Vision of the Institution

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

Mission of the Institution

- To expand the frontiers of knowledge through Quality Education.
- To provide valued added Research and Development.
- To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional Behavior.

Vision of ECE Department

In pursuit of world class excellence in the field of Electronics& Communication Engineering by imparting quality education and promoting Research.

Mission of ECE Department

- To empower students with knowledge and competencies in the field of Electronics & Communication Engineering conforming to International standards.
- To produce creative solutions essential to local and global needs in the field of Electronics & Communication Engineering.
- To mould the students professionally with a consciousness of moral values and professional ethical code**.**

Program Educational Objectives (PEOs) of ECE Department

PEO1: To provide world class Education in the principles of engineering that incorporate open ended design experience and the use of software and hardware tools related to Electronics and Communication Engineering and hence improve the employability skills of the student.

PEO2: To make the students able to function with multi-disciplinary teams that will enhance the leadership qualities and to formulate and solve engineering problems as a team which helps the student to adopt better professional conduct.

PEO3: To provide learning environment that provides open interaction for the students with faculty and staff that makes them innovative and dynamic and encourages research and motivate them to solve the problems of the society.

Program Outcomes (POs) of ECE Department

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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.
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.
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.
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.
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.
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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.

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.
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 Outcomes (PSOs) of ECE Department

1. Will be equipped with knowledge of innovative, dynamic complete design flow specialized in implementation of projects pertaining to communication system, signal processing, digital and analog IC design, embedded systems and will integrate all areas to illustrate the goal of digital India.
2. Will have the ability to analyze, design electronics and communication applications using software tools like, pSpice, XYLINX, MATLAB, Mentor Graphics and other related software's.
3. Can demonstrate the principles of semiconductor devices, digital system, Microprocessor and microcontrollers, signal processing, antenna design in fields of consumer electronics, medical, defence and spacecraft electronics industry.
4. Will have strong ethical moral values and sound fundamental foundation of technical knowledge in all core subjects which help them to explore scientific theories, ideas, methods and technologies that help in solving current and future universal societal problems through Assistive Technology Laboratory as a flat form.

III SEMESTER						
S. No	**Course Name**	**L**	**P**	**C**	**I**	**E**
1.	**Program Specific Elective V**					
	DSP Processors and Architectures	3	-	3	40	60
	EMI / EMC					
	CMOS Analog & Digital IC Design					
2.	**Open Elective**					
	Reliability Engineering	3	-	3	40	60
	MEMS and its Applications					
	Real Time Operating Systems					
3.	Dissertation Phase – I	-	20	10	-	-
	Total	**`6**	**20**	**16**	**80**	**120**
					200	

III SEMESTER

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

R19 M.Tech.(DECS) SYLLABUS

Course Name	DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (Program Elective V)			
Semester	M. Tech / III Sem	L	P	C
Regulation Year	2020-21	3	-	3

UNIT –I: Introduction to Digital Signal Processing and Computational Accuracy in DSP Implementations

Introduction, Digital signal-processing system, the sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II: Architectures for Programmable DSP Devices

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III: Programmable Digital Signal Processors

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV: Analog Devices Family of DSP Devices

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.
Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V: Interfacing Memory and I/O Peripherals to Programmable DSP Devices

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. EmbeddedSignalProcessingwiththeMicroSignalArchitecturePublisher: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing –Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, Ph.D.,California Technical Publishing, ISBN 0-9660176-3-3, 1997
6. Embedded Media Processing by David J. Katz and Rick Gentile of Analog Devices,Newnes , ISBN 0750679123, 2005

Course Name	ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (EMI / EMC) (Program Elective V)			
Semester	**M. Tech / III Sem**	**L**	**P**	**C**
Regulation Year	**2020-21**	**3**	**-**	**3**

UNIT -I: Introduction, Natural and Nuclear Sources of EMI / EMC

Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT -II: EMI from Apparatus, Circuits and Open Area Test Sites

Electromagnetic emissions, Noise from relays and switches, Non-linearities in circuits, passive intermodulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT -III: Radiated and Conducted Interference Measurements and ESD

Anechoic chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements, ESD, Electrical fast transients / bursts, Electrical surges.

UNIT -IV: Grounding, Shielding, Bonding and EMI filters

Principles and types of grounding, Shielding and bonding, Characterization of filters, Power lines filter design.

UNIT –V: Cables, Connectors, Components and EMC Standards

EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, National / International EMC standards.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility - Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT – Delhi, Modules 19.

REFERENCE BOOKS:

1. Introduction to Electromagnetic Compatibility - Ny, John Wiley, 1992, by C.R. Pal.

Course Name	CMOS ANALOG AND DIGITAL IC DESIGN (Program Elective V)			
Semester	M. Tech / III Sem	L	P	C
Regulation Year	2020-21	3	-	3

UNIT-I: CMOS Device Modeling and Analog CMOS Sub-Circuits

Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, and Sub-threshold MOS Model. Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-II: CMOS Amplifiers

Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT -III: CMOS Operational Amplifiers

Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

UNIT -IV: MOS Design and Combinational MOS Logic Circuits:

Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.
MOS logic circuits with depletion NMOS loads, CMOS logic circuits – NOR & NAND gate, Complex Logic circuits – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates – Designing with Transmission gates, Complementary Pass-transistor Logic (CPL).

UNIT-V: Sequential MOS Logic Circuits and Dynamic Logic Circuits

Behavior of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.
Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits

TEXT BOOKS:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

3. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
4. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
5. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2016.
2. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.
3. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

Course Name	MEMS AND ITS APPLICATIONS (Open Elective)			
Semester	M. Tech / III Sem	L	P	C
Regulation Year	2020-21	3	-	3

UNIT - I

Introduction Basic structures of MEM devices – (Canti-Levers, Fixed Beams diaphragms). Broad Response of Micro electromechanical systems (MEMS) to Mechanical (Force, pressure etc.) Thermal, Electrical, optical and magnetic stimuli, compatibility of MEMS from the point of power dissipation, leakage etc.

UNIT – II

Review of mechanical concepts like stress, strain, bending moment, deflection curve. Differential equations describing the deflection under concentrated force, Distributed force, distributed force, Deflection curves for canti-levers- fixed beam.

UNIT – III

Electrostatic excitation – columbic force between the fixed and moving electrodes. Deflection with voltage in C.L, Deflection vs. Voltage curve, critical fringe field – field calculations using Laplace equation. Discussion on the approximate solutions – Transient response of the MEMS.

UNIT-IV

Types Two terminal MEMS - capacitance vs. voltage Curve – Variable capacitor. Applications of variable capacitors. Two terminal MEM structures. Three terminal MEM structures – Controlled variable capacitors – MEM as a switch and possible applications.

UNIT-V

MEM Circuits & Structures MEM circuits & structures for simple GATES- AND, OR, NAND, NOR, Exclusive OR, simple MEM configurations for flip-flops triggering applications to counters, converters. Applications for analog circuits like frequency converters, wave shaping. RF Switches for modulation. MEM Transducers for pressure, force temperature. Optical MEMS.

UNIT-VI

MEM Technologies Silicon based MEMS- Process flow – Brief account of various processes and layers like fixed layer, moving layers spacers etc., and etching technologies. Metal Based MEMS: Thin and thick film technologies for MEMS. Process flow and description of the processes, Status of MEMS in the current electronics scenario.

TEXT BOOKS:

1. MEMS Theory, Design and Technology - GABRIEL. M.Review, R.F., 2003, John wiley& Sons. .
2. Strength of Materials –ThimoShenko, 2000, CBS publishers & Distributors.
3. MEMS and NEMS, Systems Devices; and Structures - ServeyE.Lyshevski, 2002, CRC Press.

REFERENCE BOOKS:

1. Sensor Technology and Devices - Ristic L. (Ed), 1994, Artech House, London.

Course Name	RELIABILITY ENGINEERING (Open Elective)			
Semester	M. Tech / III Sem	L	P	C
Regulation Year	2020-21	3	-	3

UNIT-I: Reliability Concepts

Reliability Engineering- Introduction, reliability, maintainability, availability and quality, reliability vs quality, Reliability Function, Mean Time to Failure, Hazard rate function, Bath-tub curve, conditional reliability.

UNIT -II: Reliability Mathematics

Probability theory: Properties, theorems and Axioms, Random variables, Probability density function (pdf), cumulative density function (CDF), relationship between pdf and cdf, Joint Probability Distribution, mean life, median life, modal life, Bayes" Theorem.
Statistical Distributions: Discrete – Uniform, Bernoulli, Binomial, Geometric, Poisson, Continuous: Normal, Exponential, Weibull, Lognormal.

UNIT -III: Basic Reliability Models

Constant Failure rate model: Exponential reliability model, Failure modes, Two parameter Exponential distribution, Poisson process and redundancy.
Time-dependent failure rate model: The Weibull distribution, Three parameter Weibull distribution, Normal Distribution, Lognormal distribution

Unit IV: Reliability of Systems

System Reliability Modelling and Evaluation Techniques-I: Series, Parallel, Series-Parallel, Parallel-Series, *k*-out-of-*m*, Standby model.
Evaluation Techniques II: Event Space, Decomposition, Minimal Path sets and Cut sets, Common Mode Failures and Three State Devices.

UNIT-V: Data Analysis and Reliability Estimation

Point Estimation and Interval Estimation, Goodness-of-Fit test, Moment Estimation, Maximum Likelihood Estimator, Least Square Estimates.

UNIT-VI: Parametric Reliability Estimations and Models

Estimation Methods: Method of Moments, Likelihood functions, Method of Least Square.
Reliability Models: Historical data, Operational life testing, Burn-in testing, Accelerated Life testing, Types of Censoring, Exponential distribution, Rayleigh Distribution, Weibull Distribution, Lognormal distribution

TEXT BOOKS:

1. Elsayed A. Elsayed, Reliability Engineering, John Wiley, 2nd Ed, 2012
2. Charles E. Ebling, Reliability and Maintainability Engineering, TMH, 9th Reprint, 2008.
3. V. N. A. Naikan, Reliability Engineering and Life Testing, PHI, 2008

REFERENCE BOOKS:

1.K. C. Kapur and L. R. Lamberson, Reliability in Engineering Design, Wiley India, 2009.
2.K. K. Agrawal, Reliability Engineering, Springer-Science+Business Media, 1993.

Course Name	REAL TIME OPERATING SYSTEMS (Open Elective)			
Semester	M. Tech / III Sem	L	P	C
Regulation Year	2020-21	3	-	3

UNIT I: Introduction to UNIX

Overview of Commands, File I/O. (Open, Create, Close, Lseek, Read, Write), Process Control (Fork, Vfork, Exit, Wait, Waitpid, Exec), Signals, Inter Process Communication (Pipes, FIFOs, Message Queues, Semaphores, Shared Memory).

UNIT II: Real Time Systems

Typical Real Time Application, Hard Vs. Soft Real Time Systems, a Reference Model of Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency Functional Parameters, Resource Parameters of Jobs and Parameters of Resources.

UNIT III: Approaches to Real Time Scheduling

Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs. State Systems, Effective Release Times and Dead Lines, Offline Vs. Online Scheduling.

UNIT IV: Operating Systems

Overview, Time Services and Scheduling Mechanisms, other Basic Operating System Function, Processor Reserves and Resource Kernel. Capabilities of Commercial Real Time Operating Systems.

UNIT V: Case Studies-VX Works

Memory Managements Task State Transition Diagram, Pre-Emptive Priority, Scheduling, Context Switches – Semaphore – Binary Mutex, Counting: Watch Dugs, I/O System

UNIT VI: RT Linux

Process Management, Scheduling, Interrupt Management, and Synchronization.

TEXT BOOKS:

1. Richard Stevens, “Advanced Unix Programming”.
2. Jane W.S. Liu, “Real Time Systems”, Pearson Education.
3. C.M.Krishna, KANG G. Shin, “Real Time Systems”, McGraw.Hill

REFERENCES:

1. VxWorks Programmers Guide
2. www.tidp.org
3. www.kernel.org
4. http://www.xml.com/ldd/chapter/book