



III Year –I Semester	PROFESSIONAL CORE POWER ELECTRONICS	L	T	P	C
		3	0	0	3

Pre-requisite:

Electrical Circuit Analysis, Semiconductor Physics, Control Systems

Course Objectives:

- To know the characteristics of various power semiconductor devices.
- To learn the operation of single phase controlled converters and perform harmonic analysis of input current.
- To learn the operation of three phase controlled converters and AC/AC converters.
- To learn the operation of different types of DC-DC converters and control techniques.
- To learn the operation of PWM inverters for voltage control and harmonic mitigation.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Illustrate the static and dynamic characteristics of SCR, Power-MOSFET and Power-IGBT.

CO2: Analyse the operation of phase-controlled rectifiers.

CO3: Analyse the operation of three-phase full-wave converters, AC Voltage Controllers and Cyclo converters.

CO4: Examine the operation and design of different types of DC-DC converters.

CO5: Analyse the operation of Square wave inverters and PWM inverters for voltage control.

UNIT – I

Power Semi-Conductor Devices

Silicon controlled rectifier (SCR) – Two transistor analogy - Static and Dynamic characteristics – Turn on and Turn off Methods - Triggering Methods (R, RC and UJT) – Snubber circuit design.

Static and Dynamic Characteristics of Power MOSFET and Power IGBT-Numerical problems.

UNIT – II

Single-phase AC-DC Converters

Single-phase half-wave controlled rectifiers - R and RL loads with and without freewheeling diode - Single-phase fully controlled mid-point and bridge converter with R load, RL load and RLE load - Continuous and Discontinuous conduction - Effect of source inductance in Single-phase fully controlled bridge rectifier – Expression for output voltages – Single-phase Semi-Converter with R load-RL load and RLE load – Continuous and Discontinuous



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conduction - Dual converter and its mode of operation - Numerical Problems.

UNIT – III

Three-phase AC-DC Converters & AC – AC Converters

Three-phase half-wave Rectifier with R and RL load - Three-phase fully controlled rectifier with R and RL load - Three-phase semi converter with R and RL load - Expression for Output Voltage - Numerical Problems.

Single-phase AC-AC power control by phase control with R and RL loads - Expression for rms output voltage – Single-phase step down and step up Cycloconverter - Numerical Problems.

UNIT – IV

DC-DC Converters

Operation of Basic Chopper – Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) - Output voltage equations using volt-sec balance in CCM & DCM – Expressions for output voltage ripple and inductor current ripple – control techniques – Introduction to PWM control -Numerical Problems.

UNIT – V

DC-AC Converters

Introduction - Single-phase half-bridge and full-bridge inverters with R and RL loads – Phase Displacement Control – PWM with bipolar voltage switching, PWM with unipolar voltage switching - Three-phase square wave inverters - 120^0 conduction and 180^0 conduction modes of operation - Sinusoidal Pulse Width Modulation - Current Source Inverter (CSI) - Numerical Problems.

Text Books:

1. Power Electronics: Converters, Applications and Design by Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons, 2002.
2. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 2017.
3. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009.

Reference Books:

1. Elements of Power Electronics–Philip T.Krein. Oxford University Press; Second edition, 2014.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.



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4. Power Electronics: by Daniel W.Hart, Mc Graw Hill, 2011.

Online Learning Resources:

1. <https://ocw.mit.edu/courses/6-334-power-electronics-spring-2007>
2. <https://archive.nptel.ac.in/courses/108/101/108101126>



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III Year I Semester	PROFESSIONAL CORE DIGITAL CIRCUITS	L	T	P	C
		3	0	0	3

Pre-requisite:

Knowledge of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra and logic gates.

Course Objectives:

- To know the simplification methods of Boolean functions
- To understand the realization of arithmetic, data routing and memory logic circuits.
- To know the operation and design of various counters and registers.
- To understand the analysis and design of synchronous sequential circuits.
- To understand the basic concepts of digital integrated circuits.

Course Outcomes:

At the end of the course, the student will be able to,

CO1: Use the concepts of Boolean algebra, K-map, tabulation method in minimization of switching functions and able to design the arithmetic combinational circuits.

CO2: Realize different types of data routing combinational circuits and PLDs.

CO3: Apply knowledge of flip-flops in designing of registers and counters.

CO4: Analyze synchronous sequential circuits and apply different methods for the design of synchronous sequential circuits.

CO5: Understand the logic families in the form of digital integrated circuits.

UNIT – I:

Combinational logic circuits – I

Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, simplification of logic functions using Boolean theorems, NAND and NOR implementations, Karnaugh maps – 3,4,5 variables, Incompletely specified functions (Don't care terms), Simplifying Max term equations, Quine-McCluskey minimization technique, General approach to combinational logic design, Look ahead carry adder, Cascading full adders, 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder, Binary comparators.

UNIT – II:

Combinational logic circuits – II

Decoders, BCD decoders, 7 segment decoder, higher order decoder, multiplexer, higher order multiplexing, de-multiplexers, higher order de-multiplexing, realization of Boolean functions using decoders, multiplexers, encoders, priority encoder, Read only and Read/Write Memories, Programmable ROM, PAL, PLA-Basics structures, programming tables of



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PROM, PAL, PLA, realization of Boolean functions.

Unit – III

Sequential logic circuits

Timing considerations of flip-flops, master-slave flip-flop, edge triggered flip-flops, characteristic equations, flip-flops with reset and clear terminals, excitation tables, conversion from one flip-flop to another flip-flop, design of asynchronous and synchronous counters, design of modulus-N counters, Johnson counter, ring counter, design of registers - buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – IV

Sequential Circuit Design

Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, Analysis of clocked sequential circuits, realization of sequence detector circuit, state reduction and assignments, design procedure.

UNIT – V

Digital integrated circuits:

Logic levels, propagation delay time, power dissipation, fan-out and fan-in, noise margin, logic families – RTL and DTL Circuits, TTL, Emitter-Coupled Logic, Metal-Oxide Semiconductor, Complementary MOS, CMOS Transmission Gate Circuits.

Textbooks:

1. Switching and finite automata theory Zvi. Kohavi, 3rd edition, Cambridge University Press, 2010.
2. M. Morris Mano and M. D. Ciletti, “Digital Design”, 4th Edition, Pearson Education, 2006.

Reference Books:

1. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition, 1992.
2. Switching Theory and Logic Design by A. Anand Kumar, Prentice Hall India Pvt., Limited, Third Edition, 2016.

Online Learning Resources:

1. <https://nptel.ac.in/courses/117106086>.
2. <https://nptel.ac.in/courses/108105113>.
- 3.



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III Year I Semester	PROFESSIONAL CORE POWER SYSTEMS-II	L	T	P	C
		3	0	0	3

Pre-requisite:

Power systems-I, Electrical circuit Analysis.

Course Objectives:

- To understand the concepts of GMD&GMR to compute inductance & capacitance of transmission lines.
- To distinguish the models of short, medium and long length transmission lines and analyze their performance.
- To learn the effect of travelling waves on transmission lines with different terminal conditions.
- To learn the concepts of corona, the factors effecting corona and effects of transmission lines.
- To design the sag and tension of transmission lines as well as to learn the performance of line insulators.

Course Outcomes:

After the completion of the course the student should be able to:

- CO1: Calculate parameters of transmission lines for different circuit configurations.
CO2: Analyze the performance of short, medium and long transmission lines.
CO3: Analyze the effect of travelling waves on transmission lines.
CO4: Estimate the effects of corona in transmission lines.
CO5: Calculate sag and tension of transmission lines and design the line insulators.

UNIT-I

Transmission Line Parameters Calculations

Conductor materials – Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for Single-phase and Three-phase single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors, Skin and Proximity effects.

Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and Three-phase single and double circuit lines without and with Bundled conductors.



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UNIT-II

Performance Analysis of Transmission Lines

Classification of Transmission Lines – Short, medium, long lines and their model representation –Nominal-T, Nominal- π and A, B, C, D Constants for symmetrical Networks.

Rigorous Solution for long line equations –Representation of Long lines – Equivalent T and Equivalent π network models - Surge Impedance and Surge Impedance Loading of Long Lines - Regulation and efficiency for all types of lines – Ferranti effect.

UNIT – III

Power System Transients

Types of System Transients – Propagation of Surges – Attenuation–Distortion–Reflection and Refraction Coefficients.

Termination of lines with different types of conditions: Open Circuited Line– Short Circuited Line, Line terminated through a resistance and line connected to a cable. Reflection and Refraction at a T-Junction.

UNIT-IV

Corona& Effects of transmission lines

Description of the phenomenon – Types of Corona - critical voltages and power loss – Advantages and Disadvantages of Corona - Factors affecting corona - Radio Interference.

UNIT-V

Sag and Tension Calculations and Overhead Line Insulators:

Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice weight on conductor – Stringing chart and sag template and its applications.

Types of Insulators – Voltage distribution in suspension insulators–Calculation of string efficiency and Methods for String efficiency improvement – Capacitance grading and Static Shielding.

Text Books:

1. Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, 1998.
2. Power System Engineering by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 3rd Edition, 2019.

Reference Books:

1. Power system Analysis–by John J Grainger William D Stevenson,



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- TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
 3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar A.Chakrabarty, DhanpatRai Co Pvt. Ltd.2016.
 4. Electrical Power Systems by P.S.R. Murthy, B.S. Publications, 2017.

Online Learning Resources:

1. <https://archive.nptel.ac.in/courses/108/105/108105104>
2. <https://archive.nptel.ac.in/courses/108/102/108102047>



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III Year – I Semester	PROFESSIONAL ELECTIVE- I SIGNALS AND SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes:

- Differentiate the various classifications of signals and systems
- Analyze the frequency domain representation of signals using Fourier concepts
- Classify the systems based on their properties and determine the response of LTI Systems.
- Know the sampling process and various types of sampling techniques.
- Apply Laplace and z-transforms to analyze signals and Systems (continuous & discrete).

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems, Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function.

UNIT-II: FOURIER SERIES AND FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Related problems

UNIT-III:

CORRELATION: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation.

SAMPLING THEOREM: Graphical and analytical proof or Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Aliasing, Related problems.

UNIT-IV:

LAPLACE TRANSFORMS: Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT-V:

Z-TRANSFORMS: Concept of Z-Transform of a discrete sequence. Region of convergence in Z- Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms, Distinction between Laplace, Fourier and Z transforms.



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TEXT BOOKS:

1. Signals, Systems & Communications-B.P.Lathi,BSPublications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3. Signals & Systems-Simon Haykin and Van Veen,Wiley,2nd Edition,2007

REFERENCE BOOKS:

1. Principles of Linear Systems and Signals—BPLathi,Oxford University Press,2015
2. Signals and Systems—TK Rawat, Oxford University press,2011.



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III Year – I Semester	PROFESSIONAL ELECTIVE- I COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	C
		3	0	0	3

Pre-requisite:

Basic knowledge in digital electronics, fundamentals of computers.

Course Objectives:

- To explain the basic working of a digital computer.
- To understand the register transfer language and micro operators.
- To learn various addressing modes supported by the processors.
- To be familiar with peripheral interfacing with processors.
- To understand memory hierarchy in computers.

Course Outcomes:

At the end of this course, student will be able to:

- CO1: Demonstrate the instruction cycle of a computer.
CO2: Understand various micro operations and register transfer language.
CO3: Describe parallel processing and pipelining.
CO4: Interface different peripherals with processors.
CO5: Know the advantages of cache and virtual memory.

UNIT-I

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input- Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

UNIT-II

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit. Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT-III

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC) Pipeline and Vector



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Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISK Pipeline, Vector Processing, Array Processors.

UNIT-IV

Input/output Organization: Peripheral Devices, I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor (IOP), Serial Communication.

UNIT-V

Memory Organization: Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory, Memory Management Hardware.

Text Books:

1. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., 3rd Edition, Sept. 2008.

References Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003.
2. Computer Organization and Architecture, Linda Null, Julia Lobur, Narosa Publications ISBN 81- 7319-609-5
3. Computer System Organization by John. P. Hayes.



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III Year I Semester	COMMUNICATION SYSTEMS	L	T	P	C
		3	0	0	3



III Year I Semester	RENEWABLE ENERGY SOURCES	L	T	P	C
		3	0	0	3

Pre-requisite: Basic Electrical Engineering

Course Objectives:

- To study the solar radiation data, equivalent circuit of PV cell and its I-V & P-V characteristics.
- To understand the concept of Wind Energy Conversion & its applications.
- To study the principles of biomass, hydel and geothermal energy.
- To understand the principles of ocean Thermal Energy Conversion, waves and power associated with it.
- To study the various chemical energy sources such as fuel cell and hydrogen energy along with their operation and equivalent circuit.

Course Outcomes:

After the completion of the course the student should be able to:

- CO1: Analyze solar radiation data, extra-terrestrial radiation, radiation on earth's surface and solar Energy Storage.
CO2: Illustrate the components of wind energy systems.
CO3: Illustrate the working of biomass, hydel plants and Geothermal plants.
CO4: Demonstrate the principle of Energy production from OTEC, Tidal and Waves.
CO5: Evaluate the concept and working of Fuel cells & MHD power generation.

UNIT-I

Solar Energy

Introduction - Renewable Sources - prospects, solar radiation at the Earth Surface - Equivalent circuit of a Photovoltaic (PV) Cell - I-V & P-V Characteristics - Solar Energy Collectors: Flat plate Collectors, concentrating collectors - Solar Energy storage systems and Applications: Solar Pond - Solar water heating - Solar Green house.

UNIT-II

Wind Energy

Introduction - basic Principles of Wind Energy Conversion, the nature of Wind - the power in the wind - Wind Energy Conversion - Site selection considerations - basic components of Wind Energy Conversion Systems (WECS) - Classification - Applications.



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UNIT-III

Biomass, Hydel and Geothermal Energy

Biomass: Introduction - Biomass conversion technologies- Photosynthesis. Factors affecting Bio digestion.

Hydro plants: Basic working principle – Classification of hydro systems: Large, small, micro hydel plants.

Geothermal Energy: Introduction, Geothermal Sources – Applications - operational and Environmental problems.

UNIT-IV

Energy From oceans, Waves & Tides:

Oceans: Introduction - Ocean Thermal Electric Conversion (OTEC) – methods - prospects of OTEC in India.

Waves: Introduction - Energy and Power from the waves - Wave Energy conversion devices.

Tides: Basic principle of Tide Energy -Components of Tidal Energy.

UNIT-V

Chemical Energy Sources:

Fuel Cells: Introduction - Fuel Cell Equivalent Circuit - operation of Fuel cell - types of Fuel Cells - Applications.

Hydrogen Energy: Introduction - Methods of Hydrogen production - Storage and Applications

Magneto Hydro Dynamic (MHD) Power generation: Principle of Operation - Types.

Text Books:

1. G.D.Rai, Non-Conventional Energy Sources, Khanna Publications, 2011.
2. John Twidell& Tony Weir, Renewable Energy Sources, Taylor & Francis, 2013.

Reference Books:

1. S.P.Sukhatme&J.K.Nayak, Solar Energy-Principles of Thermal Collection and Storage, TMH, 2011.
2. John Andrews & Nick Jelly, Energy Science- principles, Technologies and Impacts, Oxford, 2nd edition, 2013.
3. ShobaNath Singh, Non- Conventional Energy Resources, Pearson Publications, 2015.

Online Learning Resources:

1. <https://archive.nptel.ac.in/courses/103/103/103103206>
2. <https://archive.nptel.ac.in/courses/103/107/103107157>



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R23 IIIrd Year ELECTRICAL AND ELECTRONICS ENGINEERING

III Year I Semester	CONCEPTS OF ENERGY AUDITING & MANAGEMENT	L	T	P	C
		3	0	0	3

Pre-requisite:

Basics of Conservation of Electrical Energy

Course Objectives:

- To understand basic concepts of Energy Audit & various Energy conservation schemes.
- To design energy an energy management program.
- To understand concept of Energy Efficient Motors and lighting control efficiencies.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Understand the principles of energy audit along with various Energy related terminologies.

CO2: Asses the role of Energy Manager and Energy Management program.

CO3: Design a energy efficient motors and good lighting system.

CO4: Analyse the methods to improve the power factor and identify the energy instruments for various real time applications.

CO5: Evaluate the computational techniques with regard to economic aspects.

UNIT-I

Basic Principles of Energy Audit

Energy audit- definitions - concept - types of Energy audit - energy index - cost index - pie charts - Sankey diagrams and load profiles - Energy conservation schemes- Energy audit of industries- energy saving potential - energy audit of process industry, thermal power station - building energy audit - Conservation of Energy Building Codes (ECBC-2017)

UNIT-II:

Energy Management

Principles of energy management - organizing energy management program - initiating - planning - controlling - promoting - monitoring - reporting. Energy manager - qualities and functions - language - Questionnaire – check list for top management.

UNIT-III:

Energy Efficient Motors and Lighting



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Energy efficient motors - factors affecting efficiency - loss distribution - constructional details - characteristics – variable speed - RMS - voltage variation-voltage unbalance-over motoring-motor energy audit. lighting system design and practice - lighting control - lighting energy audit.

UNIT-IV

Power Factor Improvement and Energy Instruments

Power factor – methods of improvement - location of capacitors - Power factor with non-linear loads - effect of harmonics on power factor - power factor motor controllers – Energy Instruments- watt meter - data loggers - thermocouples - pyrometers - lux meters - tongue testers.

UNIT-V

Economic Aspects and their Computation

Economics Analysis depreciation Methods - time value of money - rate of return - present worth method - replacement analysis - lifecycle costing analysis – Energy efficient motors. Calculation of simple payback method - net present value method- Power factor correction - lighting – Applications of life cycle costing analysis - return on investment.

Text Books:

1. Energy management by W.R.Murphy & G.Mckay Butter worth - Heinemann publications - 1982.
2. Energy management hand book by W.CTurner - John wiley and sons - 1982.

Reference Books:

1. Energy efficient electric motors by John.C.Andreas - Marcel Dekker Inc Ltd-2nd edition - 1995
2. Energy management by Paul o' Callaghan - Mc-graw Hill Book company-1st edition - 1998
3. Energy management and good lighting practice : fuel efficiency- booklet12-EEO

Online Learning Resources:

1. <https://nptel.ac.in/courses/108106022>
2. <https://archive.nptel.ac.in/courses/108/106/108106022>



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R23 IIIrd Year ELECTRICAL AND ELECTRONICS ENGINEERING

III Year I Semester	POWER ELECTRONICS LAB	L	T	P	C
		0	0	3	1.5

Course objectives:

- To learn the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- To understand the operation of AC voltage regulator with resistive and inductive loads.
- To understand the working of Buck converter and Boost converter.
- To understand the working of single-phase & three-phase inverters.

Course outcomes:

After the completion of the course the student should be able to:

- CO1: Analyse characteristics of various power electronic devices and design firing circuits for SCR.
- CO2: Analyse the performance of single-phase dual, three-phase full-wave bridge converters and dual converter with both resistive and inductive loads.
- CO3: Examine the operation of Single-phase AC voltage regulator and Cyclo converter with resistive and inductive loads.
- CO4: Differentiate the working and control of Buck converter and Boost converter.
- CO5: Differentiate the working & control of Square wave inverter and PWM inverter.

Any 10 of the Following Experiments are to be conducted

1. Characteristics of SCR - Power MOSFET & Power IGBT.
2. R, RC & UJT firing circuits for SCR.
3. Single -Phase semi-converter with R & RL loads.
4. Single -Phase full-converter with R & RL loads.
5. Three- Phase full-converter with R & RL loads.
6. Single-phase dual converter in circulating current & non circulating current mode of operation.
7. Single-Phase AC Voltage Regulator with R & RL Loads.
8. Single-phase step down Cycloconverter with R & RL Loads.
9. Boost converter in Continuous Conduction Mode operation.
10. Buck converter in Continuous Conduction Mode operation.



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11. Single -Phase square wave bridge inverter with R & RL Loads.
12. Single - Phase PWM inverter.
13. Three-phase bridge inverter with 120^0 and 180^0 conduction mode.
14. SPWM control of Three-phase bridge inverter



III Year I Semester	ANALOG AND DIGITAL CIRCUITS LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

To impart knowledge on

- Analysis of transistor amplifiers
- Analysis of feedback amplifiers and oscillators
- Realization of digital circuits such data routing, registers and counters.

Course Outcomes:

At the end of the course, the student will be able to,

- CO1: Analyse diode clipper/clamper circuits and transistor biasing.
CO2: Illustrate the operation of feedback amplifiers and oscillator circuits.
CO3: Analyze the applications of linear IC's
CO4: Demonstrate the operation of digital circuits such as arithmetic, data routing, registers and counters.

Any 5 of the Following Experiments are to be conducted from each PART A.

1. Analysis of clipper and clamper circuits.
2. Analysis of self-bias to a transistor.
3. Analysis of voltage series and current series feedback amplifiers.
4. Analysis of Wien Bridge oscillator and RC-phase shift oscillator.
5. Analysis of Integrator and Differentiator Circuits using IC 741.
6. Analysis of Monostable and Astable multivibrator operation using IC 555 Timer.
7. Analysis of Schmitt Trigger Circuits using IC 741 and IC 555.
8. Verify the PLL characteristics using IC 565.
9. Analysis of 8 bit A to D and D to A circuits

PART-B

1. Design of Full adder and Full Subtractor using logic gates.
2. Realization of parallel adder/subtractor using IC 7483.
3. Implementation of 3 to 8 line decoder using logic gates and IC 7445.
4. Implementation of 8 to 1 multiplexer using logic gates and IC 74151.
5. Verify the operation of master-slave JK flip-flop using IC7476.
6. Realization of the following shift registers using IC7495.
 - a) SISO
 - b) SIPO
 - c) PISO
 - d) PIPO
7. Implementation of Mod-10 ripples counter using flip-flops and IC 7490.
8. Implementation of Mod-8 synchronous up/down counters using flip-flops.
9. Implementation of 4 bit Ring Counter and Johnson Counter using D flip-flops/J-K flip-flops.



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KAKINADA – 533 003 (A.P) INDIA

R23 IIIrd Year ELECTRICAL AND ELECTRONICS ENGINEERING

III Year I Semester	SKILL ENHANCEMENT COURSE SOFT SKILLS	L	T	P	C
		0	1	2	2



III Year I Semester	ENGINEERING SCIENCE TINKERING LAB	L	T	P	C
		0	0	2	1

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Objectives : To

- 1. Encourage Innovation and Creativity**
- 2. Provide Hands-on Learning**
- 3. Impart Skill Development**
- 4. Foster Collaboration and Teamwork**
- 5. Enable Interdisciplinary Learning**
- 6. Impart Problem-Solving mind-set**
- 7. Prepare for Industry and Entrepreneurship**

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

- 1) Make your own parallel and series circuits using breadboard for any application of your choice.
- 2) Demonstrate a traffic light circuit using breadboard.
- 3) Build and demonstrate automatic Street Light using LDR.
- 4) Simulate the Arduino LED blinking activity in Tinkercad.
- 5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
- 6) Interfacing IR Sensor and Servo Motor with Arduino.
- 7) Blink LED using ESP32.
- 8) LDR Interfacing with ESP32.
- 9) Control an LED using Mobile App.
- 10) Design and 3D print a Walking Robot
- 11) Design and 3D Print a Rocket.
- 12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
- 13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

- 1) <https://aim.gov.in/pdf/equipment-manual-pdf.pdf>



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- 2) <https://atl.aim.gov.in/ATL-Equipment-Manual/>
- 3) <https://aim.gov.in/pdf/Level-1.pdf>
- 4) <https://aim.gov.in/pdf/Level-2.pdf>
- 5) <https://aim.gov.in/pdf/Level-3.pdf>

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.



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R23 IIIrd Year ELECTRICAL AND ELECTRONICS ENGINEERING

III Year I Semester	EVALUATION OF COMMUNITY SERVICE INTERNSHIP	L	T	P	C
		-	-	-	2