

Dr. Ambedkar Institute of Technology
Department of Electronics & Telecommunication Engineering

The enclosed documents are verified and approved.

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for HoD H. O. D
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Course Outcome

II YEAR

18TE31	ELECTRONICS DEVICES AND CIRCUITS
CO1	Analyze different electronic circuits using diodes, transistors and FET.
CO2	Designing various transistors dc bias circuit .
CO3	Create different diode, BJT and FET circuits, evaluate h parameters.
CO4	Remember different feedback techniques used in oscillators and amplifiers.
CO5	Understand the concept of amplifiers and oscillators.

18TE32	DIGITAL SYSTEM DESIGN
CO1	Learnt the simplification of Boolean expressions and realize with minimum logic gates.
CO2	Analyse the given digital circuits.
CO3	Design various types of combinational and sequential circuits.
CO4	Realise higher order digital circuits using lower order digital circuits.
CO5	Apply combinational and sequential circuits in the design of digital systems.

18TE33	NETWORK THEORY
CO1	State and understand various Network theorems.
CO2	Understand basic concepts of Network Reduction techniques.
CO3	Apply knowledge of mathematics to solve and understand Network theorems related to network, initial conditions, Laplace Transformations, Two port network parameters
CO4	Analyse networks in terms of different two port network parameters.
CO5	Evaluate the transient behaviour of different networks, and quality factor of resonant circuits.

18TE34	LINEAR INTEGRATED CIRCUITS
CO1	Explain Op-Amp circuit and parameters including CMRR, PSRR, Input & Output Impedances and Slew Rate.
CO2	Design Op-Amp based Inverting, Non-inverting, Summing & Difference Amplifier, and AC Amplifiers including Voltage Follower.
CO3	Design Op-Amp based Voltage/ Current Sources & Sinks, Current, Instrumentation and Precision Amplifiers, linear and non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator/ Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider.
CO4	Design first & second order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators using Op-Amps.
CO5	Explain applications of linear ICs in phase detector, VCO, DAC, ADC and Timer.

18TE35	FIELD THEORY
CO1	Explain the concepts of energy expended in moving a charge, potential gradient, vector magnetic potential, wave propagation in free space.
CO2	Remember Coulomb's law, Gauss's law, Ampere's law, Biot-Savart's law.
CO3	Evaluate the value of potential, Laplace's and Poisson's equations.
CO4	Apply knowledge of Maxwell's equations for interpretation of uniform plane wave.
CO5	Analyze the variations in EM waves at interface between two media.

18TEL36	EDC LAB
CO1	Design and analysis amplifier circuits using transistors.
CO2	Design of different transistor oscillators.
CO3	Design and analysis of design different clipping and clamping circuits.
CO4	Design and analysis of various rectifier circuits.
CO5	Analysis of different parameters of FET.

18TEL37	DIGITAL SYSTEM DESIGN LAB
CO1	Design simplified combinational circuits.
CO2	Design adders and subtractors.
CO3	Design and analyze multiplexer and code converters.
CO4	Design and analyze comparators.
CO5	Design different flip-flops and verification of the same.

18TE41	MICROCONTROLLER USING ASSEMBLY AND C LANGUAGE
CO1	Explain the different architectures of Microprocessors and Microcontrollers, RISC and CISC, and Harvard and Von Neumann.
CO2	Apply the knowledge of instruction sets and various addressing modes for programming for Intel 8051 Microcontroller using assembly language.
CO3	Design Timers/counters using programming Intel 8051 Microcontroller using assembly and C language.
CO4	Analyze of 8051 serial communication & interrupts, using both assembly and C languages
CO5	Demonstrate interfacing programs for 8051 Microcontroller in assembly and C language.

18TE42	FUNDAMENTALS OF TELECOMMUNICATIONS
CO1	Explain the basic concepts of telecommunication, transmission and switching.
CO2	Apply the knowledge of modulation in various communication modalities.
CO3	Analyze the procedures involved in telephone communication.
CO4	Analyze the traffic flow and impact on telecommunication infrastructure.
CO5	Demonstrate the working of electrical signal for carrying intelligence.

18TE43	SIGNALS AND SYSTEMS
CO1	Understand signals, systems & their representation in time and frequency domains.
CO2	Evaluate the response of the system in time and frequency domains.
CO3	Analyze frequency domain representation of continuous time and discrete time systems.
CO4	Apply transformation to analyze signal characteristics in time and frequency domain.
CO5	Apply properties of transforms to solve problems on LTI systems.

18TE44	FUNDAMENTALS OF HARDWARE DESCRIPTION LANGUAGE
CO1	Remember and define different types of Description of HDL.
CO2	Understand the basics of digital design and Invoking from Verilog to VHDL
CO3	Analyze the Structural, Behavioral and dataflow description
CO4	Develop and execute algorithms for Mixed Type and Mixed Language descriptions
CO5	Design, apply and test combinational and sequential circuits, in HDL to verify the functionality.

18TE45	TRANSMISSION LINES AND WAVE GUIDES
CO1	Explain various types of transmission lines, types of losses and distortions in them.
CO2	Computation of parameters related to standing wave and learning design strategies for impedance matching.
CO3	Use Smith chart to solve problems associated with transmission lines and impedance matching.
CO4	Analyse types of guided wave between two parallel planes.
CO5	Analyse presence of modes in various types of waveguides.

18TEL46	MICROCONTROLLER LAB
CO1	Learnt simple assembly language programs for 8051 Microcontroller. Developed and executed assembly language programs using different types of Instructions for 8051 Microcontroller.
CO2	Developed and executed assembly language programs using different types of Instructions for 8051 Microcontroller.
CO3	Learnt assembly language programs using different types of instructions for 8051 Microcontroller.
CO4	Written and executed C programs for 8051 Microcontroller.
CO5	Coded and executed C programs for interfacing 8051 Microcontroller.

18TEL47	PROGRAMMING IN HDL LAB
CO1	Design and test circuits of increasing complexity and prototype with FPGA.
CO2	Design and verify the functionality of adder in Dataflow, Behavioral, and structural using HDL.
CO3	Design and test sequential circuits using RTL description, interface stepper motor and DAC with FPGA.
CO4	Implement digital circuits with Verilog & VHDL.
CO5	Design and test the circuits of MUX, comparator, Gray to binary.

III YEAR

18TE51	Digital Signal Processing
CO1	Determine the performance of analog modulation schemes in time and frequency domains.
CO2	Determine the performance of systems for generation and detection of modulated analog signals.
CO3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms.
CO4	Illustrate the applications of various modulation schemes.
CO5	Characterize the influence of channel on analog modulated signals.

18TE52	ANALOG COMMUNICATION
CO1	Determine the performance of analog modulation schemes in time and frequency domains.
CO2	Determine the performance of systems for generation and detection of modulated analog signals.
CO3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms.
CO4	Illustrate the applications of various modulation schemes.
CO5	Characterize the influence of channel on analog modulated signals.

18TE53	ANTENNA AND WAVE PROPAGATION
CO1	Describe the basic concept of antenna, its significance in wireless communication and understand the general terms associated to design antenna with its working conditions.
CO2	Define, describe the array of antennas, point sources, isotropic and non-isotropic sources and conditions to increase the directivity of array antennas.
CO3	Apply and Simulate the concepts of point sources and arrays of antennas.
CO4	Demonstrate and Simulate the importance of all types of antennas is realized with practical implication of antennas.
CO5	Understand the knowledge of the structure of atmosphere, modes of propagation methods.

18TE54	ARM processor and Embedded System Design
CO1	Explain the design for measurement of embedded system operating characteristics and to determine system performance relative to functional requirements.
CO2	Apply the concepts related to design of an embedded system with functional requirements for hardware and software components including processor.
CO3	Design and implement software systems to provide an interface between hardware peripheral sensors and systems.
CO4	Analyse the functional requirements for RTOS architecture for the efficient system design.
CO5	Demonstrate the functional requirements to solve system design problems.

18TE551	CONTROL SYSTEMS
CO1	Explain about stability of a system.
CO2	Applying reduction rules and Mason's gain formula for finding the equivalent transfer function.
CO3	Analysis of time-response of systems of various TYPE number and order.
CO4	Evaluation of stability using Routh's array method and Routh Hurwitz's criterion.
CO5	Construction of mathematical model for electrical and mechanical system, Root locus , Bode-plot.

18TE552	OBJECT ORIENTED PROGRAMMING USING C++
CO1	Apply the basic concepts and structure of OOPs for programming in C++.
CO2	Describe the object-oriented programming approach in connection with C++.
CO3	Illustrate the usage of objects and classes.
CO4	Make use of constructors, destructors and operator overloading in C++ programs.
CO5	Apply inheritance, virtual and pure functions in C++ programming.

18TE553	VLSI IN TELECOMMUNICATIONS
CO1	An ability to analyze fabrication and modeling.
CO2	An impact knowledge of logic gates, circuits and design equation.
CO3	To analyze primitive logic gates.
CO4	To create an understanding of various Flip flops.
CO5	An understanding of non ideal effects, dynamic CMOS Circuits.

18TE554	PRINCIPLES OF RADAR ENGINEERING
CO1	To become familiar with fundamentals of RADAR
CO2	To gain in depth knowledge about the different types of RADAR and their operations.
CO3	Need for signal detection in RADAR and various detection techniques.
CO4	To become familiar with RADAR navigation techniques.
CO5	To become familiar with satellite navigation and hybrid navigation.

18 TEL57	SIGNALS AND SYSTEMS AND DSP LAB
CO1	Computes impulse response of the system, linear convolution, circular convolution and correlation of sequences.
CO2	Computes DFT and IDFT using MATLAB.
CO3	Designs IIR and FIR filters using MATLAB.
CO4	Computes convolution and DFT using DSP kits.
CO5	Demonstrates FIR filter, audio applications and noise addition and removal.

18 TEL58	ANALOG COMMUNICATION & LIC LAB
CO1	Design analyze, and test different filters.
CO2	Design, analyze, and test Class-C tuned amplifier.
CO3	Design, analyze, and test AM, DSBSC and FM.
CO4	Design, analyze, and test Precision rectifiers and Transistor mixer.
CO5	Design ,analyze and test different modulation and detection schemes.

18 TE61	COMPUTER COMMUNICATION NETWORKS
CO1	Explain the architecture of OSI model and TCP/IP model and the switching techniques.
CO2	Implement Framing of the data, controlling the errors using DLL protocols in HDLC formats.
CO3	Analyze accessing of channels in a random and controlled manner using different techniques.
CO4	Analyze the Ethernet standards and wireless LANs.
CO5	Implement routing in network layer using different algorithms and analyze IPV4 and IPV6 address and their transitions.

18TE62	INFORMATION THEORY AND CODING
CO1	Compute entropy and information rate of a source.
CO2	Encode the source output using encoding algorithms and coding techniques.
CO3	Determine the channel capacity of different channels and also the mutual information.
CO4	Implement the error control coding, methods of controlling errors and Error correction and detection.
CO5	Encode using bit shift register and syndrome calculation.

18TE63	DIGITAL COMMUNICATION
CO1	Explain the operations involved in digital modulation system.
CO2	Demonstrate the problem solving skills in communication engineering.
CO3	Apply the knowledge of basic digital communication concepts to design systems.
CO4	Analyze the digital modulation techniques for efficient transmission. s
CO5	Design a few operations in digital communication system.

18TE641	CRYPTOGRAPHY & NETWORK SECURITY
CO1	Apply the concepts of cryptographic techniques that provides information and network security
CO2	Demonstrate the importance of SSL layer and Transport layer security.
CO3	Explain the concepts of public-key cryptosystems.
CO4	Illustrate the importance of Digital signature and Intruders.
CO5	Explain the concepts of malicious software and firewalls.

18TE642	ADVANCED SIGNAL PROCESSING
CO1	Design and apply optimal minimum mean square estimators and in particular linear estimators.
CO2	To understand and compute their expected performance and verify it.
CO3	Design, implement and apply Wiener filters (FIR, non-causal, causal) and evaluate their performance.
CO4	Use a combination of theory and software implementations to solve adaptive signal problems.
CO5	Identify applications in which it would be possible to use the different adaptive filtering approaches.

18TE643	SATELLITE COMMUNICATION
CO1	Analyze different satellites and orbits.
CO2	Calculate look angle for a satellite.
CO3	Compute different transmission losses.
CO4	Analyse of different satellite subsystems.
CO5	Have the knowledge of various multiple access schemes.

18TE644	DATA STRUCTURES USING C++
CO1	Construct data structures using formula based and link based representation.
CO2	Implementing programming on arrays, matrices and stacks.
CO3	Apply of representation of queues using C++ language.
CO4	Develop C++ programs using representation of skip lists and hashing.
CO5	Analyze the operations on trees and traversal of trees.

18TE651	MOBILE COMMUNICATION
CO1	Demonstrate cellular radio concepts in the design of wireless communication systems.
CO2	Analyse different propagation mechanisms.
CO3	Study small scale propagation models and modulation scheme of wireless communication systems.
CO4	Understand different multiple access schemes and speech coding.
CO5	Learn about 3G wireless technology.

18TE652	PRINCIPLES OF RADAR ENGINEERING
CO1	To become familiar with fundamentals of RADAR.
CO2	To gain in depth knowledge about the different types of RADAR and their operations.
CO3	Need for signal detection in RADAR and various detection techniques.
CO4	To become familiar with RADAR navigation techniques.
CO5	To become familiar with satellite navigation and hybrid navigation.

18TE653	SATELLITE COMMUNICATION
CO1	Analyze different satellites and orbits.
CO2	Calculate look angle for a satellite.
CO3	Compute different transmission losses.
CO4	Analyse of different satellite subsystems.
CO5	Have the knowledge of various multiple access schemes.

18TEL66	DIGITAL COMMUNICATION LAB
CO1	Analyze the performance of a baseband communication system that employs ideal Nyquist-based pulse shaping.
CO2	Analyze the ASK, FSK, PSK circuits.
CO3	Analyze DPSK, QPSK circuits.
CO4	Analyze DM and ADM circuits.
CO5	Analyze sigma modulation circuit.

18TEL67	COMPUTER COMMUNICATION NETWORK LAB
CO1	Frame the data with Bit and Character stuffing and destuffing and to Analyze Error Correction and Detection using Polynomial code check sum.
CO2	Implement Routing Algorithm to find the shortest path using Dijkstra's Algorithm and minimum spanning tree.
CO3	Perform Simulation of Encryption and Decryption of the given message using different methods.
CO4	Communicate between two PCs using different media.
CO5	Simulate and analyze network topology using Network Simulator 2.

IV YEAR

18TE71	MICROWAVE ENGINEERING
CO1	To analyze microwave generators with numericals.
CO2	To analyze and represent S-matrix of various passive microwave devices.
CO3	To analyze the working principle of microwave solid state devices.
CO4	To analyze the design of strip lines.
CO5	To analyze various radars with numericals.

18TE72	WIRELESS AND MOBILE NETWORKS
CO1	Have complete knowledge fundamentals of wireless communication and Networks and their applications.
CO2	Identify the different wireless networks like WBAN, WMAN, WLAN, WMAN, WMAN and understand their architecture and their components.
CO3	Understand and interpret the protocols and standards in different Wireless communication and networks.
CO4	Analyze the various design issues in WMAN, WLAN, WMAN, WMAN.
CO5	Determine the applications of Wireless communication networks, Adhoc networks and Sensor Networks.

18TE731	OPTICAL NETWORKING
CO1	To analyze the need for overall optical networks.
CO2	To analyze the working principle of various components of optical networks.
CO3	To analyze the impact of design considerations of optical networks.
CO4	To analyze the components of WDM networks.
CO5	To analyze the maintenance and control functions required for optical networks.

18TE732	MOBILE COMMUNICATION
CO1	Demonstrate cellular radio concepts in the design of wireless communication systems.
CO2	Analyse different propagation mechanisms.
CO3	Study small scale propagation models and modulation scheme of wireless communication systems.
CO4	Understand different multiple access schemes and speech coding.
CO5	Learn about 3G wireless technology.

18TE733	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
CO1	Understand the core concepts of Machine learning.
CO2	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms.
CO3	Explain paradigms of supervised and un-supervised learning.
CO4	Recognize a real world problem and apply the learned techniques of Machine Learning to solve the problem. Question.
CO5	Analyze algorithms on FOCL and reinforcement learning.

18TE741	SPREAD SPECTRUM COMMUNICATION
CO1	Generate various types of Spread spectrum sequences and can simulate CDMA system (Both Transmitter & Receiver).
CO2	Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction.
CO3	Can provide detection and cancellation schemes for Multiusers in CDMA cellular radio.
CO4	Analyse Initial synchronization and receiver spreading codes.
CO5	Analyse Spread spectrum systems in jamming environments.

18TE742	DIGITAL IMAGE PROCESSING
CO1	Student will have a clear understanding of representation of a digital image.
CO2	Student will be able to appreciate the effect of applying various enhancement techniques in spatial domain.
CO3	Student will be able to observe the impact of frequency domain techniques on images.
CO4	Relating computer-vision applications with various segmentation techniques.
CO5	Knowing the applications of various color-models.

18TE743	INTERNET OF THINGS
CO1	Knowledge of framework and architecture of IoT.
CO2	Knowledge of IoT Design principles.
CO3	Understand the Internet connectivity principles in IoT.
CO4	Knowledge of sensor and RFID technology for IoT.
CO5	Knowledge of prototyping embedded devices for IoT and M2M.

18TE751	SATELLITE COMMUNICATION
CO1	Student can analyze different satellites and orbits.
CO2	Calculation of look angle for a satellite.
CO3	Computation of different losses.
CO4	Analysis of different satellite subsystems.
CO5	Knowledge of various multiple access schemes.

18TE752	MULTIMEDIA COMMUNICATION
CO1	Understand types of Multimedia networks and applications.
CO2	Illustrate representation of the information of text, images, audio and video.
CO3	Implement the text and image, Audio and Video compression using different techniques and Standards.
CO4	Analyze the various Routing algorithms.
CO5	Understand different Architectures and Protocols.

18TE753	VLSI IN TELECOMMUNICATIONS
CO1	An ability to analyze fabrication and modeling.
CO2	An impact knowledge of logic gates, circuits and design equation.
CO3	To analyze primitive logic gates.
CO4	To create an understanding of various Flip flops.
CO5	An understanding of non ideal effects, dynamic CMOS Circuits.

18TEL76	MICROWAVE LAB
CO1	To understand and realize practically the working of microwave sources.
CO2	To practically plot mode curves of KPS and calculate various parameters.
CO3	To determine parameters of various microwave passive devices.
CO4	To compare practical and theoretical scattering matrices for various passive devices.
CO5	To realize practical BW and Directivity of microwave antennas.

18TE821	INTERNET OF THINGS
CO1	Knowledge of framework and architecture of IoT.
CO2	Knowledge of IoT Design principles.
CO3	Understand the Internet connectivity principles in IoT.
CO4	Knowledge of sensor and RFID technology for IoT.
CO5	Knowledge of prototyping embedded devices for IoT and M2M

18TE822	ADHOC WIRELESS NETWORKS
CO1	Analyse users in adhoc networks.
CO2	To design MAC protocols and to meet design goals.
CO3	Analyze routing protocols and design different routing protocols.
CO4	Analyze and design transport layer protocols.
CO5	Solve the issues of QOS in adhoc networks.

18TE823	HIGH PERFORMANCE COMPUTER NETWORKS
CO1	The student will have complete understanding of OSI, switching, routing.
CO2	The student can stream audio, video and real time policy mechanisms.
CO3	Has a complete knowledge of VPN, traffic measurement and overlay networks.
CO4	Can do traffic modeling.
CO5	Has a complete knowledge of network security and management.