills for scientific problem-solving related to air, water, noise & amp; land pollution.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1					3	3					3	1		
CO2						3					2				
CO3								2		2		3			
CO4									2						
CO5															

Paper Name: Digital Communication Systems

Paper Code: EC501

Contact hour: 2L+2

Total contact hour-40

Credits: 3

Course outcome:

On completion of the course students will be able to:

CO1: Able to apply the knowledge of probability and statistical calculations on random signal analysis.

CO2: Able to analyze signal vector representation of various digitally modulated signals by creating signal constellation

CO3: Able to remember the concepts of sampling pulse Modulation techniques and their comparison and demonstrate the effects of ISI and compare Eye pattern analysis

CO 4: Able to understand various types of coherent and non-coherent digital modulation techniques, analyze immunity parameters and calculate their error probabilities

CO5: Able to evaluate various digital communication techniques, can compute the bit-error performance and compare their advantages and limitations.

CO-PO-PSO Mapping:

	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	PSO 3
CO 1	3	3	3		1	1							3	2	
CO 2	3			3	3		2						3	2	
CO 3	3	3	3	3	2	2							3	2	
CO 4	3			2	3		2						3	2	
CO 5	3	2	3	3	2	2							3	1	

Paper Name: Digital Communication Systems Lab

Paper Code: EC591

Contact: 3P

Credits: 2

Course Outcome:

On completion of the course students will be able to

CO1: Analyse the concept of digital communication techniques and their applications.

CO2: Understand to the practical methods of the use of generating communication signals.

CO3: Evaluate practical methods of the use of demodulation communication signals.

CO4: Create the significance of signal constellation and spectral width and evelop insight into the relations between the input and output signals in various stages of a transmitter and a receiver.

CO5: Evaluate in sight into the relations between the input and output signals in various stages of a transmitter and a receiver.

CO6: Understand distinguish between contemporary digital communication techniques.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	1	1				1	3	3	3	
CO2	3	3	3	1	3	1	1				1	3	3	2	
CO3	3	3	3	3	3	2	2				2	3	3	1	
CO4	3	3	3	3	3	2	2				1	3	2	3	
CO5	3	3	3	3	3	1	2				2	3	1	2	

Paper Name: Microprocessor and Microcontroller

Paper Code: EC502

Contact: 3P

Credits: 3

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Understand the architecture, instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085

CO2: Understand the 8086 microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts

CO3: Learn 8051 microcontroller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts

CO4: Apply instructions for assembly language programs of 8085, 8086 and 8051

CO5: Analyze peripheral interfacing model using IC 8255, 8253, 8251 with IC8085, 8086 and 8051

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	1	1				1	3	3	3	
CO2	3	3	3	1	3	1	1				1	3	3	2	
CO3	3	3	3	3	3	2	2				2	3	3	1	
CO4	3	3	3	3	3	2	2				1	3	2	3	
CO5	3	3	3	3	3	1	2				2	3	1	2	

Paper Name : Digital Signal Processing

Paper Code: EC503

Contacts: 3L

Credits: 3

Total Contact: 35

Course Outcomes:

After successful completion of this course, students should be able to:

CO1 Able to Understand and define discrete time systems in frequency domain and their region of convergence using Z-Transforms.

CO2 Able to Define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.

CO3 Able to Analyze discrete time signals and systems in frequency domain.

CO4 Able to Examine the digital signal processing, sampling and aliasing.

CO5 Able to Build digital filters.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	2	1		2	2	3	3	2	2
CO2	3	2	2	1	2	1	1	2		1	2	3	3	2	2
CO3	3	2	1	3	-	3	-	-	2	-	-	3	3	2	2
CO4	2	2		1	-	2	2	1	-	2	2	1	3	2	1
CO5	2	3	3	-	3	3	-	1	3	-	-	2	3	1	1

Paper Name: POWER ELECTRONICS

Paper Code: EC504A

Contacts: 3L

Credits: 3

Total: 34 hrs

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: Articulate the basics of power electronic devices and the characteristics of SCR, BJT, MOSFET and IGBT.

CO 2: Express the design and control of rectifiers, inverters.

CO 3: Design of power electronic converters in power control applications

CO 4: express communication methods.

CO 5: design AC voltage controller and Cyclo Converter, Chopper circuits.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1				1		2	2	3	3	2	2
CO2	3		2	1	2		1				2	3		2	2
CO3	3	2	2	3		3			1			3	3		2
CO4	3	2				2	2	1		1	2	1	2	2	1
CO5	3	3	2		3	3		1	3			2	3	1	1

Paper Name: Electrical & Electronics Measurement

Paper Code: EC504B

Contact: 3P

Credits: 3

Lectures: 34

Course Outcomes (COs)

After successful completion of this course, students should be able to:

CO1: Able to explain the characteristics, construction and working principle analog instruments like: PMMC, MI, Electrodynamo meter type and Energy meter

CO2: Able to demonstrate the principle to measureresistance, capacitance, inductance with the help of Bridge balancing technique

CO3: Able to describe the construction and working principle of electronic instrument like: DSO, DMM, spectrum analyzer, distortion meter

CO4: Able to illustrate the functionality of sensor and transducer element

CO5: Able to demonstrate the principle of working of Telemetry System, Display device, Interface Standard , Data Acquisition system , Advanced Instruments Like OTDR,virtual instrument and PLC.

CO-PO-PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	-	-	-	1	1	1	2	2	3	2
CO2	3	2	1	2	1	-	-	-	1	2	1	2	2	2	2
CO3	3	3	3	2	3	-	-	-	1	2	2	3	2	2	2
CO4	3	3	3	3	3	2	2	2	2	2	1	3	3	3	1
CO5	3	2	2	2	3	2	2	2	3	2	3	3	2	3	2

Paper Name: Telecommunication Engineering

Paper Code: EC504C

Contact: 3P

Credits: 3

Lectures: 35

Course Outcome:

After completion of this course the students will be able to:

CO1: Identify all the elements of the telecommunication System.

CO2: Define and distinguish electromechanical, electronic, digital and analog switching systems.

CO3: Apply different parameters in designing telephone switches.

CO4: Alyze traffic engineering, transmission systems and telephone networks.

CO5: Evaluate Time Division Multiplexing Services, Broadband, IP telephony and Optical Network.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3								3	3	2	2
CO2	3	2	3	3									3	2	2
CO3	3	3	2									1	3	2	2
CO4	3	3	3	3								3	3	2	1
CO5	2	3	3	3								1	3	1	1

Paper Name: Digital Communication Systems Lab

Paper Code: EC591

Contact: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: Analyse the concept of digital communication techniques and their applications.

CO 2: Demonstrate to the practical methods of the use of generating communication signals.

CO 3: Evaluate practical methods of the use of demodulation communication signals.

CO 4: Distinguish the significance of signal constellation and spectral width.

CO 5: Develop insight into the relations between the input and output signals in various stages of a transmitter and a receiver.

CO 6: Clearly distinguish between contemporary digital communication techniques.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		1	1			2				3	2	
CO2	3			3	3		2		2				3	2	
CO3	3	3	3	3	2	2			2				3	2	
CO4	3			2	3		2		2				3	2	
CO5	3	2	3	3	2	2			2				3	1	

Paper Name: Microprocessor and Microcontroller Lab

Paper Code: EC592

Contact: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: Able to solve small assignments using the 8085 basic instruction sets and memory mapping through trainer kit and simulator.

CO 2:Able to write 8085 assembly language programs like Addition, Subtraction, Multiplication, Square, Complement, Lookup table, Copying a block of memory,Shifting, Packing and unpacking of BCD numbers, Ascending order, Descending order etc. using traine rkit.

CO 3: Able to validate the interfacing technique using 8255 trainer kit through subroutine calls and IN/OUT instructions like glowing LEDs accordingly, stepper motor rotation etc.

CO 4: Able to test fundamental of 8051 programs using the trainer kit.

CO-PO-PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	1	1	1	2		1	3	2	2	
CO2	3	3	3	3	2	1	1	1	2		2	3	2	2	
CO3	3	3	3	3	2	2	1	1	2		2	3	2	2	
CO4	3	3	2	2	2	1	1	1	2		2	3	2	2	
CO5	3	3	2	2	2	1	1	1	2		2	3	2	2	

Paper Name: Digital Signal Processing Lab

Paper Code: EC593

Contacts: 3L

Credits: 3

Total Contact: 35

Course Outcomes:

After successful completion of this course, students should be able to:

CO1: Able to compute the system output using convolution method with MATLAB Software package.

CO2: Able to verify the system characteristics.

CO3: Calculate DFT, FFT, IDFT using MATLAB.

CO4: Analyze Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR Butterworth.

CO5: Develop and Implement DSP algorithms in software using a Computer language such as C with TMS320C6713 floating point Processor.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	1	1	1		1		1		3	3	2	2
CO2	2	2	3	1	1			1				3	3	2	2
CO3	1	3		2	1			1			1	3	3	2	2
CO4	3	1	3	2	2	1	2	2	3	1	2	3	3	2	1
CO5	3	1	3	3	2	1	2	2	3	1	2	3	3	1	1

Paper Name: Mini Project-I

Paper Code: EC 581

Contact hour: 4P

Total contact hour- 40

Credits: 2

Course outcome:

After successful completion of this course, students should be able to:

CO.1: Understand the knowledge acquired through survey of recent research to set the project goal.

CO.2: Understand the way of implementation of prototype

CO 3: Analyze the fault issue through various case study

CO.4: Create the prototype using modern tools

CO.5: Evaluate the project design by presenting the idea in conference/ workshop/ seminaretc.

CO.6: Create the project design for the benefit to societal issues

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	1	3	3	1	1		3	2	2	
CO2	3	3	3	3	3						2	3	2	1	2
CO3	2		3	3	2	2	3	3	2	2		3	2	1	
CO4	1	3	3	2	3		3	3			2	3	3	3	2
CO5	3		2	3	3	2			2	2		3		2	
CO6	3	3	3	2		2	3	3	2	2		3	3	3	2

SEMESTER VI

Paper Name: EM Wave Propagation & Antenna

Paper Code: EC601

Contacts: 3L

Credits: 3

Total Contact: 33

Course Outcome:

After successful completion of this course, tudents should be able to do:

CO1: Acquired knowledge of transmission lines which play an important role in high-speed digital design and signal integrity of PCBs

CO2: Understanding the fundamentals of antenna theory.

CO3: Applying and analyzing different types of antennas and the radiation mechanism.

CO4: Analyzing and experimenting the atmospheric and terrestrial effects on radiowave propagation.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2							1	2	3	1	
CO2	3	3	3	2							2	1	3	2	
CO3	3	2	3	2							2	2	3	3	
CO4	2	2	3	3							2	1	3	2	

Subject Name: Information Theory & Coding

Subject Code: EC602

Contact hour: 2L+2T

Total contact hour-40

Credits: 3

Course outcome:

After successful completion of this course, students should be able to:

CO 1: Remember the concepts of information, mutual in formation and entropy and various source coding techniques.

CO 2: Understand the need for error control techniques in a digital communication system channel models, channel capacity and channel coding techniques.

CO 3: Apply linear algebra, concept of Galois field, conjugate roots, minimal polynomial in channel coding techniques for error control.

CO 4: Analyse different error control codes like linear block codes, cyclic codes, BCH codes, and perform error detection and correction.

CO 5: Design the circuit for different error control coding techniques.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1							1	3	3	2	2
CO2	3	3	3	1							1	3	3	2	2
CO3	3	3	3	3							2	3	3	2	2
CO4	3	3	3	3							1	3	3	2	1
CO5	3	3	3	3							2	3	3	1	1

Paper Name: Control Systems

Paper Code: EC603

Contacts: 3L

Credits: 3

Total Contact: 36

Course Outcome

On completion of the course students will be able to

CO 1: Understand open loop, closed loop control system and system modeling.

CO 2: Analyze time responses of different systems.

CO 3: Evaluate the importance of gain, location of poles and zeros.

CO 4: Examine the absolute and relative stability of different systems.

CO 5: Design different controllers, compensators to meet the desired specifications

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2						1	1		1	3	2	2
CO2	3	2	2						2	1		1	3	2	2
CO3	3	2	1	2	1	1			2	1			3	2	2
CO4	3	1			1	1			2	1		1	3	2	1
CO5	1	1	3	2	1	1	1	1	2	1	1	1	3	1	1

Paper Name: Object Oriented Programming using Java

Paper Code: EC604A

Total Contact Hours: 40

Credit: 3

Course Outcomes:

After completion of this course students will be able to

CO 1: Understand the key concepts of object oriented programming and have an ability to design OOprograms and appreciate the techniques of good design;

CO 2: Understand advanced features of Java.

CO 3: Analyze complex programming problems and optimize the solutions.

CO 4: Apply an understanding of ethical principles to problems which commonly arise in the Information Technology Industry.

CO–PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	-	-	3	3	2	2
CO2	3	3	3	3	2	-	-	-	-	-	2	3	3	2	2
CO3	3	3	3	3	2	-	-	-	-	-	-	3	3	2	2
CO4	3	3	3	3	2	-	-	-	-	-	-	3	3	2	1
CO5	2	3	3	3	2	-	-	-	-	-	-	3	3	1	1

Paper Name: Advanced Microcontroller and Embedded system

Paper Code: EC604B

Contacts: 3L

Credits: 3

Total Contact: 36

Course outcome:

After completion of this course students will be able to

CO1: Analyze the performance of PIC microcontroller.

CO2: Design the systems based on ARM controllers.

CO3: Develop the systems based on ARM controllers

CO4: An ability to use the techniques, skills, and modern engineering tools in embedded system.

CO–PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2		2		2	1		3	3	2	2
CO2	3	3	1	3	2	2	2		2		2	3	3	2	2
CO3	3	2	2	3	2		2		2	2		3	3	2	2
CO4	3	3	2	2	2		2	2	1		1	3	3	2	1

Paper Name: Optical Fiber Communication

Paper Code: EC604C

Contacts: 3L

Credits: 3

Total contact: 35L

Course Outcome

After successful completion of this course, students should be able to:

CO1: Recognize and classify the structures of Optical fiber and types.

CO2: Discuss the channel impairments like losses and dispersion.

CO3: Classify the Optical sources and detectors and to discuss their principle.

CO4: Familiar with Design considerations of fiber optic systems. To define the Wavelength Division Multiplexing.(WDM) principles and concepts.To perform characteristics of optical fiber, sources and detectors

CO5: To analyse optical fibre measurement systems

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	-	-	-	-	3	2	2
CO2	3	2	3	1	2	-	-	-	-	-	-	1	3	2	2
CO3	3	3	2	1	1	-	-	1	-	1	-	-	3	2	2
CO4	3	3	2	1	2	1	1	-	1	-	1	-	3	2	1
CO5	3	2	3	1	2	1	-	1	-	1	2	1	3	1	1

Paper Name: Engineering for System Analysis and Design

Paper Code: EC605A

Contacts: 3:0:0

Credit: 3

Total contact: 34

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: Understand the principles and tools of systems analysis and design and Understand the professional & ethical responsibilities of practicing the computer professional including understanding the need for quality.

CO 2: Solve a wide range of problems related to the analysis, design and construction of information systems & analysis and design of systems of small sizes.

CO 3: Plan and undertake a major individual project, prepare and deliver coherent and structured verbal and written technical reports

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	1	-	1	-	-	3	2	2
CO2	3	2	3	1	2	-	-	1	-	-	1	1	3	2	2
CO3	3	3	2	1	1	-	-	2	-	1	1	-	3	2	2

Paper Name: Material Science & Engineering

Paper Code: EC605B

Contacts: 3L

Credits: 3

Total Contact: 36

Course Outcomes:

After the completion of this course, the student will be able to:

CO1: Understand the conducting, semiconducting, superconducting, dielectric, ferro-eleletric and piezoelectric behavior of materials

CO2: Differentiate between diamagnetic, paramagnetic, ferromagnetic, ferromagnetic, and anti-ferromagnetic behavior of materials

CO3: Synthesis and processing of semi-conducting materials for engineering applications

CO4: Study the effect of composition, structure and temperature on the properties of the materials.

CO5: Describe the interactions of light with materials and its effects at the interface

CO6: Understand the working principles of different Electronic Materials, Nanomaterials, solid state devices,

CO-PO-PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	-	2	-	2	2	2	2	3	3	2	2
CO2	2	2	2	1	2	2	-	2	2	1	2	2	3	2	2
CO3	3	3	-	3	2	2	1	2	1	1	2	3	3	2	2
CO4	2	2	1	1	-	3	1	3	1	1	1	1	3	2	1
CO5	3	2	-	1	-	-	1	1	1	2	2	1	3	1	1
CO6	2	3	3	-	3	2	2	3	2	2	3	2	1	2	2

Paper Name: Computer Communication and Networking

Paper Code: EC605C

Contacts: 3L

Credits: 3

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Remember various protocols used in data communication.

CO2: Understand networking structure in data communication.

CO3: Analyze and transmit data securely from one place to another.

CO4: Evaluate the advantages and challenges of modern technologies.

CO–PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2							3	3	2	2
CO2		2		3	3						2	3	3	2	2
CO3	2	3	2	0	2							3	2	2	2
CO4	3	3	3	3	2							3	3	2	1

Paper Name: EM Wave Propagation Antenna Lab

Paper Code: EC691

Contacts: 3P

Credits: 2

Course Outcome:

After Successful Completion of Discourse, students should be able to:

CO1: Able to understand the theory of transmission lines which EM waves propagate.

CO2: Able to analyze the fundamentals of antenna theory.

CO3: Able to evaluate the different types of antennas and the radiation mechanism.

CO4: Able to examine and identify the different signals in hardware setup.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1	1		1		1	2			3	2	
CO2	3	2	1	1	1				1	2		2	3	2	
CO3	3	1	1	1	1		1	2	1	2		1	3	2	
CO4	3	1	1	1	1		1	2	1	2		1	3	2	

Paper Name: Control System Lab

Paper Code: EC693

Contact: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Able to apply Laplace transform, transfer functions and state variable to analyze different types of electrical, mechanical electromechanical systems.

CO2: Determine Transient and Steady State behavior of different types of systems using standard test signals.

CO3: Able to determine the importance of gain, location of poles and zeros to design a system.

CO4: Able to check the absolute and relative stability of the systems using the concept ofdifferent stability criterion.

CO5: Gain experience using modern software tools to design the systems according to the desired specifications or requirements using different types of controller and compensator.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2						1	1		1	3	2	2
CO2	3	2	2						2	1		1	3	2	2
CO3	3	2	1	2	1	1			2	1			3	2	2
CO4	3	1			1	1			2	1		1	3	2	1
CO5	1	1	3	2	1	1			2	1		1	3	1	1

Paper Name: Object Oriented Programming Lab

Paper Code: EC694A

Total Contact Hours: 30

Credit: 2

Course Outcomes:

After the completion of the course students will be able to

CO 1: Define object oriented programming concepts in designing programs

CO 2: Understand different dimensions of a problem and provide optimal solutions.

CO 3: Apply the advance features of JAVA in designing of projects

CO 4: Analyze exception handling, multithreading, SWING applications.

CO–PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		1	1			3			2	3	2	2
CO2	2	3	2		3	1			3				3	2	2
CO3	3	3	2		3	2			3	2			3	2	2
CO4	2	3	1		2	3		2	3				3	2	1

Paper Name: Optical Fiber Communication Laboratory

Paper Code: EC694C

Credits: 2

Total contact hour: 30

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Basic knowledge about the input output characteristics

CO2: Able to define and analyse the attenuation constant, bending loss

CO3: Able to define, analyze and draw V-I characteristics of optical fiber

CO4: Able to define, analyze and draw P-I characteristics of optical fiber

.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	2	-	-	2	-	-	-	-	3	-	-	3	2	2
CO2	3	2	2	-	-	2	-	-	2	-	3	-	3	2	2
CO3	3	2	2	1	-	-	2	2	-	-	3	-	3	2	1
CO4	2	2	2	-	-	-	-	-	-	3	3	1	3	1	1

SEMESTER VII

Paper Name: RF & Microwave Engineering
Paper Code: EC701
Contact: 3L
Credits: 3
Lectures: 34

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Understand the Microwave Frequency range and their application.

CO 2: Develop fundamental understanding of the Two–port RF network and matching techniques.

CO3: Learn the Scattering matrix for microwave passive components.

CO 4: Understand the Microwave tubes and devices along with their fundamental principle of operation.

CO5: Learn the microwave measurements techniques.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1							2	1	3	2	
CO2	3	3	2	1	2				3		2	2	3	2	
CO3	2	2	1	3								2	3	2	
CO4	2	2		1							2	1	3	2	
CO5	3	3	3		3							2	3	1	

Paper Name: Principles of Management

Paper Code: HU705

Credits: 2

Total Contact Hours: 24

Course Outcomes:

After successful completion of this course, students should be able to:

CO1: To understand the managerial functions and will remember the basic knowledge on international aspect of management

CO2: To analyze the planning process in the organization

CO3: To understand and apply the concept of organization

CO4: Demonstrate the ability to directing, leadership and communicate effectively

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			1	1	1						2	1	2	2	
CO2			2	1	2						2	2	2	2	
CO3				1	1						1	2	2	2	
CO4				1							2	1	1	2	

Paper Name: VLSI & Microelectronics

Paper Code: EC702

Total Contact Hours: 45 (3L+1T/Week)

Credit: 4

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Able to describe scale of integration–SSI, MSI, LSI, VLSI, Moor's Law, scaling, short channel effect, VLSI design flow, FPGA architecture and construct gate level circuit with PAL & amp; PLA concept.

CO2: Able to analyze CMOS inverter voltage transfer characteristics with the parameters –VIL, VIH, VOL, VOH, Vth and based on the knowledge of digital circuit design methodology like–CMOS, Pass transistor, TG, DCVSL, dynamiclogic, NORA and construct schematic of combinational, sequential circuit, SRAM, DRAM cell using MOSFET

CO3: Able to apply the fundamental concept of MOSFET characteristics and model, able to calculate value of resistance of current source, MOS diode, current of current mirror circuit, voltage of references (voltage divider, threshold voltage and bandgap), emulate resistance of switch capacitor circuit, gain of switch capacitor integrator and 1st order switch capacitor filter.

CO4: Able to analyze MOS transistor model and calculate the value of parameters to design CMOS differential amplifier and two stage OP-AMP.

CO5: Able to describe fabrication steps of IC and construct stick diagram & amp; layout of CMOS inverter and basic gates based on lambda and micron design rules.

CO6: Able to calculate gate delay, dynamic power, short circuit power and leakage power and total power consumption across CMOS inverter circuit evaluate delay and power based on the derived expressions.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	1	2	1	1	1	3	2	1
CO2	3	3	3	3	1	-	-	1	2	1	1	3	3	2	1
CO3	3	3	3	2	1	-	-	1	2	1	1	3	3	2	1
CO4	3	3	3	1	1	-	-	1	2	1	1	3	3	2	1
CO5	3	3	3	1	1	-	-	1	2	1	1	3	3	2	1
CO6	3	3	3	2	1	-	-	1	2	1	1	2	3	2	1

Paper Name: Digital Image Processing

Paper Code: EC703A

Contact hour: 3P

Total contact hour: 35

Credits: 3

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: Define basic idea on digital image fundamentals and Importance of Digital Image Transform.

CO2: Understanding the importance of Digital Image enhancement in spatial and frequency domain and filtering techniques

CO3: Analyze the requirements and types of Image Compression and its standards.

CO4: Classify the basic concepts of Digital Image Restoration and Segmentation of Digital Images

CO 5: Explain Edge detection techniques and concepts on security in Digital Image Processing

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1			2	1		2	2	3	3	2	2
CO2	3	2	2	1	2	1	1	2		1	2	3	3	2	2
CO3	2	2	1	3		3			2			3	3	2	2
CO4	3	2		2		2	2	2		3	2	1	3	2	1
CO5	2	3	3		3	3		1	3			2	3	1	1

Paper Name: Computer Organization and Architecture

Paper Code: EC703B

Contact: 3L

Credits: 3

Course Outcome:

After successful completion of this course, students should be able to:

CO 1: The students will be able to know about basic of computer architecture, existing architectures and design related computing systems.

CO 2: The students will be able to design about basic of computer memory structures and RAM, ROM architecture.

CO 3: The students will be able to know about different CPU architecture & amp; Processor-memory communication technique.

CO 4: The students will be able to knowabout pipelining techniques and design related architectures.

CO 5: The students will be able to know about ILP, Super scaler, VLIW architectures.

CO 6: The students will be able to know the basic concepts of VHDL.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		2	2	1		1				3	3	2	2
CO2			3		2	1		1				3	3	2	2
CO3	3		2		1			1				3	3	2	1
CO4	3	3	2		1	1						3	3	1	1
CO5	3			2	1							3	2	2	2
CO6	3	2	2	1	3							3	1	2	3

Paper Name: Data Base Management System

Paper Code: EC703C

Contact: 3L

Credits: 3

Course Outcomes (COs)

After successful completion of this course, students should be able to:

CO 1: Apply the knowledge of Entity Relationship (E-R) diagram for an application.

CO 2: Create a normalized relational database model

CO 3: Analyze real world queries to generate reports from it.

CO 4: Determine whether the transaction satisfies the ACID properties.

CO 5: Create and maintain the database of an organization.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	3						3	3	2	2	2
CO2	2	3	3	3	3						3	3	2	2	2
CO3	3	3	2	3	3						3	3	2	2	2
CO4	3	3	2	2	2						2	3	2	1	2
CO5	3	3	3	3	3						3	3	2	3	2

Paper Name: Artificial Intelligence and Robotics

Paper Code: EC704A

Credits: 3

Total lecturers: 37

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Understanding Basic idea about AI

CO2: Analyzing Problem solving and searching AI Problems

CO3: Applying Neural network to solve AI problems

CO4: Understanding fundamental idea of Robots mechanics

CO5: Exemplifying Robot based sensors and assessing robot path planning

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2		2		3			3	3	2	2
CO2	3	3	3	3	2	2	2		3		2	3	3	2	2
CO3	3	2	3	2	2		2		3	2		3	1	2	2
CO4	3	3	3	3	2		2	2	3			3	3	2	1
CO5	2	3	2	3	2		2		3			3	3	1	1

Paper Name: Biomedical Electronics and Imaging

Paper Code: EC704B

Contacts: 3L

Credits: 3

Total Contact: 36

Course Outcome

After successful completion of this course, students should be able to:

CO.1: Explain Bioelectric signals, human physiological system and different types of transducers.

CO.2: Understand different types of medical measurement system.

CO.3: Able to understand deferent types of biomedical signal acquisition electrodes and different types of signal amplification techniques and able to design the amplifiers.

CO.4: Able to examine the data handling, filtering techniques of bio-medical signals and able to analysis of time and frequency domain.

CO.5: Able to understand medical imaging techniques and implement Different algorithms to feature extract the signals.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	3	2	-	2	1	-	-	1	1	-	1	3	2	2
CO2	3	2	2	-	-	-	-	-	2	1	-	1	3	2	2
CO3	3	2	1	2	1	1	-	-	2	1	-	-	1	2	1
CO4	3	1	-	-	1	1	-	-	2	1	-	1	3	1	1
CO5	1	1	3	2	1	1	-	-	2	1	-	1	2	2	2

Paper Name: Renewable Source & Applications

Paper Code: EC704C

Total Contact Hours: 42

Credit: 3

Course Outcomes:

After successful completion of this course, students should be able to:

CO1: Able to understand the importance of Renewable energy over conventional process

CO2: Able to explain different methods of Power generation from the Non- conventional sources like Solar, Wind Energy, Biomass, Geothermal energy, OTEC, Tidal energy, MHD Power generation schemes.

CO3: Able to illustrate the different techniques of grid integration of the power generated from renewable energy sources with the initiation of power electronic converters and drives.

CO4: Able to design different hybrid energy systems and energy storage systems

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	-		3	1	-	-	3	3	3	2	
CO2	3	1	2	2	-		3	-	-	-	2		2	3	
CO3	2	2	2	-	-		3	-	-	-	2		2	2	
CO4	2	2	2	-	-		3	-	-	-	2	3	2	2	

Paper Name: RF & Microwave Engineering Lab

Paper Code: EC791

Contact: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Able to define, identify and list out special type transmission line, its characteristics in microwave frequencies and concept of load tools

CO2: Able to recognize, memorize, categorize, arrange and implement suitably the various microwave passive devices with the utilization of engineering mathematics.

CO3: Able to analyse and use the various sources of microwave energy and the characters of its operation.

CO 4: Students Able to use, compute, solve, demonstrate and apply various hardware, software tools and measuring instruments in the field of Radio Frequencies, for the betterment of communication engineering, medical science andvarious domestic and commercial engineering. Expansion insdomain

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2		2		3			3	3	2	
CO2	3	3	3	3	2		2		3			3	3	2	
CO3	3	3	3	3	2		2		3			3	3	2	
CO4	3	3	3	3	2		2		3			3	3	2	

Paper Name: VLSI & Microelectronics Lab

Paper Code: EC 792

Contacts: 3P/Week

Credit: 2

Course Outcomes

After successful completion of this course, students should be able to:

CO1: Simulate VTC of CMOS inverter, measure V_{IL},$V_{IH,}$$V_{OL,}$$V_{OH}$ and calculate noise margin

CO2: Measure and analyze gate delay and average power consumption of CMOS inverter forV_{DD}≤1.2V and with the nano dimensional channel length of MOS transistor through transient analysis

CO3: Design combinational circuit - CMOS AND/ NAND, OR/NOR, XOR/XNOR gate , CMOS full adder circuit, sequential circuit-CMOS SR latch, clocked SR latch & D flip-flop at schematic level for functional verification with the help of SPICE tools.

CO4: Construct layout of CMOS inverter, CMOS NAND, CMOS NOR gate using layout design tools of SPICE based on design rules.

CO5: Design of combinational circuits - logic gates , Full adder using half adder, 4:1 MUX using 2:1 MUX, Sequential circuits- S-R Flip-Flop, 8 bit synchronous counter, 8 Bit bi- directional register with tri-stated input output using VHD Land4:1MUXusingFPGA

CO6: Design of CMOS differential amplifier with active load and biased with current mirror for given specification using SPICE tools at schematic level.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3			2	2		1	3	3	2	
CO2	3	3	3	3	3			2	2		1	3	3		1
CO3	3	2	3	3	3			2	2		1	3	3		1
CO4	3	3	3	3	3			2	2		1	3	3		
CO5	3	2	3	3	3			2	2	3	1	3	3	2	
CO6	3	3	3	3	3			2	2		1	3	3	2	

Subject Name: Digital Image Processing Lab

Subject Code: EC793A

Contact hour: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO.1: Build knowledge on Digital Imaging fundamentals and Digital Image Transform.

CO.2: Understanding Digital Image enhancement techniques in spatial and frequency domain

CO.3: Explaining the requirements and types of Image Compression and its standards.

CO.4: Demonstrate the Digital Image Restoration and Segmentation of Digital Images

CO.5: Build ideas on Edge detection techniques and concepts on Digital Image security

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	3	3	2	3	2	2	3	2	2	3	2	2
CO2	2	2	2	2	3	2	2	2	3	2	3	2	3	2	2
CO3	2	2	2	3	3	2	3	2	3	1	3		2	3	3
CO4	2	2		3	1		2	2	3	2	3		3	3	2
CO5	2	2		3	3	3	2	2	3	2	3	2	2	3	2

Subject Name: Computer Organization and Architecture Lab

Subject Code: EC793B

Contact: 3P

Credits: 2

Course Outcome:

After successful completion of this course, students should be able to:

CO1: The students will be able to design different digital circuits using HDL.

CO2: The students will be able to design different sub-systems of the computer using HDL.

CO3: The students will be able to design simple as well as complex CPU architecture.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	3	1	1	1	1	1	2	3	3	3	2
CO2	2	3	3	2	3	1	1	2	1	1	2	3	3	3	2
CO3	2	2	2	3	3	1	1	2	1	2	2	3	3	3	2

Subject Name: Database Management System Lab

Subject Code: EC793C

Contact: 3P

Credits: 2

Course Outcome(s)

On completion of the course students will be able to

CO 1: Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.

CO 2: Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases andbe aware of some advanced databases like partial multimedia and mobile databases.

CO 3: Differentiate between DBMS and ad vanced DBMS and use of advanced database concepts and become proficient in creating database queries.

CO 4: Analyze database system concepts and apply normalization to the database.

CO 5: Apply and create different transaction processing and concurrency control applications.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	3				2			3	2	2	1
CO2	2	3	3	3	3				2			3	2	2	2
CO3	3	3	2	3	3				2			3	3	2	2
CO4	3	3	2	2	2				2			3	2	1	3
CO5	3	3	3	3	3				2			3	3	2	2

SEMESTER VIII

Paper Name: Advanced Communication systems

Paper Code: EC801

Contact hour: 2L+2T

Total contact hour-45

Credits: 3

Course outcome:

After successful completion of this course, students should be able to:

CO1: Apply the knowledge of probability and statistical calculations to analyse the performance of a digital communication system.

CO2: Develop in sight on the various spreads pectrum techniques and their application.

CO3: Evaluate the various physical layer issues in the mobile and wireless communication systems

CO4: Understand the concepts of satellite communication systems

CO5: Analyse and design the satellite uplink and downlink and link budget

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3									3	3	3	
CO2	3	3	3	3							2	3	3	2	
CO3	3	3	3	3								3	2	2	
CO4	3	3	3	2							2	3	3	2	
CO5	3	3	3	3								3	3	1	

Paper Name: Economics for Engineers

Paper Code: HU801

Credit: 2

Contact Hours: 36

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.

CO2: Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.

CO3: Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.

CO4: Evaluate the profit of a firm, carry out the break even analysis and employ this tool to make production decision.

CO5: Discuss and solve advanced economic engineering analysis problems including taxation and inflation.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	1								3	1		1
CO2		1	1	1								3		1	
CO3											2	3			
CO4												1			
CO5												2			

Paper Name: Advanced Semiconductor Devices

Paper Code: EC802A

Total Contact Hours:

Credit: 3

Course Outcome:

After successful completion of this course, students should be able to:

CO1: To understand all the aspects of operation and design for modern semiconductor devices, highlighting traditional, nano scale and excitonic/organic device physics

CO2: To analyze the semiconductor physics and the development of devices, with an interest in how they have changed to accommodate novel materials: organic semiconductors, graphene and layered materials, and quantum dots.

CO3: To expand their understanding of fundamental principles of modern electronic devices, while gain in exposure to cutting edge technology.

CO4: To gain updated knowledge in the most advanced development of low dimensional semiconductor hetero structures and their applications.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1		1			3	2	3		3	2	2
CO2		3	2	2	3		1	3	3	2	3	3	3	2	2
CO3	3		3	1	3	3		3	3	2		3	3	2	1
CO4	2	2	3	2	3	3	1	3	3		3	3	3	1	1

Paper Name: Electromagnetic Interference and Compatibility (EMI/EMC)

Paper Code: EC802B

Contacts: 3L

Credits: 3

Total: 30

Course Outcome :

After successful completion of this course, students should be able to:

CO1: Understanding EMC problems.

CO2: Awareness of International EMC Standards for equipment design.

CO3: Analyze Conducted EMI Coupling and Designing electronic systems for EMC

CO4: Analyze Radiated EMI Coupling and Design for EMC

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1				2		2	2	3	3	3
CO2	3	3	3	3		1			2		1	2	3	3	3
CO3	3	3	3	3		1	1		2	1		2	3	3	3
CO4	3	3	3	3				1	2			2	3	3	3

Paper Name: Mobile Communication and Network

Paper Code: EC802C

Contacts: 3L

Credits: 3

Total Contact: 36

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Remember the evolution and history of wireless technology.

CO2: Understand the cellular concepts for mobile communication.

CO3: Understand radio signal propagation issues and different technological advancement mobile communication.

CO4: Analyze wireless and Radio channels and Compare 3G Cellular telephone data rates with those over Wireless LAN

CO5: Evaluate mobile IP allocation and function of the station roaming.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	3						1		2	3	2	
CO2	3	2	2		1	1	1			1			2	2	
CO3	2	2	3	3		1						2	2	2	
CO4	2	2		3		1	1					2	3	2	1
CO5	2	2	3		1	1						2	3	1	1

Paper Name: Software Engineering

Paper Code: EC803A

Contact Hours: 3L+ 1T

Credits: 4

Course outcome:

After successful completion of this course, students should be able to:

CO.1: Understand the structure and behavioral software system the UML class diagrams and state diagrams.

CO.2: Understand common life cycle processes including waterfall (linear), incremental approaches (such as Unified process), and agile approaches.

CO.3: Apply software testing and quality assurance techniques at the module level, and understand these techniques at the system and organization level.

CO.4: Work collaboratively in a small team environment to develop a moderate-sized software system from conceptualization to completion, including requirements elicitation, system modeling, system design, implementation, unit and system testing, integration, source code Management configuration management, and release management

CO.5: Prepare technical documentations and make presentations on various aspects of a software development project, including the technical aspects (architecture, design, quality assurance) as well as the managerial aspects (planning, scheduling, and delivery).

CO.6: Design a solution to a given problem using one or more design patterns and implement the design in a programming language.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	3	3	3		1	1						3	3	2	2
CO.2	3	3		3			2		L	2	2	3	3	2	2
CO.3	3	3	2	3	3	2				3	3	3	3	2	1
CO.4	3	3	1	2					2		2	3	3	1	1
CO.5	3	3		1	2		1			1	3	3	2	2	2
CO..6	3	3	3		2	2						3	2	2	2

Paper Name: Physical Design, Verification &Testing

Paper Code: EC803B

Contact Hours: 3L+1T

Credits: 4

Total: 30

Course Outcome :

After successful completion of this course, students should be able to:

CO1: Able to Design, Verification and Test a VLSI circuit pertaining to these three phases.

CO2: Aims to cover the important problems /algorithms /tools so that students get a comprehensive idea of the whole digital VLSI design flow.

CO3: able to understand High level Synthesis, Verilog RTL Design, Combinational and Sequential Synthesis Logic Synthesis (for large circuits) through VLSI Design.

CO4: Able to analyze Hardware Verification and methodologies, Binary Decision Diagrams (BDDs) and algorithms over BDDs through Verification Techniques.

CO5: Able to check Combinational equivalence checking, Temporal Logics, Modelling sequential systems and model checking, Symbolic model checking through Verification Techniques.

CO6: Able to locate Faultmodels, Fault Simulation, Test generation for combinational circuits, Test generation algorithms for sequential circuits and Built in Self test through VLSI Testing.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	3	3	3	3				2	2		2	2	3	2	2
CO.2	3	3	3	3			2		2	2	2	2	3	2	2
CO.3	3	3	3	3	1	2			2	3	3	2	3	2	1
CO.4	3	3	3	3			1		2		2	2	3	1	1
CO.5	3	3	3	3	2		1	2	2	1	3	2	2	2	2
CO..6	3	3	3	3	2	2			2			2	2	2	2

Paper Name: Soft Computing

Paper Code: EC803C

Contact Hours: 3L+1T

Credits: 4

Total Lecture: 38

Course Outcome:

After successful completion of this course, students should be able to:

CO1: Learn about soft computing techniques and their applications

CO2: Analyze various neural network architectures

CO3: Define the fuzzy systems

CO4: Understand the genetic algorithm concepts

CO5: Identifty asuitable soft computing technique to solve a problem

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							3	3	2	2
CO2	3	3	2	3	2	2					2	3	3	2	2
CO3	3	2	3	2	2							3	1	3	2
CO4	2	3	3	3	2			2				3	3	2	1
CO5	2	3	2	2	2							3	3	1	1

GURU NANAK INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Paper Name: Advanced Communication Lab

Paper Code: EC891

Contact hour: 3P

Course Outcome:

On completion of the course students will be able to

CO.1: Analyze the concept of Mobile, wireless and satellite communication techniques and their applications.

CO.2: Demonstrate practically the use of satellite communication, links etup and the frequencies used.

CO.3: Evaluate practically the modulation and demodulation techniques applied in communication signals.

CO.4: Analyze the performance of a communication system under the effect of noise and fading.

CO.5: Evaluate the various routing algorithms applied in the adhoc networks

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		1	3						1	3	2	
CO2	3	3	3	1	1	3					3	3	3	2	
CO3	3	3	2	1	1	3					3	1	3	2	
CO4	3	3	3	1	3	3						3	3	2	
CO5	3	3	2	2	1	3					2	3	3	1	

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