VIDYAVARDHAKA COLLEGE OF ENGINEERING

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COURSE OUTCOMES OF 15 SCHEME SUBJECTS

Subject Code : 15MAT31
Course Code : C201
Course Name : Engg. Mathematics III

CO1. Apply periodic signals and Fourier series to analyse circuits and system communications and develop Fourier series for different types of functions

CO2. Apply Fourier transforms and Z- Transforms in general linear system theory for continuous-time signals and digital signal processing

CO3. Apply statistical method to fit various curves for the given data and also apply various numerical methods to obtain solution of algebraic and transcendental equation

CO4. Apply different numerical techniques to interpret the relation , get familiar with the advent of high speed digital computers and increasing=g demand for numerical answers to various problems

CO5. Apply Green's theorem, Divergence theorem and Stoke's theorem in various applications in the field of electro- magnetic and gravitational fields and fluid flow problems. Apply Calculus of Variation to determine the externals of functional and to solve hanging chain problems

Subject Code : 15EC32
Course Code : C202
Course Name : Analog Electronic Circuits

CO1 Acquire knowledge of working principles, characteristics and frequency response of BJT and FET single stage, cascaded and feedback amplifier configurations.
CO2 Understand the principle and characteristics of feedback, oscillator circuits and power amplifiers.
CO3 Construct transistorized circuits, amplifiers and oscillators.
CO4 Analyze the FET amplifier of various configurations, power amplifiers and oscillator circuits.
CO5 Evaluate the performance of BJT, FET and power amplifier circuits.
CO6 Design amplifier, feedback and oscillator circuits.

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Subject Code : 15EC33
Course Code : C203
Course Name : Digital Electronics

CO1 Acquire knowledge of Combinational Logic,Simplification Techniques using Karnaugh Maps, Quine-McClusky Technique.

CO2 Design various combinational logic circuits like encoders, decoders, multiplexers, demultiplexers, comparators, adders, subtractors and carry look ahead adders.

CO3 Analyze the working of latches, Flip-Flops and designing of registers and counters.

CO4 Design and analyze various synchronous and asynchronous sequential circuits.

CO5 Construct Mealy-Moore Machines with state diagrams.

Subject Code : 15EC34
Course Code : C204
Course Name : Network Analysis

CO1. Solve electrical circuit problems related to star delta, source transformation, source shifting, mesh and nodal methods.

CO2. Reduce complex electric circuits using network theorems to arrive at feasible solutions.

CO3. Analyze series and parallel resonant circuits and measure the performance.

CO4. Analyze the behavior of R, R-L, R-L-C electrical circuits considering Initial, final conditions and Laplace transforms.

CO5. Find Network solution using Various Two port Parameters and their inter relationship.

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Subject Code : 15EC35
Course Code : C205
Course Name : Electronic Instrumentation

CO1. Define errors, digital voltmeters and the basic principle of oscilloscope, signal generators and different types of electrical transducers.
CO2. Discuss different types of errors, differentiate dc voltmeter and ac voltmeters, along with ammeters
CO3. Describe the different types of digital instruments such as digital time meter, frequency meter, tachometers, pH meters and multimeters.
CO4. Discuss the working principle of oscilloscope, types of oscilloscope and differentiate dual beam and dual trace CRO, various types of signal generators, Microprocessor based instrumentation
CO5. Describe different types of transducers and differentiate between active and passive transducers.

Subject Code : 15EC36
Course Code : C206
Course Name : Engineering Electromagnetics

CO1. Explain the concepts related to Electric Fields, Magnetic Fields, Electromagnetic Waves, Time-varying fields and Maxwell's equations.
CO2. Interpret different Charge and Current Configurations to derive Electromagnetic Field Equations, Poisson's and Laplace's Equations, Uniqueness theorem.
CO3. Apply the concepts of Electric and Magnetic fields to solve problems related to Electromagnetic fields and Waves.
CO4. Analyze Gradient, Divergence, Curl, Maxwell's Equations, Wave propagation in free space and dielectrics.

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Subject Code : 15ECL37
Course Code : C207
Course Name : Analog Electronics Lab

CO1. Design and Test rectifiers, clipping circuits, clamping circuits and voltage regulators.

CO2. Compute the parameters from the characteristics of JFET and MOSFET devices.

CO3. Design, test and evaluate BJT amplifiers in CE configuration.

CO4. Design and Test JFET/MOSFET amplifiers.

CO5. Design and Test a power amplifier.

CO6. Design and Test various types of oscillators.

Subject Code : 15ECL38
Course Code : C208
Course Name : Digital Electronics Lab

CO1. Build and verify various Boolean functions and De-Morgan's theorem using logic Circuits.

CO2. Analyze the Behavior of combinational logic circuits using basic logic gates and universal gates.

CO3. Examine the combinational and sequential circuits using Digital Integrated Circuits.

CO4. Evaluate sequential circuits like various Flip Flops and counters based on shift registers using logic circuits.

CO5. Simulate full adder and up/down synchronous and asynchronous counters.

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Subject Code : 15MAT41
Course Code : C209
Course Name : Engineering Mathematics IV

CO1. Apply appropriate single step and multi step numerical methods to solve first order ODE arising in flow data design problems

CO2. Apply appropriate multi step numerical methods to solve second order differential equations arising in the flow data design problems. Apply Bessel function and Legendre polynomials for tackling problems arising in mechanics, hydrodynamics and heat conduction

CO3. Construction of analytic function by applying concepts of C-R equation. Explain the idea of analyticity, potential field's residues and poles of complex potentials in field theory and electromagnetic theory. Evaluation of complex line integrals.

CO4. Describe random variables and probability distributions using rigorous statistical methods to analyse problems associated with optimization of digital circuits , information, coding theory , stability analysis of systems and the knowledge of joint probability distributions

CO5. Apply the concepts of sampling theory in decision making problems and Markov chains in attempting engineering problems for feasible random events

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Subject Code : 15EC42
Course Code : C210
Course Name : Microprocessor

CO1 Explain the evolution of Microprocessors, Architecture of 8086, 8088, 8087, Von – Neumann and Harvard CPU Architecture.

CO2 Apply the Addressing Modes and Instruction Set to write Assembly Language Programs, Modular Programs.

CO3 Analyze the differences between macros and procedures; distinguish basic configurations of Minimum and Maximum mode.

CO4 Design and interpret Static Memory Chips and interface 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper Motors with 8086.

CO5 Differentiate various INT21 DOS interrupt function calls to handle Keyboard and Display.

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Subject Code : 15EC43
Course Code : C211
Course Name : Control Systems

CO1 : Apply the knowledge of mathematics and engineering to analyze closed-loop and open loop control systems and various mathematical models for stability and steady-state performance.

CO2 : Apply mathematical techniques to perform time & frequency response analysis of a control system.

CO3 : Analyze the stability of a system from the transfer function and by using the properties of state transition matrix, RH criterion, root locus, bode plots, Nyquist criterion and find the transfer function.

CO4 : Interpret the transfer functions using block reduction & signal flow graph techniques and verify the stability of the system using various stability analysis methods.

CO5 : Designing a closed-loop control system to satisfy dynamic performance specifications using frequency response, root-locus, and state-space techniques, as well as steady state error specifications.

Subject Code : 15EC44
Course Code : C212
Course Name : Signals and Systems

CO1. Understand the mathematical description of continuous and discrete time signals and systems.

CO2. Classify signals and systems into different categories based on their properties.

CO3. Analyze the Linear Time Invariant (LTI) systems in time domain using convolution sum and convolution integral.

CO4. Analyze Linear Time Invariant (LTI) systems in Fourier domain and z-domain.

CO5. Select the appropriate transformation required for a particular class of signal.

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Subject Code : 15EC45
Course Code : C213
Course Name : Principles of Communication System

CO1: Describe the principles, generation, reconstruction and applications of amplitude modulation.

CO2: Describe the principles, generation, reconstruction and applications of angle modulation.

CO3: Characterize analog signals in time domain as random processes and discuss the properties of autocorrelation and cross correlation functions that are essential in communication systems.

CO4: Examine the types of noise that are encountered in communication systems and evaluate the performance of the communication system in presence of noise.

CO5: Analyze the pulse modulation and sampling techniques.

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Subject Code : 15EC46
Course Code : C214
Course Name : Linear Integrated Circuits

CO1 Understand the basics of Op-Amp circuit and parameters including CMRR, PSRR, Input and Output Impedances and Slew Rate

CO2 Apply the basic concepts of for configuring Op-Amp based DC and AC amplifiers circuits.

CO3 Design circuits for Op-Amp based Voltage / Current Sources & Sinks, Current, Instrumentation Amplifiers and Precision Rectifiers.

CO4 Design circuits for Op-Amp based linear and non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator / Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider.

CO5 Design first and second Order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators.

CO6 Explain applications of linear ICs in phase detector, VCO, DAC, ADC and Timer circuits

Subject Code : 15ECL47
Course Code : C215
Course Name : Microprocessor Lab

CO1. Understand instruction set, assembler directives and DOS Interrupts required for programming.

CO2. Analyze and program a microprocessor to perform arithmetic, logical and data transfer applications.

CO3. Apply procedures and macros for modular programming

CO4. Interface a microprocessor to various devices for simple applications.

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Subject Code : 15ECL48
Course Code : C216
Course Name : LIC Lab

CO1. Design, Demonstrate and Analyse instrumentation amplifier, filters, DAC, adder, differentiator and integrator circuits, using op-amp.

CO2. Design, Demonstrate and Analyse multivibrators and oscillator circuits using Op-amp

CO3. Design, Demonstrate and Analyse analog systems for AM, FM and Mixer operations.

CO4. Design, Demonstrate and Analyse balance modulation and frequency synthesis.

CO5. Demonstrate and Analyse pulse sampling and flat top sampling.

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Subject Code : 15EC51
Course Code : C301
Course Name : Management and Entrepreneurship

CO1. Discuss the characteristics and functional areas of management such as planning, organizing and staffing.

CO2. Distinguish the directing and controlling abilities of a leader

CO3. Interpret the concepts of social responsibilities of Business, Entrepreneurship and various stages of entrepreneurial process

CO4. Investigate the roles and policies of SSI, their impact on Global front and the project preparation process.

Subject Code : 15EC52
Course Code : C302
Course Name : Digital Signal Processing

CO1 Apply the discrete Fourier transform (DFT) on a sequence, relate it to the discrete-time Fourier transform (DTFT), z-transform and Fourier transform (FT) and use the DFT to compute the linear and circular convolution of two sequences.

CO2 Apply various DFT properties to evaluate the given sequence, use the DFT for linear filtering and understand the drawbacks of the direct computation of DFT.

CO3 Apply the fast Fourier transform on a sequence using two approaches namely, the divide and conquer approach and the linear filtering approach.

CO4 Design the analog infinite impulse response (IIR) filter for a given specifications, design the digital IIR filter from its analog counterpart and realize the digital IIR filter.

CO5 Design the digital finite impulse response (FIR) filter for a given specifications and realize the digital FIR filter.

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Subject Code : 15EC53
Course Code : C303
Course Name : Verilog HDL

CO1. Describe digital circuits utilizing various constructs of Verilog.

CO2. Explain syntax, lexical conventions, data types, modules and ports.

CO3. Model the digital system using gate level and dataflow description.

CO4. Model the digital system using behavioral description.

CO5. Analyze the steps involved in synthesis of HDL code

Subject Code : 15EC54
Course Code : C304
Course Name : Information Theory and Coding

CO1 Emphasize the need for average information content of a system and develop a mathematical model to measure the information content of a message.

CO2 Validate the performance of the coding algorithms in terms of their efficiency.

CO3 Discuss and develop the relations for the communication channels to measure the channel capacity.

CO4 Design and analyze the encoding and decoding procedures of linear block codes.

CO5 Develop and analyze the encoding and decoding processes of convolutional codes.

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Subject Code : 15EC553
Course Code : C305
Course Name : Operating systems

CO1. Explain the basic concepts of OS and its classes.
CO2. Analyze the concepts of process and threads along with the demonstration of scheduling
CO3. Discuss the procedure involved in memory management and its types.

CO4. Illustrate the procedure involved in File systems.
CO5. Discuss the steps involved in message passing and deadlocks.

Subject Code : 15EC555
Course Name : MSP430 MICROCONTROLLER

CO1. Understand the architecture of MSP430 microcontrollers and its applications in embedded systems, instruction set and features available.

CO2. Use suitable addressing modes and instructions from the instruction set to write programs to solve the problems.

CO3. Implement Interrupt Service Routines and Timer functions for time critical solutions

CO4. Interface ADCs, DACs, LCDs and other peripherals

CO5. Realize synchronous and asynchronous serial communication protocols between microcontroller and peripherals

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Subject Code : **15EC562**
Course Name : **OOP using C++**

CO1. Apply the knowledge of C++ in writing programs to solve engineering problems

CO2. Make use of Object Oriented Paradigm while writing programs in C++

CO3. Analyze the applicability of various OOP techniques such as encapsulation, abstraction, polymorphism and exception handling in developing solutions

CO4. Evaluate the performance of program to increase efficiency in terms of execution speed and resource utilization

Subject Code : **15ECL57**
Course Code : **C307**
Course Name : **DSP Lab**

CO1. Determine the sampling frequency required for a multispectral signal.

CO2. Perform convolution of two aperiodic and periodic sequences. Further, verify the properties of the convolution.

CO3. Perform correlation and verify its properties.

CO4. Obtain the transform domain representation of a sequence using the DFT and FFT. Plot the magnitude and phase spectrum. Apply the DFT properties to obtain the transformed domain representation in an efficient way.

CO5. Determine the order of the system described in terms of the difference equation and solve to obtain the response of the system.

CO6. Design the FIR and IIR filter for the given specifications.

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Subject Code	**: 15ECL58**
Course Code	**: C308**
Course Name	**: HDL Lab**

CO1. Describe the importance of modern programmable logic devices

CO2. Demonstrate different styles of writing HDL code

CO3. Use Xilinx tools in digital circuits modeling, simulation, functional verification in Verilog

CO4. Validate and synthesize a digital circuit to FPGA board using VHDL

CO5. Validate and implement working circuits on FPGA using interfaces in VHDL

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Subject Code : **15EC61**
Course Code : **C309**
Course Name : **Digital Communication**

CO1. Associate and apply the concepts of Bandpass sampling to well specified signals and channels.

CO2. Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.

CO3. Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.

CO4. Demonstrate by simulation and emulation that bandpass signals subjected to corrupted and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specified performance.

Subject Code : **15EC62**
Course Code : **C310**
Course Name : **ARM Microcontroller and Embedded System**

CO1. Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.

CO2. Apply the knowledge gained for Programming ARM Cortex M3 for different applications.

CO3. Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.

CO4. Develop the hardware /software co-design and firmware design approaches.

CO5. Explain the need of real time operating system for embedded system applications.

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Subject Code	**: 15EC63**
Course Code	**: C311**
Course Name	**: VLSI Design**

CO1. Demonstrate understanding of MOS transistor theory and fabrication flow.

CO2. Draw the basic gates using the stick diagram and layout diagrams with the knowledge of physical design aspects.

CO3. Demonstrate knowledge of scaling models and FPGA based system design

CO4. Analyze CMOS subsystems and architectural issues with the design constraints.

CO5. Interpret Memory elements along with timing considerations, testing and testability issues in VLSI Design

Subject Code	**: 15EC64**
Course Code	**: C312**
Course Name	**: Computer Communication Network**

CO1. Identify the protocols and services of Data link layer.

CO2. Identify the protocols and functions associated with the transport layer services.

CO3. Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.

CO4. Distinguish the basic network configurations and standards associated with each network.

CO5. Construct a network model and determine the routing of packets using different routing algorithms.

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Subject Code : **15EC653**
Course Name : **Artificial Neural Network**

CO1. Describe the role of neural networks in engineering, artificial intelligence, and cognitive modelling.

CO2. Explain the concepts and techniques of neural networks through the study of the most important neural network models.

CO3. Explain the concepts of Support Vector Machines, Radial Basis Function and its application.

CO4. Explain the concepts of reinforcement learning using neural networks and its particular application.

CO5. Explain the concepts of unsupervised learning using neural networks and its particular application.

Subject Code : **15EC654**
Course Name : **Digital Switching Systems**

CO1. Describe the basic types of switching systems in telecommunication, Network Structure, services and telecommunication transmission methods.

CO2. Explain the concepts of DSS building blocks, Basics of Call processing, software architectures and maintenance of DSS

CO3. Determine the telecommunication traffic and its measurements.

CO4. Define the technologies associated with the data switching operations.

CO5. Describe the software aspects of switching systems and its maintenance.

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Subject Code : **15EC663**
Course Name : **Digital System Design using Verilog**

CO1. Construct the combinational circuits, using discrete gates and Programmable logic devices and Case study of accelerators. Design Methodology: Design flow, Design optimization, Design for test.
CO2. Develop a Verilog model for sequential circuits and test pattern Generation.

CO3. Design a semiconductor memory for specific chip design, and embedded systems using small microcontrollers, larger CPUs/DSPs,or hard or soft processor cores.

CO4. Synthesize different types of processor and I/O controllers that are used in embedded system.

Subject Code : **15ECL67**
Course Code : **C315**
Course Name : **Embedded Controller Lab**

CO1. Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
CO2. Develop assembly language programs using ARM Cortex M3 for different applications.
CO3. Interface external devices and I/O with ARM Cortex M3.
CO4. Develop C language programs and library functions for embedded system Applications.

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Subject Code	**: 15ECL68**
Course Code	**: C316**
Course Name	**: Computer Commuincation Lab**

CO1: Design and Simulate Network elements with various protocols and standards.

CO2: Use the network simulator tools for learning and practice of networking algorithms.

CO3: Demonstrate the working of various protocols and algorithms using C programming.