SurTech

DR. SUDHIR CHANDRA SUR INSTITUTE OF TECHNOLOGY AND SPORTS COMPLEX
(Formerly known as Dr. Sudhir Chandra Sur Degree Engineering College)

SARADINDU PANDA

COs for Electronics and Communication Engineering Department (3rd to 8th Semester)

3RD Semester

Electronic Devices (EC301)

EC301	COURSE OUTCOMES
EC301.1	Understand the concepts of Energy Bands and Charge Carriers in Semiconductors
EC301.2	Realize the working of PN Junctions
EC301.3	Comprehend the basic MOS Device
EC301.4	Identify with the functioning of Opto-electronic devices and IC fabrication

Digital System Design (EC302)

EC302	COURSE OUTCOMES
EC302.1	Design and Analyze Combinational logic circuits
EC302.2	Design and Analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
EC302.3	Design and Analyze Synchronous sequential logic circuits
EC302.4	Logic Families and Semiconductor Memories: TTL, ECL, CMOS families, VHDL for combinational and sequential circuits

Signals and System (EC303)

EC303	COURSE OUTCOMES
EC303.1	Understand Signals and systems as seen in everyday life
EC303.2	Realize Linear shift-invariant (LSI) systems, Periodic and semi-periodic inputs to an LSI system
EC303.3	Explain evolution of Transforms: Fourier Transform, Laplace Transform, Z-transform
EC303.4	Comprehend The Sampling Theorem and its implications

Network Theory (EC304)

EC304	COURSE OUTCOMES
EC304.1	Identify various signals, sources and systems.
EC304.2	Explain different engineering problems by the application of various theorems and methods.
EC304.3	Construct mathematical model of a given electric circuit using modern engineering tools and solve it using technique of domain transformation for practical related problems.
EC304.4	Measure different network problems using graph theory concept and design the given electric circuit in terms of two port network, graph theory and filters and engage in life-long learning.

Data Structure & Algorithms (ES-CS301)

ES-CS301	COURSE OUTCOMES
ES-CS301.1	Able to analyse the algorithms to determine the time and computation complexity and justify the correctness.
ES-CS301.2	Able to implement Stacks, Queues, linked list and analyse the same to determine the time and computation complexity.
ES-CS301.3	Able to write an algorithm Search problem (Linear Search and Binary Search) ,Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
ES-CS301.4	Able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Probability and Statistics (BS-M301)

BS-M301	COURSE OUTCOMES
BS-M301.1	Learn the ideas of probability and random variables, calculate probabilities using conditional probability, rule of total probability and Bayes' theorem.
BS-M301.2	Illustrate various discrete and continuous probability distribution with their properties and their applications in physical and engineering environment.
BS-M301.3	Understand the basic ideas of statistics with different characterization of a unilabiate and bivariate data set.
BS-M301.4	Apply statistical tools for analyzing data samples and drawing inference on a given data set.

Electronic Devices Lab (EC391)

EC391	COURSE OUTCOMES
EC391.1	The students will be able to identify various electronic components and can explain the uses and operations of various laboratory instruments
EC391.2	The students will be able to design simple circuits to experimentally obtain V-I characteristics of PN junction and Zener diodes and compute different device parameters.
EC391.3	Students will be able to design simple circuits and obtain V-I characteristics of BJT and FET and compute different device parameters.
EC391.4	The students will be able to design simple circuits to experimentally obtain characteristics of photoelectric devices. And The students will be able to measure and record the experimental data, analyze the results and prepare a formal laboratory report.

Digital System Design Lab (EC392)

EC392	COURSE OUTCOMES
EC392.1	Interpret the nomenclature of Digital ICs, Data sheets, VCC, Ground.
EC392.2	Verify the truth table of logic gates using TTL ICs.
EC392.3	Implement, design and verify various combinational and sequential circuits.
EC392.4	Use the modern IT tool like VHDL/Verilog to design, simulate and verify combinational and sequential circuits.

Data Structure Lab (ESCS-391)

ESCS-391	COURSE OUTCOMES
ESCS-391.1	Students will be able to understand the basic data structures and their applications.
ESCS-391.2	Students will be able to apply Linea Data Structure that can be implemented using different data structures.
ESCS-391.3	Students will be able to analyze the different sorting and searching algorithms mentioned in the course, their implementation and performance analysis.
ESCS-391.4	Students will be able to construct and evaluate algorithms to solve a problem by choosing an appropriate data structure.

4TH SEMESTER

Analog Communication (EC401)

EC401	COURSE OUTCOMES
EC401.1	Understand Introduction to Analog Communication
EC401.2	Realize generation & Detection of Amplitude Modulation:
EC401.3	Visualize angle Modulation:
EC401.4	Explain multiplexing technique

Analog Electronic Circuits (EC402)

EC402	COURSE OUTCOMES
EC402.1	Analyze the characteristics of diodes and transistors, and their related circuits
EC402.2	Comprehend the working of various classes of amplifiers and topologies
EC402.3	Design sinusoidal and non-sinusoidal oscillators and multivibrators
EC402.4	Understand the functioning of Differential amplifiers and OP-AMP based circuits.

Design and Analysis of Algorithm (ES-CS-401)

ES-CS-401	COURSE OUTCOMES
ES-CS-401.1	Students able to analyze and evaluate asymptotic performance of algorithms and write rigorous correctness proofs for algorithms
ES-CS-401.2	Students able to identify and explain familiarity of major algorithms and data structures.
ES-CS-401.3	Students able to apply important algorithmic design paradigms and methods of analysis.
ES-CS-401.4	Students able to synthesize efficient algorithms in common engineering design situations

Microprocessor & Microcontroller (EC 403)

EC403	COURSE OUTCOMES
EC403.1	Apply the fundamental concept of digital electronics to Microprocessor based system, relationship between software and hardware part of microprocessors 8085,8086.
EC403.2	Illustrate interfacing of different peripheral devices with microprocessor.
EC403.3	Distinguish the architectures of Microprocessors and Microcontroller.
EC403.4	Understand RSIC processors and fundamental design of ARM microcontroller based systems.

Biology for Engineers (BS-B 401)

BS-B 401	COURSE OUTCOMES
BS-B 401.1	Understand the biological concepts from an engineering perspective
BS-B 401.2	Understand the concepts of biological sensing and its challenges
BS-B 401.3	Understand development of artificial systems mimicking human action
BS-B 401.4	Integrate biological principles for developing next generation technologies

Numerical Methods (BS) (BS-M 401)

BS-M 401	COURSE OUTCOMES
BS-M 401.1	Solve first and second order ordinary differential equation arising in flow problems using single step numerical methods
BS-M 4012	Determine the extremals of functional and solve the simple problems of the Calculus of variations
BS-M 401.3	Solve the mathematical formulation of linear programming problem
BS-M 401.4	Solve the applications of transport problems, theory of games and fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data

Numerical Methods Lab (BS) (BS-MCS 491)

BS-MCS 491	COURSE OUTCOMES
BS-MCS 491.1	Understand the basic concept of various statistical and numerical methods
BS-MCS 491.2	Apply the statistical and numerical methods to engineering subjects
BS-MCS 491.3	Understand applications of probability theory, regression
BS-MCS 491.4	Understand correlational analysis to process transportation data

Analog Communication Lab (EC491)

EC491	COURSE OUTCOMES
EC491.1	Identify the various circuit arrangements pertaining to this lab.
EC491.2	Understand the functioning of equipments like Function Generators.
EC491.3	List the components required for conducting the experiments
EC491.4	Design various analog circuits and study their outputs.

Analog Electronic Circuit Lab (EC492)

EC492	COURSE OUTCOMES
EC492.1	Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
EC492.2	Compute the parameters from the characteristics of JFET and MOSFET devices
EC492.3	Design, test and evaluate BJT amplifiers in CE configuration.
EC492.4	Design and test JFET/MOSFET amplifiers.

Microprocessor and Microcontroller Lab (EC493)

EC493	COURSE OUTCOMES
EC493.1	Students will be able to demonstrate the operation of 8085 trainer kit and able to execute basic programs using trainer kit.
EC493.2	Students will be able to write and run different types of programs using a kit and simulator.
EC493.3	Students will be able to interface with various output devices using subroutine calls and IN/OUT instructions with the help of 8255 PPI on the trainer kit.
EC493.4	Students will be able to write programs for 8051 Microcontroller kit.

Soft Skill Development Lab (HS-HU481)

HS-HU481	COURSE OUTCOMES
HS-HU481.1	Think critically on issues for informed decision making and know how to communicate effectively through choice of appropriate language and speech, while dealing with others at the workplace.
HS-HU481.2	Identify and introspect on individual strengths and weaknesses.
HS-HU481.3	Improve levels of self-awareness and self-worth for greater efficacy at workplace.
HS-HU481.4	Prepare resume and learn how to face interview

5TH SEMESTER

Electromagnetic Waves (EC501)

EC501	COURSE OUTCOMES
EC501.1	Co-ordinate system, Basic Electromagnetic Equation ,Maxwell Law
EC501.2	Understand characteristics and wave propagation on high frequency transmission lines; Carryout impedance transformation on TL
EC501.3	Use sections of transmission line sections for realizing circuit elements; Characterization of uniform plane wave
EC501.4	Calculate reflection and transmission of waves at media interface; Analyze wave propagation on metallic waveguides in modal form; Understand principle of radiation and radiation characteristics of an antenna

Computer Architecture (EC 502)

EC502	COURSE OUTCOMES
EC502.1	Understand the basic of computer architecture and instructions
EC502.2	Realize the Information representation and Control designs in computer
EC502.3	Comprehend the memory organization in Computers
EC502.4	Appreciate the concept of parallel processing

Digital Communication and Stochastic Process (EC503)

EC503	COURSE OUTCOMES
EC503.1	Understand definition and examples of Stocastics Process, classification of random processes
EC503.2	Analyse between signal and vector, distinguishability of signal, orthogonality and orthonormality
EC503.3	Realize Concept of sampling, Pulse Amplitude Modulation (PAM)
EC503.4	Grasp types of Digital Modulation, coherent and non-coherent Binary Modulation Techniques

Digital Signal Processing (EC504)

EC504	COURSE OUTCOMES
EC504.1	Understand discrete time signals: Sequences; representation of signals on orthogonal basis
EC504.2	Realize design of FIR Digital filters: Window method, Park-McClellan's method
EC504.3	Explain Effect of finite register length in FIR filter design.
EC504.4	Visualize origin of Wavelets, Classification (CWT & DWT), Filter Bank Origin

Nano Electronics (PE-EC505A)

PE-EC505A	COURSE OUTCOMES
PE-EC505A.1	Revisit and comprehend the basic of nanotechnology
PE-EC505A.2	Realize the limitations of normal MOSFET and need of scaling them into nano scale devices
PE-EC505A.3	Conceptualize the quantum transport phenomena and working principles of nano-electronic devices.
PE-EC505A.4	Understand the recent trends of microelectronics and nano-electronics

Cyber Law & Intellectual Property Rights (OE-EC506B)

OE-EC506B	COURSE OUTCOMES
OE-EC506B.1	Able to understand the role and main types of intellectual property rights.
OE-EC506B.2	Able to understand the steps for successful registration and protection of intellectual property rights at national, regional and international levels.
OE-EC506B.3	Able to understand search patent and trademark databases.
OE-EC506B.4	Able to understand the legal aspects for intellectual property protection.

Electromagnetic Wave Lab (EC591)

EC591	COURSE OUTCOMES
EC591.1	Able to explain the concepts of different types of guided structures like transmission lines, it's different case studies and determination of parameters in hardware or software simulation-based system.
EC591.2	Able to summarize the concept of radiation pattern of different types of antennas and to know the determination procedure of antenna parameters.
EC591.3	Able to discuss the role of Spectrum Analyzer to study different filters .
EC591.4	Learn about the characteristics and measurements of E and H Field

Digital Communication Lab (EC592)

EC592	COURSE OUTCOMES
EC592.1	Design, implementation and study of all the properties of 7-length and 15-length pn sequences using shift register
EC592.2	Pulse Amplitude Modulation and demodulation
EC592.3	PCM and demodulation
EC592.4	line coders: polar/unipolar/bipolar NRZ ,RZ and Manchester

Digital Signal Processing Lab (EC593)

EC593	COURSE OUTCOMES
EC593.1	Students will be able to identify and analyze different kind of signal and system properties.
EC593.2	Students will be able to analyze different types of data sequences.
EC593.3	Students will be able to analyze different signals graphically.
EC593.4	Students will be able to learn and apply different data handling algorithm.

Effective technical Communication (MC HU 581)

MC HU 581	COURSE OUTCOMES
MC HU 581.1	Develop vocabulary and language skills relevant to engineering as a profession
MC HU 581.2	Analyze, interpret, and effectively summarize a variety of textual content
MC HU 581.3	Create effective technical presentations and Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus.
MC HU 581.4	Identify drawbacks in listening patterns and apply listening techniques for specific needs and Create professional and technical documents that are clear and adhering to all the necessary conventions

6TH SEMESTER

Control System and Instrumentation (EC601)

EC601	COURSE OUTCOMES
EC601.1	Realize Introduction to control problem, Feedback control systems
EC601.2	Understand Time response of second order systems, Frequency response analysis
EC601.3	Explain State Variable Analysis, Nonlinear control systems
EC601.4	Demonstrate CRO- measurement with it and its function with block diagram representation

Computer Network (EC602)

EC602	COURSE OUTCOMES
EC602.1	Understand research problem formulation
EC602.2	Analyze research related information and Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
EC602.3	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
EC602.4	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Information Theory and Coding (PE-EC603D)

PE-EC603D	COURSE OUTCOMES
PE-EC603D.1	Understand the concept of information and entropy
PE-EC603D.2	Define Shannon's theorem for coding
PE-EC603D.3	Calculate of channel capacity and correlate error control codes
PE-EC603D.4	Apply different coding techniques

Object Oriented Programming (OE-EC604C)

OE-EC604C	COURSE OUTCOMES
OE-EC604C.1	Specify simple abstract data types and design implementations, using abstraction functions to document them.
OE-EC604C.2	Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
OE-EC604C.3	Name and apply some common object-oriented design patterns and give examples of their use.
OE-EC604C.4	Design applications with an event-driven graphical user interface.

Economics for Engineers (HS-HU601)

HS-HU601	COURSE OUTCOMES
HS-HU601.1	Summarize the basic concepts of economics and cost analysis related to engineering
HS-HU601.2	Associate the value engineering and its functions with engineering activities
HS-HU601.3	Distinguish various methods of cash flow
HS-HU601.4	Discuss various methods of Maintenance and Replacement policy

Computer Network Lab (EC692)

EC692	COURSE OUTCOMES
EC692.1	To understand the working principle of various communication protocols.
EC692.2	To analyze the various routing algorithms and Understand the TCP/IP configuration for Windows and Linux.
EC692.3	To know the concept of data transfer between nodes
EC692.4	Implement device sharing on network and learn the major software and hardware technologies used on computer networks

Control System and Instrumentation Laboratory (EC 691)

EC691	COURSE OUTCOMES
EC691.1	Use MATLAB control system toolbox to analyse control systems
EC691.2	Investigate stability of a system using different tests.
EC691.3	Design various controllers for specified system requirements
EC691.4	Characterize measuring instruments for static and dynamic behaviour

Mini Project (EC681)

EC681	COURSE OUTCOMES
EC681.1	Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
EC681.2	Design, implement and test the prototype/algorithm in order to solve the conceived problem.
EC681.3	Write comprehensive report on mini project work.
EC681.4	Manage entire team to complete the required work.

Universal Human Values (MC681)

MC681	COURSE OUTCOMES
MC681.1	Understand and analyse the essentials of human values and skills, self exploration, happiness and prosperity.
MC681.2	Identify and evaluate the role of harmony in family, society and universal order.
MC681.3	Understand and associate the holistic perception of harmony at all levels of existence.
MC681.4	Develop appropriate technologies and management patterns to create harmony in professional and personal lives.

7TH SEMESTER

Mobile Communication and Networks (PE-EC701C)

PE-EC701C	COURSE OUTCOMES
PE-EC701C.1	Understand the working principles of the mobile communication systems.
PE-EC701C.2	Understand the underlying technology of mobile communication systems.
PE-EC701C.3	Understand the relation between the user features and underlying technology.
PE-EC701C.4	Analyse mobile communication systems for improved performance

Digital Image and Video Processing (PE-EC702B)

PE-EC702B	COURSE OUTCOMES
PE-EC702B.1	Mathematically represent the various types of images and analyze them
PE-EC702B.2	Process these images for the enhancement of certain properties or for optimized use of the resources.
PE-EC702B.3	Develop algorithms for image compression.
PE-EC702B.4	Develop the codes.

Embedded System (PE-EC703A)

PE-EC703A	COURSE OUTCOMES
PE-EC703A.1	Understand the concept and design process of embedded systems.
PE-EC703A.2	Understand device and communication buses for device network.
PE-EC703A.3	Understand device drivers and interrupt service mechanism
PE-EC703A.4	Apply threads, tasks, process, semaphores and RPC for IPC.

Web Technology (OE-EC704A)

OE-EC704A	COURSE OUTCOMES
OE-EC704A.1	design good web pages using different tags, tables, forms, frames and style sheets supportedby HTML.
OE-EC704A.2	implement, compile, test and run Java programs, comprising more than one class, to address aparticular software problem
OE-EC704A.3	demonstrate the ability to employ various types of selection statements and iterationstatements in a Java program
OE-EC704A.4	be able to leverage the object- oriented features of Java language using abstract class and interface.

Principles of Management (HS-HU701)

HS-HU701	COURSE OUTCOMES
HS-HU701.1	Upon completion of the course students will be able to have clear understanding of managerial functions like planning ,and have same basic knowledge on international aspect of management
HS-HU701.2	To understand the planning process in the organization
HS-HU701.3	To understand the concept of organization
HS-HU701.4	Demonstrate the ability to directing, leadership and communicate effectively

Industrial Training (EC781)

EC781	COURSE OUTCOMES
EC781.1	Understand the Organizational Structure of a company.
EC781.2	Develop work habits and attitudes necessary for job success (technical competence, professional attitude, organization skills etc.)
EC781.3	Develop written communication and technical report writing skills.
EC781.4	Develop knowledge of contemporary issues and an awareness for the need and applications of standards in the industry.

Project Stage – I (EC782)

EC782	COURSE OUTCOMES
EC782.1	Students will be able to identify the problem area of practical relevance to society and correlate existing literature relevant to the problem with one another.
EC782.2	Students will be able to formulate the exact problem for project by identifying the scope of work from existing literature and explain the existing theory behind the problem taken for the project which is necessary for building the foundation for project.
EC782.3	Students will be able to distribute a given task among group members and identify his share of work as a member of the team.
EC782.4	Students will be able to effectively write down the progress of the project work in the form of technical report which serves as the synopsis for the project.

8TH SEMESTER

Fiber Optic Communication (PE-EC801B)

PE-EC801B	COURSE OUTCOMES
PE-EC801B.1	Understand the principles fiber-optic communication, the components and the bandwidth advantages.
PE-EC801B.2	Understand the properties of the optical fibers and optical components
PE-EC801B.3	Understand the operation of lasers, LEDs, and detectors
PE-EC801B.4	Analyse system performance of optical communication systems, design optical networks and understand non-linear effects in optical fibers

Industrial Automation and Control (PE-EC802B)

PE-EC802B	COURSE OUTCOMES
PE-EC802B.1	select suitable sensor to measure industrial parameters and the different types of actuators and its working. They will be able to design proper signal conditioning circuit to the transducer.
PE-EC802B.2	determine the effect of proportional gain, integral time, derivative gain constant on the system performance and will be able to tune the controller using tuning methods, implement PID using electronic , digital, pneumatic and hydraulic methods.
PE-EC802B.3	design the ladder logic to implement any process with given problem statement.
PE-EC802B.4	analyze DCS hardware and SCADA hardware and software and its merits/demerits in industrial automation.

Internet of Things (IoT) (OE-EC 803A)

OE-EC 803A	COURSE OUTCOMES
OE-EC 803A.1	Understand the application areas of IOT and design principles for connected devices
OE-EC 803A.2	Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
OE-EC 803A.3	Appreciate the Prototyping the physical design and techniques for Embedded code
OE-EC 803A.4	Recognise building blocks of Internet of Things and characteristics

Artificial Intelligence (OE-EC 804A)

OE-EC 804A	COURSE OUTCOMES
OE-EC 804A.1	understand the modern view of AI as the study of agents that receive percepts from the environment and perform actions.
OE-EC 804A.2	demonstrate awareness of the major challenges facing AI and the complex of typical problems within the field.
OE-EC 804A.3	exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.

OE-EC 804A.4	asses critically the techniques presented and to apply them to real world problems and Design applications for NLP that use Artificial Intelligence

Project Stage – II (EC881)

EC881	COURSE OUTCOMES
EC881.1	Students will be able to choose suitable and effective methodology (ies) for solving the problem which may include detailed qualitative and quantitative analysis, design of experiment(s) and/or selecting suitable simulation tool keeping in mind public health and safety.
EC881.2	Students will be able to distribute a given task among group members and identify his share of work as a member of the team and analyze, interpret and validate results obtained by conducting experiments and/or simulation and subsequently arrive at valid conclusion
EC881.3	Students will be able to effectively explain and demonstrate their technical findings in the form of presentation before the technical experts and also will be able to write technical report effectively
EC881.4	Students will be able to identify the methods of solving a problem so as to complete a given task within a given time frame committing to ethical principles and the limitation of the work accomplished and explain the future scope of the work done

Grand Viva (EC882)

EC882	COURSE OUTCOMES
EC882.1	Students can be able to demonstrate the application of the knowledge acquired in the fours semesters to solve the problems of the various forms of organisations/ institutions.
EC882.2	Understand the practical difficulties in applying the various forms of solutions to find the feasible solution.
EC882.3	Solve the real life problems and assess the implications of various forms of solutions.
EC882.4	Students can be able to make effective presentation of different topics learnt before the expert problem.