EC – 1851 Wireless Communication

Course Title	Course Code	Credits - 3		
		L	T	P
Wireless Communication	EC 1851	3	-	2

COURSE OBJECTIVE	The student should be made to: Know the characteristic of wireless channel. Learn the various cellular architectures. Understand the concepts behind various digital signaling schemes for fading channels. Be familiar the various multipath mitigation techniques. Understand the various multiple antenna systems
PRE-REQUISITES	• Probability Theory, • Digital Communication
COURSE CONTENTS	**Unit I**: Probability and Stochastic Processes: Probability: Random Variable, Probability Distributions, and Probability Densities, Functions of Random Variables, Statistical Averages of Random Variables, Some Useful Probability Distributions, Central Limit Theorem. Stochastic Processes: Statistical Averages, Power Density Spectrum, Discrete-Time Stochastic Signals and System, Cyclo-stationary Processes. **Unit-II**: WIRELESS CHANNELS: Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading. **Unit-III**: DIGITAL SIGNALING FOR FADING CHANNELS: Structure of a wireless communication link, Principles of Offset QPSK, p/4 DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR. **Unit-IV**: MULTIPATH MITIGATION TECHNIQUE: Equalization – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver. **UNIT V**: MULTIPLE ANTENNA TECHNIQUES: MIMO systems – spatial multiplexing -System model -Pre-coding – Beam forming – transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

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COURSE OUTCOMES:	**At the end of the course, the student should be able to:** **CO1:** Acquire knowledge of wireless communication techniques, systems, processes and able to demonstrate.-(BL1,BL2,BL3) **CO2:** Analyze different parameters of wireless transmission. (BL3,BL4) **CO3:** Design a cellular system and implement various signaling schemes for fading channels, Compare multipath mitigation techniques and analyze their performance Design and implement systems with transmit/receive diversity and MIMO systems -(BL3,BL6) **CO4:** Evaluate the performance of different wireless channels using different technique.(BL3,BL5)
TEXT BOOKS & REFERENCES:	• Rappaport T. S., "Wireless communications", Second Edition, Pearson Education, 2010. • Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2006. • David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005. • Upena Dalal, "Wireless Communication", Oxford University Press, 2009. • Van Nee, R. and Ramji Prasad, "OFDM for Wireless Multimedia Communications", Artech House, 2000. • John G. Proakis, "Digital Communications", Edition 4th ed., McGraw-Hill, 2000.
LABORATORY EXPERIMENTS	1. Design a QPSK detector and understand the relation between BER and SNR.-CO3 2. Design pulse shaping filters used in wireless communication and draw input output waveforms.-CO3 3. Perform multidimensional signal analysis.-CO2 4. Determine frequency selectivity of wireless channel.-CO2 5. Implement and error detection and correction codes for wireless communication and compare-CO4 6. Estimation of Bit Error Probability of Modulation Schemes used in wireless communication -CO4 7. Determination of path loss using OKUMURA HATA MODEL for urban, suburban and open field or rural areas.-CO2 8. Generate binary random sequence with length 10000 and plot the distribution.-CO2 9. Generate a real Gaussian noise sequence with zero mean and variance -CO2 Verify the sequence has a Gaussian distribution. Plot and compare it with theoretical Gaussian function 10. Assume BPSK modulation is used for SNR range of 0-15 dB with a step of 2 dB. Length=1000 bits. Simulate: (i) BER of system (ii) Plot BER vs SNR performance for simulated results-CO4

END

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EC – 1852 Antenna and Wave Propagation

Course Title	Course Code	Credits - 4		
		L	T	P
Antenna and Wave Propagation	EC 1852	3	-	2

COURSE OBJECTIVE	This course will introduce students to the concepts of Antenna theory and design as well as wave Propagation in various media. He will be able to understand the working of antenna systems and thus will be able to develop his own design.
PRE-REQUISITES	• Vector Algebra • Electromagnetic Field Theory
COURSE CONTENTS	**Unit I**: Radiation: Potential function and the Electromagnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wave monopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna, Far-field Approximation. **Unit II**: Fundamental Parameters of Antennas: Introduction, network theorems, Radiation Intensity, Gain, Directivity, Antenna Efficiency, Half Power Beam width, Beam Efficiency, Bandwidth, Polarization, Input Impedance, Antenna Radiation Efficiency, Antenna Vector Effective Length and equivalent areas, Maximum Directivity and Maximum Effective area, Friss Transmission Equation, Antenna Temperature. **Unit III**: Types of Antenna: Babinet's principle and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna. **Unit IV**: Antenna Array Synthesis: Introduction, different forms of linear arrays, two –element array, linear array analysis, multiplication of patterns, effect of earth on vertical patterns, Binomial array, array structures, weighting functions, Schelknoff unit circle, linear array synthesis, sum and difference patterns, Dolph-Chebychev synthesis of sum pattern, Taylor synthesis of sum patterns, planar arrays, arrays with rectangular boundary.

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Unit V: Propagation of Radio Waves Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane Earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wavefront due to ground losses. Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, tropospheric propagation, fading, path loss calculations. Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance

COURSE OUTCOMES:

On successful completion of this course student should be able to:

CO 1: Acquire and demonstrate fundamental knowledge of radiation pattern, antenna parameters and types of arrays and propagation of waves.(BL1,BL2)

CO 2: Analyze antenna on the basis of different parameters(BL3,BL4)

CO 3: Able to synthesize and design Antenna arrays, and improve upon the performance of existing systems for implementing better propagation models.(BL3,BL6)

TEXT BOOKS & REFERENCES:

- Jordan and Balmain: Electromagnetic Waves and Radiating System, PHI Learning.
- Kraus: Antennas and wave propagation, TMH.
- Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.
- Harish and Sachidananda: Antennas and wave propagation, Oxford University Press.
- Raju: Antennas and Wave Propagation, Pearson Education.
- Kennedy: Electronic Communication Systems, TMH.

LABORATORY EXPERIMENTS

1. To Plot the Radiation Pattern of an Omni Directional Antenna.-CO2
2. To Plot the Radiation Pattern of a Directional Antenna.-CO2
3. To Plot the Radiation Pattern of a Parabolic Reflector Antenna.-CO2
4. To Plot the Radiation Pattern of a Log Periodic Antenna.-CO2
5. To Plot the Radiation Pattern of a Patch Antenna.-CO2
6. To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna.-CO2
7. To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.-CO2
8. To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.-CO2
9. To Plot the Radiation Pattern of a Broad site Antenna.-CO2
10. To Plot the Radiation Pattern of a Square Loop Antenna.-CO2
11. Design a loop and dipole antenna.-CO3
12. Design a collinear antenna.-CO3

END

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EC – 1853 Microprocessor and Interfacing

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Course Code</td><td colspan="3">Credits - 4</td></tr>
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<tr><td rowspan="2">Microprocessor and Interfacing</td><td rowspan="2">EC 1853</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>3</td><td>-</td><td>2</td></tr>
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COURSE OBJECTIVE	To make students familiar with the basic blocks of 8 bit & 16 bit microprocessor device in general. To provide comprehensive knowledge of the architecture, features and interfacing with peripherals of 8085/8086 microprocessor. To use assembly and high level languages to interface the microprocessor to various applications.
PRE-REQUISITES	• Digital Circuit Systems. • Basic Electronics.
COURSE CONTENTS	**Unit I**: Introduction of computer organization & Microprocessor- Architecture and function of general computer system, CISC, RISC, CPU, Memory, Input/output device, Address, Data and Control Buses. 8085 Microprocessor: Architecture, Pin Diagram, and various functional units. Memory Interfacing, I/O Mapped I/O and Memory Mapped I/O. **Unit –II**: Instruction Set and Operation of 8085- Instruction set of 8085 microprocessor, Addressing mode, counter and time delay, stack and stack handling, Subroutines, Timing diagram, instruction cycle machine cycle, T-state, code conversion and 16 – Bit Data Operation, 8085 Interrupts. **Unit –III**: Introduction to 16 bit Microprocessor-Introduction to 8086 Microprocessor family Architecture, Pin diagram, Instruction set, Assembler directive, Addressing modes, Maximum and Minimum Mode operation, Elementary 8086 Programming. **Unit –IV**: Interfacing Chips- Interfacing Data converters (A/D, D/A), Programmable interface device, 8155 I/O, Timer8253/8254, 8279 Keyboard/ Display Interface, DMA Controller 8257.Serial I/O & Data communication, USART (8251), RS232, Modem and various standards. **Unit –V**: Peripherals and their interfacing-Semiconductor memory interfacing, Interfacing I/O ports, PIO 8255 and interfacing with ADC & DAC. Interfacing with keyboard, LED'S, Motor and programmable keyboard/display interface etc. Multiprocessor systems.
COURSE OUTCOMES:	**On successful completion of this course student should be able to:** **CO 1:** Acquire and demonstrate fundamental knowledge of microprocessors or interfacing and programming (BL1,BL2) **CO 2:** Analyze the performance of microprocessor with the help of instruction set (BL3, BL4) **CO 3:** Define instruction sets and write assembly language programming. (BL3, BL6) **CO 4:** Evaluate performance of 8085 and 8086 compare them. (BL3, BL5)

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TEXT BOOKS& REFERENCES:

- Ramesh S Goankar, Micro processor Architecture, Programming & Applications with the 8085, Penram International Publishing (India) Pvt. Ltd., Fourth Edition, 2002.
- Douglas V. Hall, Microprocessors and interfacing programming and hardware Gregg Division, McGraw-Hill, 1986
- A K Ray & K M Bhurchandi, Advanced Microprocessor and Peripheral, Tata McGraw-Hill Publishing Company Limited.

LABORATORY EXPERIMENTS

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers. -CO4
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers. -CO4
3. To perform multiplication and division of two 8 bit numbers using 8085.
4. To find the largest and smallest number in an array of data using 8085 instruction set. -CO3
5. To write a program to arrange an array of data in ascending and descending order. -CO4
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set. -CO2
7. To write a program to initiate 8251 and to check the transmission and reception of character. -CO4
8. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes. -CO2
9. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave. -CO2 .
10. Serial communication between two 8085 through RS-232 C port.-CO2
11. Programs for 16 bit arithmetic operations for 8086 (using various addressing modes) -CO4
12. Program for sorting an array for 8086 -CO4
13. Program for searching for a number or character in a string for 8086 -CO4
14. Program for String manipulations for 8086 -CO4
15. Program for digital clock design using 8086. -CO4
16. Interfacing ADC and DAC to 8086.-CO2

END

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EC–1854 Digital Signal Processing

Course Title	Course Code	Credits - 4		
		L	T	P
Digital Signal Processing	EC 1854	3	-	2

COURSE OBJECTIVE	The objective of this course is to introduce the students with the concept of Processing Discrete Time Signals and System Realization.
PRE-REQUISITES	• Signals and system • Probability and random processes.
COURSE CONTENTS	**Unit I:** Relating the Z-transform and DTFT, DTFT and DFT, DFS and DFT, System analysis using the DTFT, Spectral leakage, Spectral spacing and zero padding. Filtering method based on DFT, FFT algorithms: Decimation in Time (DIT) and Decimation in frequency (DIF), comparison of DIT and DIF algorithms, Computation advantage of FFT algorithms, **Unit II:** Filter concepts: Gain, Phase delay, Group delay, minimum phase factor, Graphical view of filters frequency response, pole zero pattern of linear phase filters, Types of linear phase sequences, averaging filters, First and second order IIR filters, pole-zero placement and filter design. **Unit III**: Filter specifications, the impulse invariance transformation, bilinear and matched Z-Transform. Design of high pass, band pass and band stop digital IIR filters. Spectral transformation of IIR filters, finite word length effects, effect of coefficient quantization. **Unit IV:** Ideal filters, truncation and windowing, FIR filters and linear phase, Types of linear phase sequences for FIR filter design, window based, frequency sampling FIR differentiators and Hilbert transformers. **Unit V:** Basic structures for FIR and IIR systems, Lattice structures, Number representation fixed and floating point, effects of coefficient quantization, effects of round off noise in digital filters, zero input limit cycle.
COURSE OUTCOMES:	**On successful completion of this course student should be able to:** **CO 1:** Understand and demonstrate fundamentals of filtering and their concepts, filter specifications. (BL1, BL2, BL3) **CO 2:** Analyze different FIR and IIR systems in time and frequency domain. (BL3, BL4) **CO 3:** Design different FIR and IIR systems as per given specifications in frequency domain. (BL3, BL6) **CO 4:** Evaluate performance of different FIR and IIR systems based on design method and coefficient quantization. (BL3, BL5)

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TEXT BOOKS & REFERENCES:

- S.K Mitra, "Digital Signal Processing" Prentice Hall
- J.G Proakis " Digital Signal Processing"
- Ashok Amberdar, "Digital Signal Processing

LABORATORY EXPERIMENTS

1. Signal generation and manipulation.-CO2
2. Verification of sampling theorem (use interpolation function).-CO2
3. Linear and circular convolution of two given sequences, Commutative, distributive and associative property of convolution.-CO2
4. Auto and cross correlation of two sequences and verification of their properties-CO2
5. Solving a given difference equation.-CO2
6. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum (using DFT equation and verify it by built-in routine).-CO2
7. Verification of DFT properties (like Linearity and Parseval's theorem, etc.)-CO2
8. DFT computation of square pulse and Sinc function etc.-CO2
9. Design and implementation of Low pass and High pass FIR filter to meet the desired specifications (using different window techniques) and test the filter with an audio file. Plot the spectrum of audio signal before and after filtering.-CO4
10. Design and implementation of a digital IIR filter (Low pass and High pass) to meet given specification and test with an audio file. Plot the spectrum of audio signal before and after filtering. CO4
11. Obtain the Linear convolution of two sequences.-CO3
12. Compute Circular convolution of two sequences.-CO3
13. Compute the N-point DFT of a given sequence.-CO2
14. Determine the Impulse response of first order and second order system.-CO3
15. (a) 1Evalate performance of FIR using different window functions. -CO4
    (b) 1Evalate performance of FIR based on coefficient quantization. -CO4
    (c) 1Evalate performance of IIR. using different window functions.-CO4

END

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EC – 1855(A) Control Systems

Course Title	Course Code	Credits - 3		
		L	T	P
Control Systems	EC 1855(A)	3	-	-

COURSE OBJECTIVE	1. To make the students capable of understanding the fundamental concepts of Control systems and mathematical modeling of the system 2. To make the students capable of analyzing the concept of time response, frequency response and stability of the system.
PRE-REQUISITES	• Signals & Systems • Mathematics I & II
COURSE CONTENTS	Unit-I: Introduction: Control systems. Mathematical Model of Physical Systems: Introduction, Differential equation representation of physical systems, Transfer function concepts, Block diagram algebra, Signal flow graphs. Unit-II: Feedback Characteristics of Control Systems: Introduction, Reduction of parameter variation by use of feedback, Control of system dynamics by use of feedback, Control of effects of disturbance signals by use of feedback, Regenerative feedback, Illustrative examples Unit-III: Time Response Analysis: Introduction, Standard test signals, Performance indices, Time response of first order system, Time response of second order systems, Design specifications of second order systems, Compensation schemes, Design specifications of higher order systems. Unit-IV: Stability Analysis in Time Domain: The concept of stability, Assessment of stability from pole positions, Necessary conditions for stability, Routh Stability Criterion, Relative stability analysis.Root Locus Technique: Introduction, The root locus concept, Root locus construction rules, Root contours. Unit-V: Frequency Response Analysis: Introduction, Performance indices, Frequency response of second order systems, Polar plots, Bode plots, Nyquist Plot, All pass systems, Minimum-phase and Non-minimum-phase systems. Introduction to Design: The design problem, Concepts of cascade and feedback compensation. Realization of basic compensators, Case studies. Concepts of state, state variables and state model, State models of linear continuous-time systems, Concepts of Controllability and Observability, Illustrative examples.
COURSE OUTCOMES:	**On successful completion of this course student should be able to:** CO 1: Acquire knowledge and understand of different types of systems and their representation, stability, time domain and frequency domain behavior controllers and compensators to obtain mathematics. (BL1,BL2) CO 2: Apply knowledge to obtain mathematical modeling of different systems, find out transfer function and obtain knowledge, signal flow graph and state space representation.(BL3) CO 3: Analyze the time domain and frequency domain behavior of different types of signal & system stability(BL3,BL4) CO 4: Design feedback controllers and compensation circuits.-(BL3, BL5)

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TEXT BOOKS& REFERENCES:	• B.C. Kuo and F. Golnaraghi, Automatic Control System • J. NagrathMadan Gopal, Control Systems Engineering, NEW AGE INTERNATIONAL PUBLISHERS LTD.-NEW DELHI • S. Hasan Saeed, Control Systems (English) 7th Edition, S K Kataria & Sons • Narasimham R.L., Analysis of Linear Control System • PadmanabhanK, Control Systems • Bhattacharya, Control Systems Engineering, 3e, Pearson

END

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EC – 1855(B) Instrumentation and Measurement

Course Title	Course Code	Credits - 3		
		L	T	P
Instrumentation and Measurement	EC 1855(B)	3	-	-

COURSE OBJECTIVE

By learning this course students will able to know basics of various Instruments, transducers and working of electronic circuits used in electronic test and measuring instruments. Types of skills leading to the achievement of following competency. Maintain various electronic, test and measuring instrument.

PRE-REQUISITES

- Electronic Devices

COURSE CONTENTS

Accuracy and precision, Significant figures, Types of errors, statistical, Probability of errors, Limiting errors. Functional elements of an instrument, Active and Passive transducers, Analog and Digital mode of operation, Null deflection methods, Input and output configuration of measuring instrument and instrument system. Wheat stone bridge : Basic operation, measurement errors,
Thevenin's equivalent circuit, Guarded Wheatstone bridge, Kelvin bridge: Effects of connecting leads, Kelvin double Bridge. AC Bridges and their application: Condition and application of the balance equation. Maxwell's bridge, Hay Bridge, Schering Bridge, Wein Bridge unbalanced condition. PMMC galvanometer, DC ammeters, Ohmmeter: Series and shunt type, VOM, watt hour meter, instrument transformers power factor meter, Q- meter. Transducers as input elementsto instrumentation system. Basic methods of Force measurement, Torque measurement of rotating shafts, shaft power measurement (Dynamometers) Pressure and Sound Measurement: Standards and calibration, Basic methods of pressure measurement, high pressure and low-pressure measurement, sound measurement. Temperature and Heat Measurement: Standards and calibration, Thermal expansion methods, Thermocouples (Thermoelectric sensors), Resistance thermometers Junction semiconductors sensors, Digital thermometers. Heat-flux sensors, Radiation types. Strain Measurement: Bonded and un-bonded electrical strain gauges, gauge factor, temperature compensation methods. Introduction, Amplified DC meter, AC voltmeter using rectifiers, Electronic multi-meter, Digital voltmeters, Q meter. Oscilloscope: Introduction, Oscilloscope block diagram, Cathode Ray tube (CRT), CRT circuits, Deflection systems, Delay line. Multiple trace, Simple frequency counters. Strip XY recorder, CRO, signal conditioning Techniques used in various transducers, Gain clipping, filtering, amplification, data logger.IEEE488Bus: Principles of operation, protocols

COURSE OUTCOMES:

On successful completion of this course student should be able to:

CO1: Understand and respond to the need for rigorous and formal metrology concepts in designing measurement system. The errors in measurements and their rectification. Understand the operating principles of a range of widely used instruments. (BL1,BL2,BL3)
CO2: Apply the knowledge to select and identify specific sensors (or complete instruments) for controlling machines and processes. (BL3, BL4)
CO3: Design of signal conditioning circuit for measurement systems. (BL3,BL6)

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TEXT BOOKS& REFERENCES:

- Albert.D. Helfrick and William. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques ", Pearson education
- Earnest. O Doeblin, "Measurement Systems Application and Design", McGraw Hill International editions, the edition, 1990.
- R1. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000 2.
- A. K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanapat Rai & Sons, 2000.
- A. J. Bouwens, "Digital Instrumentation", McGraw Hill, 1986.
- Geroge C. Barney, "Intelligent Instrumentation", IEEE, 1992.

LABORATORY EXPERIMENTS

1. Verification of principle of superposition with dc and ac sources.-CO2
2. Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits -CO2
3. Verification of Tellegin's theorem for two networks of the same topology. -CO2
4. Determination of transient response of current in RL and RC circuits with step voltage input.
5. Determination of transient response of current in RLC circuit with step voltage input for under damp, critically damp and over damp cases -CO2
6. Determination of frequency response of current in RLC circuit with sinusoidal ac input -CO2
7. Determination of z and h parameters (dc only) for a network evaluation and computation of Y and ABCD parameters.-CO4
8. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.-CO3
9. Design phase lead and lag network. CO3

END

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EC – 1855(C) Digital Hardware Design

Course Title	Course Code	Credits - 3		
		L	T	P
Digital Hardware Design	EC 1855(C)	3	-	-

COURSE OBJECTIVE	To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits and to prepare students to perform the analysis and design of various digital electronic circuits..
PRE-REQUISITES	• Digital Logic Design • VLSI Circuit Design
COURSE CONTENTS	Review of Combinational circuit design and optimization, fault detection in combinational circuits Synthesis of synchronous Sequential circuits. Finite state machine, state transition diagrams and state transition tables, ASM charts. Asynchronous sequential Logic. Memory elements: ROM, PROM, RAM-SRAM, DRAM. Introduction to Hardware Description Language, Analysis and Synthesis, Array based logic elements (Memory, PLA, FPGA), Special Topics (such as processor design, testing and verification, special digital systems, asynchronous state machines etc.) Case studies using VHDL: design of DSP processor, Any Digital communication perspective design
COURSE OUTCOMES:	**On successful completion of this course student should be able to:** **CO1:** Students will be able to conceptualize combinatorial circuits and sequential circuits And design of state machines and memory cell design. Students will learn about various hardware descriptive languages such as VHDL and Verilog. – (BL1,BL2) **CO2:** The students analyze process of digital integrated circuit synthesis, together with place and route, starting from HDL code to silicon/gate array level. –(BL3,BL4) **CO3:** Students will be able to develop/design applications related to digital communication processors.-(BL3,BL6)
TEXT BOOKS& REFERENCES:	• Morris mano: Digital Design, Pearson Education • Charles H Roth: Digital Systems Design using VHDL, Thomson Learning, 1998 • H.Taub and D. Schilling, Digital Integrated Electronics, McGraw Hill, 1977 • D.A. Hodges and H.G. Jackson, Analysis and Design of Digital Integrated Circuits, International Student Edition, McGraw Hill, 1983. 67 • F.J. Hill and G.L. Peterson, Switching Theory and Logic Design, John Wiley, 1981. • Z. Kohavi, Switching and Finite Automata Theory, McGraw Hill, 1970.

END

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EC – 1856 Simulation Lab II

Course Title	Course Code	Credits - 1		
		L	T	P
Simulation Lab II	EC 1856	-	-	2

COURSE OBJECTIVE

The objective of this course is twofold. First one is to familiarize the students with LabVIEW Environment, its uses and Implementation Methodologies. Second one is to educate students on implementation of Digital Signal Processing Systems through MATLAB System.

PRE-REQUISITES

- Basic Mathematics
- Digital Logic Design
- Network Analysis
- Signal & Systems
- Simulation Lab I
- Digital Signal Processing

COURSE CONTENTS

LabVIEW Lab: Introduction to LabVIEW Environment and its design Components. Design and Development following

Basic Mathematics Exercises

1. Display 1 to 10 (while loop)
2. Single and Multiple input mathematical operations
3. Check whether given number is Even or Odd
4. Factorial calculation using loop structures
5. Multiple unit conversion Exercises in single VI through use of Sub VIs
6. Sum of n natural, even and odd numbers.
7. Design of simple Calculator

Digital Design Exercises

1. Boolean indicator
2. Logic gates
3. Degree to radian conversion
4. 4 bit parallel binary adder
5. Binary to decimal convertor
6. Half adder
7. Full adder using half adder
8. Y = ABC + DE

COURSE OUTCOMES:

On successful completion of this course student should be able to:

CO1: Students will learn coding concepts –(BL1, BL2)
CO2: The students will analyze any concept, process, signal and system by performing coding. –(BL3, BL4)
CO3: Students will be able to develop/design solutions/ applications related to engineering problems through coding. -(BL3,BL6)

END

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