GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

Azadi Ka Amrit Mahotsav

mygov मेरी सरकार

PREAMBLE TO THE CONSTITUTION

PREAMBLE

WE, THE PEOPLE OF INDIA,

having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC **REPUBLIC** and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

[redacted]

Signature

23-01-2022

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

("Deemed to be University u/s 3 of the UGC Act, 1956")
Accredited 'A+' Grade by NAAC
Agalakote, B.H.Road, Tumkur – 572 107.KARNATAKA, INDIA.

No. SSAHE/ACA-S&C/27/UG(BE)/2024 Date: 15/07/2024

N O T I F I C A T I O N

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Electrical and Electronics Engineering)

Ref: Proceedings of the Academic Council meeting held on 10/07/2024 vide agenda No. SSAHE/AC/XXVIII-12/2024

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Electrical and Electronics Engineering) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to
1) Office of the Chancellor, SSAHE, for kind information,
2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
3) All Officers of the Academy Examination Branch / Academic Section
4) Guard File / Office copy.

S.S.A.H.E TUMKUR

SRI SIDDHARTHA
INSTITUTE OF TECHNOLOGY, TUMAKURU
Nurturing Young Minds
A Constituent College of Sri Siddhartha Academy of Higher Education
Department of Electrical and Electronics Engineering
(Accredited by NBA, New Delhi in Tier-1)

Scheme & Syllabus for Third Year-2024-25

Department of Electrical & Electronics Engineering

Under Graduate courses where students and faculty can pursue knowledge without boundaries, a place where theory and practice combine to produce a better understanding of our world and ourselves. The objective of department is to equip students with techniques to become providers of innovative and indigenous solutions. The discipline of E&EE has been striving towards providing a vibrant atmosphere for students in diverse areas of Electrical Engineering. Its programs are designed to prepare students for technical excellence.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
(Accredited by NBA, New Delhi for Three Years 2023-26)

Department Vision:

To impart value based education in the field of Electrical and Electronics Engineering which provides a great learning experience and be an outstanding part of the community.

Department Mission:

- To impart fundamental knowledge of science and technology.
- To instill managerial, entrepreneurial and soft skills.
- To make significant contribution to meet societal needs.
- To develop a knowledge-based information system in the Electrical Engineering domain which can be updated regularly for future learning and cater to the needs of the society.

Department Program Educational Objectives (PEOs):

- To mould Electrical and Electronics Engineering graduates with fundamental Knowledge of engineering and sciences to excel in professional career.
- To work in a team, exhibit leadership qualities and provide solutions to Electrical Engineering problems and demonstrate the importance of professional integrity.
- To produce graduates who will continue to enhance their knowledge and are able to take up confidently diverse career paths with professional ethics and meet the societal needs.

Program Specific Outcomes (PSOs)

- Identify, formulate, analyze, design and implement electrical and electronic circuits, Control Systems, Drives, Power Systems and Power Electronic Systems.
- Understand and apply the impact of engineering solutions by using modern tools to solve problems in diverse and multidisciplinary environment and a commitment to maintain professional ethics and lifelong learning.
- Demonstrate the ability to effectively work in a team, communicate appropriately, develop a fair attitude and concern for society & environment.

Program Outcomes (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, tomanage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of Teaching and Examination (160 Credits Scheme, NEP Batch)

THIRD YEAR B.E., ELECTRICAL AND ELECTRONICS ENGINEERING
5th Semester B.E.
Effective from the Academic year 2024-25

Sl No	Course Code		Course Title	Teaching Dept.	L	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	PC	22EE501	Electrical Machine Design	EE	3	-	3	50	50	100	3
2	PC	22EE502	Industrial Automation	EE	3	2	4	50	50	100	3
3	PC	22EE503	Microcontroller and Embedded system	EE	3	2	4	50	50	100	3
4	PE	22EE5PE4x	**Professional Elective-I** 1. Advanced Control Systems 2. Illumination Engineering 3. Linear Integrated Circuits	EE	3	-	3	50	50	100	3
5	OE	22EE5OE5x	**Open Elective-I** 1. EnergyConversion Techniques 2. Fundamentals of Illumination Engineering	EE	3	-	3	50	50	100	3
6	HS	22IE56X	**Institutional Elective-** 1:Research Methodology 2:Management and Entrepreneurship 3: Project Management	HS	3	-	2	50	50	100	3
7	PC	22EE507	Dept. Skill Lab-3 (Level – IV)	EE	1	2	2	50	50	100	3
8	HS	22SK508	Skill Development-II	T&P	-	2	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				Total	**18**	**08**	**22**	**400**	**350**	**750**	--

Scheme of Teaching and Examination (160 Credits Scheme, NEP Batch)

THIRD YEAR B.E., ELECTRICAL AND ELECTRONICS ENGINEERING
6th Semester B.E.
Effective from the Academic year 2024-25

Sl No	Course Code		Course Title	Teach. Dept.	L	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs.
1	PC	22EE601	Power Systems – I	EE	3	-	3	50	50	100	3
2	PC	22EE602	Digital Signal Processing	EE	3	2	4	50	50	100	3
3	PC	22EE603	Switchgear and High Voltage Engineering	EE	3	2	4	50	50	100	3
4	PE	22EE6PE4X	**Professional Elective-II** 1. Advanced Power Electronics 2.Solar and Wind Energy Systems 3. Python Programming	EE	3	-	3	50	50	100	3
5	OE	22EE6OE6x	**Open Elective-II** 61. Programmable Logic Controller 62. Fundamentals of Renewable Energy Sources	EE	3	-	3	50	50	100	3
6	PC	22EE66X	**Online-Course: NPTEL/MOOC/SWAYAM** 22NP661-NPTEL 22MC662-MOOC 22SW663-SWAYAM	EE	2	-	2	50	-	50	-
7	PW	22EEMP607	Mini-project	EE	-	4	2	50	50	100	3
8	HS	22SK608	Skill Development-III	T&P	-	2	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**17**	**10**	**22**	**400**	**350**	**750**	**-**

Syllabus for the Academic Year-2024-2025

Department: Electrical & Electronics Engineering

Semester: V

Course Name: ELECTRICAL MACHINE DESIGN

Course Code: PC-22EE501 **L-P-C: 3-0-3**

Course Objectives:

1. To realize the fundamentals of electrical machine design.
2. To apply the design aspects in Electrical machines.
3. To analyze the number of slots in AC & DC machines.
4. To design the overall dimension of Electrical machines.

UNIT	Description	Hours
I	**Fundamentals of Design:** Introduction, considerations for the design of electrical machines, limitations. Different types of materials and insulators used in electrical machines. **Design of DC Machines:** Output equation, choice of specific loadings, choice of number of poles, design of main dimensions, design of armature & slot dimensions.Estimation of number of turns in the field winding.Problems only on main dimension & number of slots.	**08**
II	**Design of Single Phase Transformers:** Output equation, choice of specific loadings, expression for volts / turn, determination of main dimensions of the core, estimation of number of turns and cross sectional area of primary and secondary coil, estimation of no load current.	**08**
III	**Design of Three Phase Transformers:** Output Equation, choice of specific loadings. Determination of main dimensions of the core, estimation of number of turns and cross sectional area of primary and secondary coil, tank design, number of tubes.	**08**
IV	**Design of Three Phase Induction Motor:** Output equation, choice of specific loading, main dimensions of 3-phase induction motor, stator winding design, choice of length of the air gap, estimation of number of slots for the squirrel cage rotor. Problems only on main dimension & number of slots.	**08**
V	**Design of Synchronous Machines:** Output equations, choice of specific loadings, short circuit ratio, number of slots for the stator, design of main dimensions, armature winding, slot details for the stator of salient & non salient pole, synchronous machines design, design of rotor of salient pole synchronous machines. Problems only on main dimension & number of slots.	**08**

Course Outcomes:

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

1. Realize the fundamentals of electrical machine design.
2. Apply the design aspects in Electrical machines.
3. Analyze the number of slots in AC & DC machines.
4. Design the overall dimension of Electrical machines.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2				2					2	2	2	
CO2	3	2	2				2					2	2	2	
CO3	3	2	2				2					2	3		
CO4	3	2	2				2					2	3		

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	A Course in Electrical Machine Design	A K Sawhney	6th edition, 2014, Dhanpat Rai & Sons.
Reference Books:			
1	A Simplified Text in Electrical Machine Design	A NagoorKani	RBAPublications,2nd edition.
2	Design of Electrical Machines	V N Mittle	Standard Publishers, 4th edition.
NPTEL: https://www.nptel.ac.in/courses/108/106/108106023			

Syllabus for the Academic Year – 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: V
Subject Name: Industrial Automation
Subject Code: PC-22EE502 **L-P-C: 3-2-4**

Course Objectives:

1. To explain PLC system, standards, I/O devices and SCADA
2. To analyze PLC programming and data processing for industry application
3. To apply the knowledge of timers and counters for industry automation application.
4. To develop ability to solve industrial problems using HMI and SCADA.

UNIT	Description	Hours
I	**INTRODUCTION:** Introduction to Programmable logic controller (PLC), role in automation, advantages and disadvantages, hardware, internal architecture, sourcing and sinking, list of input and output devices, I/O processing, input/output units, signal conditioning, remote connections, networks, processing inputs I/O addresses.	**08**
II	**PROGRAMMING:** Ladder programming- ladder diagrams, logic functions, latching, multiple outputs, entering programs, functional blocks, Instruction list, sequential functions charts & structured text, jump and call subroutines**.**	**08**
III	**TIMERS AND COUNTERS**: Types of timers, programming timers, ON and OFF- delay timers, pulse timers, forms of counter, programming, up and down counting, timers with counters, sequencer.	**08**
IV	**ANALOG PLC OPERATIONS and HMI:** Different PLC operations, applications of PLCs: Stepper motor control, speed control of D.C. motor & Induction motor, lift/elevator control, water level control, Traffic control, Temperature control. HMI(Human Machine Interfacing) Architecture, types and specifications, Interfacing and Networking with PLC.	**08**
V	**SCADA :** Introduction, definition and history of Supervisory Control and Data Acquisition, typical SCADA System Architecture, Features, advantages, disadvantages and applications of SCADA. SCADA Architecture (First generation-Monolithic, Second Generation-Distributed, Third generation-Networked Architecture), DCS architecture, Communication Protocol.	**08**

Lab Content:

SL.	Description
1.	Realization of basic logic gates.
2.	Construction and develop PLC ladder diagram to control lamp.
3.	Construction and develop PLC ladder diagram to control motor.
4.	Develop and test ladder diagram to control lamp with Timer
5.	Develop and test ladder diagram to control motor with counters
6.	Develop and test ladder diagram for Star and Delta connection.
7.	Develop and test ladder diagram for DOL type motor with PLC
8.	Develop and test traffic light controller logic.

Course Outcomes:

After completion of course, student will be able to:

1. Explain PLC system, standards, I/O devices and SCADA
2. Analyze PLC programming and data processing for industry application
3. Apply the knowledge of timers and counters for industry automation application.
4. Develop ability to solve industrial problems using HMI and SCADA..

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2			2						2	1	2	2	
CO2	3	2	3		2						2	1	2	2	
CO3	3	2	3		3						2	1	2	2	
CO4	3	2	3		3						2	1	2	2	

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	**Programmable Logic controllers**	W Bolton	4th edition, Elsevier- newness, 2006.
2	**Securing SCADA System**	Ronald L Krutz	Wiley Publication
Reference Books:			
1	**Programmable Controller Theory and Applications**	L. A Bryan, E. A Bryan	2nd edition, An industrial text company publication, 1997.
2	**SCADA Supervisory Control and Data Acquisition**	Stuart A Boyer, ISA	4th Revised edition
NPTEL: https://nptel.ac.in/courses/108/105/108105063			

Syllabus for the Academic Year 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: V
Course Name: MICROCONTROLLER AND EMBEDDED SYSTEM
Course Code: PC-22EE503 **L-P-C: 3-2-4**

Course Objectives:

1. To generalize the basics of Microprocessor, 8051 Microcontroller with architecture, hardware, Instruction set and programming.
2. To Illustrate programming skills for real time application to manage different process.
3. To inspect various programmable interfacing modules for building Embedded System.
4. To assemble interfacing processor with I/O devices using different communication methods.

UNIT	Description	Hours
I	**Microcontroller: -** Introduction; comparison of microprocessor & microcontroller; A survey of microcontroller, Architecture of 8051: Input /Output Pins; Ports and Circuits; External memory; counter & timers; serial data input/output; & Interrupts. Addressing modes, 8051 Instruction Set - Data movement Instruction, arithmetic instruction, Logic instruction, Branch Instruction (No Programs, explain with an example only)	**08**
II	**Software and Programming:** 8051 software and Programming memory interfacing and address decoding, programming Input/ Output port/ timer/ ADC/DAC, Serial data communication controller and interrupts controller.	**08**
III	**Introduction to Embedded System -** The build process for embedded systems- Structural units in Embedded processor, selection of processor & memory devices- DMA - Memory management methods- Timer and Counting devices, Memory Devices, Processor and Memory Selection, Memory Map and Applications, Memory Blocks for Different Structures.	**08**
IV	**Peripherals & Networking** Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging. Embedded Networking - Introduction - I/O Device Ports & Buses - Serial Bus communication protocols - RS232 standard - RS422 - RS485 - CAN Bus -Serial Peripheral Interface (SPI) -Inter Integrated Circuits (I2C) - need for device	**08**
V	**Interfacing Applications:** Interfacing 8051microcontroller to LCD, Keyboard,Parallel and serial ADC, DAC, Stepper motor interfacing and DC motor interfacing.	**08**

LABORATORY EXPERIMENTS:

SL. NO.	Description
1	Data Transfer - Block movement, Exchange, Sorting, Finding largest element in an array.
2	Arithmetic Instructions - Addition/subtraction, multiplication/division, square and cube of a number (16 bits Arithmetic operations bit addressable).
3	Counters, Boolean & Logical Instructions & Conditional CALL & RETURN
4	Code conversions and Programs to generate delay, Programs using serial port and on- Chip timer / counters
5	Alphanumeric LCD panel and Hex keypad input interface to 8051
6	Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC Interface to 8051 microcontroller.
7	Interfacing of Stepper motor and DC motor control interface to 8051 microcontroller.
8	Elevator interface to 8051 microcontroller.

Course Outcomes:

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

1. Generalize the basics of Microprocessor, 8051 Microcontroller with architecture, hardware, Instruction set and programming.
2. Illustrate programming skills for real time application to manage different process.
3. Inspect various programmable interfacing modules for building Embedded System.
4. Assemble interfacing processor with I/O devices using different communication methods.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	1	1	1	1						1	1	1	
CO2	2	2	2	1	2	1						1	1	1	
CO3	2	2	2	2	2	2						2	1	1	
CO4	2	1	3	2	1	1						2	1	1	

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	The 8051 Microcontroller and Embedded Systems using assembly	C, Muhammad Ali Mazidi, and Janice Gilles pie, Mazidi and Rollin D, Mc Kinlay	PHI, 2 nd edition, 2016.
2	Embedded System, Architecture, Programming and Design	aj Kamal	TMH, 2nd Edition 2008
Reference Books:			
1	The 8051 Microcontroller Architecture, Programming & Applications	Kenneth J Ayala	2 nd edition, Penram, International, 1996/Thomson, Learning, 2005
2	The 8051 Microcontroller	V Udayashankar and Mallikarjuna Swamy, Tata Mc Graw-Hill,	New Delhi, 2009.
3	Embedded Microcomputer Systems	Real time interfacing,Valvano	J.W,2nd impression, Pearson education, 2007, 5th edition.
NPTEL: https://nptel.ac.in/courses/108/105/108105102			

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Course Name: ADVANCED CONTROL SYSTEMS
Course Code: PE-22EE5PE41 **L-P-C: 3-0-3**

Course Objectives:

1. To infer the concept of state variable analysis, state equations and nonlinearsystem.
2. To articulate the concept of matrix fundamentals and compute Eigen values, Eigen vectorsand state transition matrix.
3. To categorize the system controllability and observability.
4. To design State feedback controller and state observer.

UNIT	Description	Hours
I	**Controllers:** P, PI, PD and PID. **State Variable analysis & Design:** Introduction, concept of state, statevariables and state model of linear systems.	**08**
II	**State space representation:** Physical variables, phase variables and canonical variables. Derivation of transfer function from state model, Eigen values, Eigen vectors, generalized Eigen vectors, diagonalization/linear transformation.	**08**
III	**Solution of state equation:** state transition matrix & its properties, computation using Laplace transformation, power series method, Cayley-Hamilton method, concept of controllability & observability-Methods.	**08**
IV	**Non-Linear System:** Introduction, behavior of non-linear system, common physical non-linearities, saturation, friction, backlash, dead zone, relay, Phase- Plane method (Basic concepts), nodal point, saddle point, focus point singular points, Stability of non-linear systems, limit cycles. (Construction of phase- trajectories- excluded)	**08**
V	**Pole placement techniques:** State feedback controller design-direct substitution method and by using Ackramann's formula, full order state observer design- direct substitution method and by using Ackramann's formula.	**08**

Course Outcomes:

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

1. Infer the concept of state variable analysis, state equations and nonlinear system.
2. Articulate the concept of matrix fundamentals and compute Eigen values, Eigen vectors andstate transition matrix.
3. Categorize the system controllability and observability.
4. Design State feedback controller and state observer.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3		2									2		
CO2	3	3		2										2	
CO3	3	3		2									3		
CO4	3	3	3	2									3		

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Digital Control & State Variable Methods	M Gopal	TMH, 2nd edition, 2003
2	State Space Analysis of Control systems	Katsuhiko Ogata	PHI, 2007
Reference Books:			
1	Control Systems Engineering	J. Nagrath, M. Gopal	New Age International Publishers,6th Multi Color Edition, 2017
2	Advanced Control Theory	A Nagoor Kani	RBA Publications, 2nd edition, 2003
3	Modern Control Theory	M.V Bakshi, UA Bakshi	Technical Publication, 2nd edition, 2003
NPTEL: https://nptel.ac.in/courses/108/103/108103008			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: V
Course Name: ILLUMINATION ENGINEERING
Course Code: PE-22EE5PE42 **L-P-C: 3-0-3**

Course Objectives:

1. To understand the concepts of Illumination.
2. To apply the concepts and various factors considered for illumination.
3. To analyze illumination schemes for various applications.
4. To design different lighting systems as per the requirement of customers.

UNIT	Description	Hours
I	**Introduction to lighting system:** Eye and Vision, Electromagnetic Spectrum, Visible Spectrum, Components of Eye and functions of each, Vision functions, accommodation, adaptation and convergence, luminance contrast and colorcontrast.	**08**
II	**Illumination systems, Light sources:** EN 12464-1,2(illumination standards), Day light, Incandescent, electric discharge, fluorescent, arc lamps.	**08**
III	**Laws of Illumination:** Illumination from point, line and surface sources, Photometry, spectro photometry, photocells, environment and glare. General Illumination design, Interior lighting, residential lighting, office departmentalsources, theatre, hospitals.	**08**
IV	**Interior Lighting Design:** lighting design objectives, safety and health performance appearance and comfort lighting design flow chart, lighting for commercial buildings and public buildings such as offices, hotels, teaching establishments, theaters and hospital lighting.	**08**
V	**Exterior Lighting Design:** Flood lighting, street lighting, Aviation and Transport lighting, Lighting for displays and signaling neon signs, LED-LCD displays and lighting for surveillance.	**08**

Course Outcomes:

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

1. Understand the concepts of Illumination.
2. Apply the concepts and various factors considered for illumination.
3. Analyze the illumination schemes for various applications.
4. Design different lighting systems as per the requirement of customers.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2			3	3	3	3	3	2	2	3	3	3
CO2	3	2	2			3	3	3		1	2	2	3	3	3
CO3	1	2	2			2	2	2		2	2	2	3	3	3
CO4	3	3	2			2	2	2		3	2	2	3	3	3

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	M A Cayless and A M Marsden	Lamps and Lighting	Oxford and IBH Publishing, 4th Edition, 1996
2	J B Gupta	Utilization of Electrical Power	Dhanpat Rai and Sons, New Delhi
	Reference Books:		
1	Illumination Engineering for Energy Efficiency Luminous Environment	Ronald N Helms	PHI, 1980
2	Lighting by Design	Brain Fitt and Joe Thornily	A Technical Guide, Focal Press, Boston, 1992
NPTEL: https://nptel.ac.in/courses/108/105/108105061			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: V
Course Name: Linear Integrated Circuits.
Course Code: PE-22EE5PE43 **L-P-C: 3-0-3**

Course Objectives:

1. To explain the basic concepts of op-amps and as AC and DC amplifiers.
2. To analyze frequency response and compensation techniques of op-amps.
3. To evaluate the performance of op-amps as signal generation and signal processing circuits.
4. To design linear and nonlinear circuits using op-amps.

UNIT	Description	Hours
I	**Operational Amplifier Fundamentals**: Introduction to operational amplifiers, Op-amp parameters – Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedances, Slew rate and Frequency limitations; Op-amps as DC Amplifiers- Biasing Op-amps, Direct coupled -Voltage Followers, Non-inverting Amplifiers, Inverting amplifiers, Summing amplifiers, Difference amplifier. **Op-amps as AC Amplifiers:** Capacitor coupled voltage follower, Capacitorcoupled Non-inverting amplifier, High Zin capacitor coupled Non-inverting amplifier, Capacitor coupled inverting amplifier, setting upper cutofffrequency.	**08**
II	**Op-amps frequency Response and Compensation:** Op-amp circuit stability,frequency and phase response, frequency compensating methods, op-amp circuit bandwidth, Slew rate effects, Stray capacitance effects, Load capacitance effects, circuit stability precautions	**08**
III	**Signal Processing circuits:** Current amplifiers, instrumentation amplifier, Precision half wave and full wave rectifiers, limiting circuits, clamping circuits,peak detectors, sample-and-Hold circuit**.**	**08**
IV	**Op-amps and nonlinear circuits:** Op-amps in switching circuits, zero crossing detectors, Inverting and non-inverting Schmitt trigger circuits, Astable and Monostable multi vibrator. V to I and I to V converters, Log and antilog amplifiers, Multiplier and divider, A/D and D/A converters.	**08**
V	**Signal generator:**Active Filters **–**First and second order Low pass & Highpass filters. Triangular/Rectangular wave generator, waveform generator design, Phase shift oscillator, oscillator amplitude stabilization, Wein bridge oscillator, Signal generator.	**08**

Course Outcomes:

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

1. Explain the basic concepts of op-amps as AC and DC amplifiers.
2. Analyze frequency response and compensation techniques of op-amps.
3. Evaluate the performance of op-amps as signal generation and signal processing circuits.
4. Design linear and nonlinear circuits using op-amps.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3										3		
CO2	3	3	3	2		1							3		
CO3	3	3	3	2		1							3		
CO4	3	3	3			1				2			3		

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Operation Amplifiers and Linear IC's	David A. Bell	2nd Edition, PHI/Pearson, 2004
2	Linear Integrated Circuits	D. Roy Choudhury and Shail B Jain	2nd Edition, New Age International,2006
Reference Books:			
1	Op Amps and Linear Integrated Circuits-Concepts and Applications	James M.Fiore Cengage	Learning, 2009
2	Operational amplifiers and linear IC's	Stanley William D	4th edition, Pearson Education
NPTEL: https://nptel.ac.in/courses/108/108/108108111			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Course Name: ENERGY CONVERSION TECHNIQUES
Course Code: OE-22EE5OE51 **L-P-C: 3-0-3**

Course Objectives:

1. To understand the concepts of energy conversion from one form to another.
2. To apply energy conversion techniques for different energy conversion systems.
3. To analyze the concept of energy conversion techniques in energy conversion systems.
4. To evaluate conversion techniques in energy conversion systems.

UNIT	Description	Hours
I	**Energy Conversion in Machines:** History of energy conversion, Energy resources and environment. **Conversion of Mechanical Energy to Electrical Energy:** DC generator principle, types, applications. **Conversion of Electrical to Mechanical Energy:** DC motor, Principle, types and applications. **Energy conversion techniques in AC machines:** 3-phase induction motor,principle, types and applications.	**08**
II	**Non-Conventional Energy Sources:** **Solar energy:** Principle of solar energy, beam and diffuse radiation, solar electric power generation, solar water heating, solar pump, solar pond, applications. **Wind energy:** Principles of WECS, basic components of WECS, wind energy collectors applications. **Bio-gas plants:** Principle, classification, conversion techniques, KVIC digester applications.	**08**
III	**Nuclear energy:** Nuclear energy conversion techniques, principle, types,working of nuclear reactor, applications. **Battery energy:** Battery energy conversion techniques, Principle, working,types and applications.	**08**
IV	**Hybrid Electric Vehicles:** Introduction to electric vehicles, hybrid electric vehicles, series hybridvehicles, parallel hybrid vehicles, applications. **Traction motors:** Types and construction, classification, dc and ac series motors, linear induction motor, applications.	**08**
V	**Special Machines:** Construction, working and applications of Universal motor, Stepper motor,BLDC motor and Reluctance motor. **Transducers :** **C**lassification, characteristics and applications of transducers-Strain gauge,LVDT, Thermocouples.	**08**

Course Outcomes:

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

1. Understand the concepts of energy conversion from one form to another.
2. Apply energy conversion techniques for different energy conversion systems.
3. Analyze the concept of energy conversion techniques in energy conversion systems.
4. Evaluate the conversion techniques in energy conversion systems.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1				2	3	3	2	2	1		2		2	
CO2	2				2	3	2	2	3	1		2		2	
CO3	1				3	2	2		3	1		2		3	
CO4															

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Principles of Electric Machines	E. G. Janardhan	PHI, I Edition, 2014
2	Non-conventional Energy Sources	G. D. Rai, Khanna	5th edition, 2014
Reference Books:			
1	Special Electrical Machines	James M.Fiore Cengage	Learning, 2009
2	Electric and Hybrid Vehicles Design Fundamentals	Iqbal Husain	CRC Press, E Book- PDF, 2nd Edition, 2011.
NPTEL: https://nptel.ac.in/content/storage2/courses/121106014/Week12/lecture38.pdf			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: V
Course Name: FUNDAMENTALS OF ILLUMINATION ENGINEERING
Course Code: OE-22EE5OE52 **L-P-C: 3-0-3**

Course Objectives:

1. To explain the concepts of Illumination.
2. To apply the concept and various factors considered for illumination.
3. To analyze illumination schemes for various applications.
4. To evaluate different lighting systems as per the requirement of customers.

UNIT	Description	Hours
I	**Introduction to lighting system:** Electromagnetic Spectrum, Components of Eye and functions of each, Vision functions, accommodation, adaptation and convergence.	**08**
II	**Illumination systems, Light sources:** Incandescent lamp, CFL, LED, fluorescent, arc lamps, sodium vapour lamp and mercury vapour lamp	**08**
III	**Laws of Illumination:** Laws of Illumination, Illumination at a point due to source of light, important definitions, definitions of utilization factor, maintenance factor, Beam factor, Waste light factor, Absorption factor.	**08**
IV	**Interior Lighting Design:** lighting design objectives, comfort lighting design flow chart, lighting of public buildings such as offices, hotels, teaching establishments (Class room and Seminar halls).	**08**
V	**Exterior Lighting Design:** Flood lighting, street lighting, LED-LCD displays, lighting of swimming pool, lighting of tennis court.	**08**

Course Outcomes:

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

1. Explain the concepts of Illumination.
2. Apply the concept and various factors considered for illumination.
3. Analyze the illumination schemes for various applications.
4. Evaluate different lighting systems as per the requirement of customers.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2			3	3	3	3	3	2	2	3	3	3
CO2	3	2	2			3	3	3		1	2	2	3	3	3
CO3	1	2	2			2	2	2		2	2	2	3	3	3
CO4	3	3	2			2	2	2		3	2	2	3	3	3

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Lamps and Lighting	M A Cayless and A M Marsden	Oxford and IBH Publishing,4th Edition,1996
2	J B Gupta	Utilization of Electrical Power	Dhanpat Rai and Sons, New Delhi
	Reference Books:		
1	Illumination Engineering for Energy Efficiency Luminous Environment	Ronald N Helms	PHI, 1980
2	Lighting by Design"- A Technical Guide	Brain Fitt and Joe Thornily	Focal Press, Boston, 1992
NPTEL: https://nptel.ac.in/courses/108/105/108105061			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Course Name: RESEARCH METHODOLOGY
Course Code: 22IE561 **L-P-C: 3-0-2**

Course Objectives:

1. To give an overview of the research methodology and explain the technique of defining a research problem.
2. To explain carrying out a literature search, its review and to explain various research designs and their characteristics.
3. To explain the details of sampling designs, and also different methods of data collections.
4. To develop theoretical, conceptual frameworks, writing a review, to explain the art of interpretation and the art of writing research reports.

UNIT	Description	Hours
I	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India. **Defining the Research Problem**: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration. **Bloom's Taxonomy Level: L1,L2.**	6
II	**Reviewing the literature:** Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed. **Bloom's Taxonomy Level: L1,L2.**	5
III	Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs. Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs. **Bloom's Taxonomy Level: L1,L2.**	7hrs
IV	**Data Collection**: Experimental and Surveys, Collection of Primary and Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. Hypothesis- Basic concepts, types of hypothesis, Formulation of hypothesis, testing of hypothesis, Analysis of data, Interpretation of data- Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Editing, classification and tabulation. **Bloom's Taxonomy Level: L1,L2.**	6hrs

V	**Report Writing:** Significance of Report Writing, Different Steps in Writing Report, Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports. Research ethics, Citations, Similarity check. **Bloom's Taxonomy Level: L1,L2,L3,L4.**	4hrs

Legends: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analyzing.

Course Outcomes:

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

1. Discuss research methodology and the technique of defining a research problem.
2. Explain the functions of the literature review in research, carrying out a literature search.
3. Developing theoretical and conceptual frameworks and writing a review
4. Explain various research designs, their characteristics. explain the art of interpretation and the art of writing research reports

Course Articulation Matrix

PO/PSO CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	3	2	1	2	2	1	1	3	3	2	3
CO2	1	1	2	2	1	1	1	1	1	1	1	2
CO3	3	3	3	3	1	2	2	1	3	3	2	3
CO4	1	3	2	1	1	2	2	3	3	2	3	3

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Research Methodology: Methods and Techniques	C.R. Kothari, Gaurav Garg	New Age International 4th Edition, 2018
2	Research Methodology a step-by-step guide for beginners. (For the topic Reviewing the literature under module 2	Ranjit Kumar	SAGE Publications Ltd. 3rd Edition, 2011
	Reference Books:		
1	Research Methods: the concise knowledge base	Trochim	Atomic Dog Publishing2005
2	Conducting Research Literature Reviews: From the Internet to Paper	Fink A	Sage Publications 2009

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Course Name: Management and Entrepreneurship
Course Code: 22IE562 **L-P-C: 3-0-2**

Course Objectives:

1. Explain fundamentals of management, functions of a manager. Also explain planning, organizing, and staffing, decision making processes and explain the organizational structure.
2. Describe the understanding of motivation and different control systems in management, leadership process, understanding of Entrepreneurship and its development process.
3. Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur and summarize the preparation of project report, need significance of report. Also to explain about industrial ownership.
4. To explain various forms of the intellectual property, its relevance and business impact in the changing global business environment and to discuss leading International Instruments concerning Intellectual Property Rights

UNIT	Description	Hours
I	Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection. Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control. **Bloom's Taxonomy Level: L 1,L2.**	6
II	Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. **Bloom's Taxonomy Level: L 1,L2.**	5
III	Preparation of project and ERP (Enterprise resource planning) - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain.Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation. **Bloom's Taxonomy Level: L 1,L2.**	7
IV	Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in	6hrs

	establishing micro and small enterprises, Government of India indusial policy 2007 on micro and small enterprises, case studies in respective domains. Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency. **Bloom's Taxonomy Level: L 1, L2.**	
V	Intellectual Property: Introduction to IP: Importance of IPR, International conventions / agreements / treaties, Origin of IP law and history, laws related to IP in India: Indian Patent Act 1970, WIPO. Patents: Criteria for patentability, patentable and non-Patentable Matters, introduction to Prior Art Search, types of patent application: ordinary, convention, PCT, divisional and Patent of addition, filing procedure, drafting complete specification and claims. Copyright: Criteria, filing procedure, Copyright Infringement, rights of authorship and ownership, Fair Use, first sale doctrine, moral rights and economic rights. Trademarks: definition, eligibility Criteria, types of patents, filing procedure, Classification of Trademarks and well-known mark Geographical Indications: Definitions, importance, filing procedure, GI ecosystem in India and case laws Industrial design: eligibility criteria, Non-Protectable Industrial Designs India, Procedure for Registration, importance of design registration. **Bloom's Taxonomy Level: L 1,L2.**	4hrs

Legends: L1 – Remembering, L2 – Understanding.

Course Outcomes:

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

1. Explain management functions of a manager. Also explain planning and decision making processes.
2. Describe the understanding of motivation and different control systems in management and understanding of Entrepreneurships and its development process.
3. Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur. Summarize the preparation of project report, need significance of report.
4. Shall get an adequate knowledge on patent and copyright for their innovative research works and provide further the way for developing their idea for innovations

Course Articulation Matrix

PO/PSO CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1	2	2	1	3	2	3	3	3	2	2
CO2	1	1	2	2	1	2	1	3	3	3	3	1
CO3	1	2	3	2	1	3	2	3	3	3	3	1
CO4	1	1	2	1	1	2	2	2	2	2	1	2

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Principles of Management	P. C. Tripathi, P. N. Reddy	Tata McGraw Hill, 4th / 6th Edition, 2010.
2	Intellectual property rights - Unleashing the knowledge economy	Pmbuddha Ganguli	Tata Mccraw Hill Publishing Company Ltd
Reference Books:			
1	Management and Entrepreneurship	Kanishka Bedi	Oxford University Press-2017
2	Entrepreneurship Development	S S Khanka	S Chand & Co.
3	Dynamics of Entrepreneurial Development & Management	Vasant Desai	Himalaya Publishing House

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Course Name: Project Management
Course Code: 22IE563 **L-P-C: 3-0-2**

Course Objectives:

1. To understand the scope, timing and quality of the project, and to analyze the project goals, constraints, deliverables, performance criteria, control needs and resource requirement in consultation with stakeholders.
2. To implement the process of project management, life cycle and the embodied concepts, tools and techniques in order to achieve project success.
3. To understand the team efforts and stakeholders in professional manner, respecting differences, to ensure a collaborative project environment.
4. To apply project management practices to new programs, initiatives, products, services and events relative to the needs of stakeholders

UNIT	Description	Hours
I	Introduction: Project, Program, and portfolio, Operations management, Product life cycle, Project life cycle, Project management life cycle, Role of project manager and office, Ten Project Knowledge areas with their associated processes. Project Integration Management: Develop project charter, Develop project management plan, Direct & manage project work, Monitor control project, Perform integrated change control, Close project / phase. **Bloom's Taxonomy Level: L 1,L2,L3.**	6
II	Project scope management: Plan scope management, Collect requirements, Define scope, Create WBS (Work Breakdown Structure), Validate Scope, Control scope. Project Schedule management: Plan Schedule management Define activities, Sequence activities, Estimate activity durations, Develop schedule, and Control schedule. **Bloom's Taxonomy Level: L 1,L2,L3.**	5
III	Project cost management: Plan cost management, Estimate cost, Determine budget, and Control costs. Project quality management: Plan quality management, Manage quality and Control quality. Project resource management: Plan resource management, Estimate activity resources, Acquire resources, Develop team, Manage team and Control resources. **Bloom's Taxonomy Level: L 1, L2,L3.**	6
IV	Project communication management: Plan communication management, Manage communications and Monitor communications. Project risk management: Plan risk management, Identify risks, Perform qualitative risk analysis, Perform quantitative risk analysis, Plan risk responses, Implement risk responses and Monitor risks. Project Procurement management: Plan procurement management, Conduct procurement, Control procurements. **Bloom's Taxonomy Level: L 1 ,L2,L3.**	6hrs

V	Project stake holder management: Identify stake holders, Plan stake holder management, Manage stakeholder engagement, and Monitor stake holder engagement. A case study relevant to the domain knowledge of the department is taken up to explain the principles of the project management as brought out above. **Bloom's Taxonomy Level: L 1,L2,L3.**	5

Legends: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analyzing.

Course Outcomes:

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

1. Outline the procedure for analyzing a project and define the rational of work break structure.
2. Illustrate the use of network techniques for successful project implementation.
3. Design the procedure for overall financial analysis of the project alongside the resources requirement and ideal quality.
4. Identify the sources and process for communication, risk management and procurement and build a comprehensive plan for the stakeholder management.

Course Articulation Matrix

PO/PSO CO	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	1	2	1	2	2	1	2	2	3	3	3	2
CO2	1	2	2	3	1	3	2	3	3	3	3	1
CO3	1	3	2	1	1	2	1	3	3	3	3	1
CO4	1	1	3	2	1	2	2	3	3	3	3	2

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Project Management	Book of Knowledge	6th Edition, PMI, USA
2	Project Management	Dennis Lock	Taylor & Francis 10 th Edition-2013
	Reference Books:		
1	Project Planning: Analysis, Selection, Implementation and Review,	Prasanna Chandra	MC- Graw Hill Education, 8th Edition, 2017.
2	Project Management-a system approach to planning, scheduling & controlling	Harold Kerzner	CBS publications and Distributions,2002

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: V
Subject Name: Department Skill Lab-3 (Level-IV)
Subject Code: PC-22EE506 **L-P-C: 1-2-2**

Course Objectives:

1. To understand the concept of single line diagram and Electrical machines
2. To apply winding concept and assembly of DC and AC machines
3. To analyze and design the assembly of AC and DC machines.

Sl.no.	SYLLABUS CONTENT
1.	Power plants layout diagram and single line diagram of substations.
2.	Developed winding diagrams of D.C. machines and A.C. machines
3.	Transformers - sectional views of single and three phase core and shell type transformers.
4.	D.C. machine - sectional views of yoke, field system, armature and commutator dealt Separately.
5.	Induction motor – sectional views of stator and rotor dealt separately
6.	synchronous generator – sectional views of stator and rotor dealt separately

Course Outcomes:

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

1. Understand the concept of single line diagram and Electrical machines
2. Apply winding concept and assembly of DC and AC machines
3. Analyze and design the assembly of AC and DC machines.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3		3	1			1	1	1	2	1	1	
CO2	2	2	3	3	2				1	2		2	1	2	
CO3			3		1	2			2		1	2	1	2	

Department: Humanities and Sciences			Semester:	5th Semester
Subject: SKILL DEVELOPMENT-II (APTITUDE SKILLS)				
Subject Code:	22SK508		L – T – P - C:	0-0-2-1

Course Objectives:

Sl. No	This course will enable the students to
1	Develop Critical Thinking and Reasoning Skills
2	Master Seating and Arrangement Techniques
3	Enhance Analytical and Mathematical Reasoning
4	Apply Advanced Problem-Solving Strategies

COURSE TOPICS: The course has 28 lecture hours in 5 Units, 2- lecture hours per week of 1-hour duration.

Unit	Description	Hrs
I	**Logical Aptitude** - Syllogism, Venn-diagram method, Three statement syllogism, Deductive and inductive reasoning. Introduction to puzzle and games organizing information, parts of an argument, common flaws, arguments and assumptions. **Linear Seating Arrangement** Single or Double rows facing each other or away from each other in the same direction **Circular Seating Arrangement** · Uni- & Bi-directional problems on · Circular, Square, Rectangular, Hexagonal tables **Coding Decoding:** Letter Coding, Number Coding, symbol coding **Crypt arithmetic**: Basic concepts , addition , subtraction, multiplication of coded alphabets, Types of cryptarithm, Clocks and Calendar **Reasoning** – a. Verbal - Blood Relation, Sense of Direction, Arithmetic & Alphabet. Non- Verbal reasoning - Visual Sequence, Visual analogy and classification. Analytical Reasoning - Single & Multiple comparisons, Linear Sequencing.	6
II	**Permutation and Combination**: Understanding the difference between the permutation and combination, Rules of Counting-rule of addition, rule of multiplication, factorial function, Concept of step arrangement, Permutation of things when some of them are identical, Concept of 2n, Arrangement in a circle. **Probability**: Single event probability, multi event probability, independent events and dependent events, mutually exclusive events, non-mutually exclusive events, combination method for finding the outcomes.	6

III	**Number System** · Divisibility & Remainder, · Multiples & Factors,· Integers,· LCM & HCF,· Complete a number Series,· Find the Missing Term and Wrong Term **Simplification** · BODMAS Rule, · Approximation, · Decimals, · Fractions, · Surds & Indices **Percentage** Calculation-oriented basic percentage, Profit and Loss, Successive Selling type, Discount & MP, Dishonest Dealings, Partnerships Interest : Simple Interest, Compound Interest, Mixed Interest, Instalments. **Data Interpretation**: Approach to interpretation - simple arithmetic, rules for comparing fractions, Calculating (approximation) fractions, short cut ways to find the percentages, Classification of data– Tables, Bar graph, line graph, Cumulative bar graph, Pie graph, Combination of graphs. Combination of table and graphs	6
IV	**Averages and Allegations mixtures**: Average: relevance of average, meaning of average, properties of average, deviation method, concept of weighted average. Allegation method: a situation where allegation technique, general representation of allegations, the straight line approach, application of weighted average and allegation method in problems involving mixtures. Application of allegation on situations other than mixtures problems. **Data Sufficiency**: Questions based on > Quantitative aptitude, > Reasoning aptitude > Puzzles	4
V	**Ratio and Proportion** · Simple Ratios, · Compound Ratios, · Comprehend and Dividend · Direct & Indirect Proportions, · Problems on ages,· Mixtures & Allegation **Speed, Time and Distance** · Relative Speed, · Average Speed, · Problems on Train, · Boat & Stream. **Time and Work** · Work Efficiency, · Work & Wages, Pipes & Cisterns	6

Course Outcomes:

Course outcome	At the end of the course students will be able to
CO1	Enhanced Logical and Analytical Thinking
CO2	Proficiency in Advanced Arrangement and Sequencing Problems
CO3	Strong Numerical and Mathematical Aptitude
CO4	Effective Data Interpretation and Quantitative Analysis

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					2		3	3	3				
CO2	1					2		3	3	3				
CO3	1					2		3	3	3				
CO4	1					2		3	3	3				

Text Books:

Sl	Text Book title	Author	Volume and Year of
1	**How to Prepare for Logical Reasoning for CAT" by Arun**	**Arun Sharma**	• ISBN-10: 9352602280 • ISBN-13: 978-
2	**A Modern Approach to Verbal & Non-Verbal**	R.S. Aggarwal	• ISBN-10: 8121924987 • ISBN-13: 978-

Reference Books:

Sl	Text Book title	Author	Volume and Year of
1	Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal	R.S. Aggarwal	ISBN-10: 9352534026 ISBN-13: 978-9352534021
2	Logical Reasoning and Data Interpretation for the CAT" by Nishit K. Sinha	Nishit K. Sinha	ISBN-10: 933922269X ISBN-13: 978-9339222694

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY, TUMAKURU-572105
(A Constituent College of Sri Siddhartha Academy of Higher Education, Deemed-to-be-University)
Scheme of Teaching and Examination (160 Credits Scheme, NEP Batch)

THIRD YEAR B.E., ELECTRICAL AND ELECTRONICS ENGINEERING
6th Semester B.E. Effective from the Academic year 2024-25

Sl No	Course Code		Course Title	Teach Dept.	L	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs.
1	PC	22EE601	Power Systems – I	EE	3	-	3	50	50	100	3
2	PC	22EE602	Digital Signal Processing	EE	3	2	4	50	50	100	3
3	PC	22EE603	Switchgear and High Voltage Engineering	EE	3	2	4	50	50	100	3
4	PE	22EE6PE4X	**Professional Elective-II** 1.Advanced Power Electronics 2. Solar and Wind Energy Systems 3. Python Programming	EE	3	-	3	50	50	100	3
5	OE	22EE6OE6x	**Open Elective-II** 1. Programmable Logic Controller 2.Fundamentals of Renewable Energy Sources	**EE**	3	-	3	50	50	100	3
6	PC	22EE66X	**Online Course:NPTEL/MOOC/SWAYAM** 22NP661-NPTEL 22MC662-MOOC 22SW663-SWAYAM	EE	2	-	2	50	-	50	-
7	PW	22EEMP607	Mini-project	EE	-	4	2	50	50	100	3
8	HS	22SK608	Preplacement Training	T&P	-	2	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**17**	**10**	**22**	**400**	**350**	**750**	**-**

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Course Name: POWER SYSTEMS- I
Course Code: PC-22EE601 **L-P-C: 3-0-3**

Course Objectives:

1. To explain the concepts of single line diagram, per unit system, types of faults, symmetrical components for a given power system network with all its complex components present.
2. To apply the basic concepts to solve power system problems under normal and abnormalconditions
3. To analyze the given power system for symmetrical and unsymmetrical faults.
4. To evaluate the current and voltage in a power system during normal and abnormalconditions.

UNIT	Description	Hours
I	**Representation of Power system Components**: Circuit models of Transmission line, Synchronous machines, Transformer and load, one line diagram, Assumptions made to draw reactance diagram. Per unit system, Per unit impedance diagram, Illustrative examples.	**08**
II	**Symmetrical three phase faults:** Transients on an unloaded transmission line for a fault, Short - Circuit currents and the reactance of synchronous machine on No load & On load, Selection of circuit breakers, Illustrative examples.	**08**
III	**Symmetrical components:** Analysis of unbalanced load against balanced three phase supply, Resolution of unbalanced phasors into their symmetrical components,Phase shift of symmetrical components in star- delta transformer bank, Illustrative examples.	**08**
IV	**Sequence Impedances and Networks:** Power in terms of symmetrical components, Analysis of balanced and unbalanced loads against unbalanced three phase supply, Sequence impedances and sequence networks, Sequence impedance of power system elements (alternator, transformer and transmission line), positive, negative and zero sequence networks of power system elements, Illustrative examples.	**08**
V	**Unsymmetrical faults:** L-G, L-L, L-L-G faults on an unloaded alternator with and without fault impedance, Unsymmetrical faults on a power system with and without fault impedance, Open conductor faults in power systems, Illustrative examples.	**08**

Course Outcomes:

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

1. Explain the concepts of single line diagram, per unit system, types of faults, symmetrical components for a given power system network with allits complex components present.
2. Apply the basic concepts to solve power system problems under normal and abnormalconditions
3. Analyze the given power system for symmetrical and unsymmetrical faults.
4. Evaluate the current and voltage in a power system during normal and abnormalconditions.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3			2						2	2		
CO2	2	2	2			3						2		2	
CO3	3	3	3			3						2	2	2	
CO4	2	2										3	1	2	

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Elements of Power System Analysis	W D Stevenson	First edition, 1994, Mc Graw Hill
2	Modern Power System Analysis	I J Nagrath and D P Kothari	Fourth edition, 2011, TMH.
	Reference Books:		
1	Power system analysis	HadiSaadat	Second edition, 2002,TMH
2	Power system analysis	Bergen Arthur	Second edition, Pearson Education
NPTEL: https://nptel.ac.in/courses/108/105/108105067			

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Course Name: Digital Signal Processing
Course Code: PC-22EE602 **L-P-C: 3-2-4**

Course Objectives:

1. To Explain the concepts of signals and systems in terms of both the time and frequency domains.
2. To Analyze the concepts of Discrete Fourier Transformers, Fast Fourier Transformers and digital filters.
3. To Apply DFT and inverse DFT to find the convolution of the given sequence.
4. To Design different methods of realizing a digital IIR and FIR filter and design digital filters using different windowing techniques.

UNIT	Description	Hours
1.	**Introduction to signals and systems:** Definitions of signals and systems, classification of signals, Basic operation on signals, Elementary signals, Properties of Systems.Introduction to discrete Fourier transforms ,Definitions of DFT and IDFT(Problems on 4 point)	08
2.	**Discrete Fourier Transforms Properties:** Properties- periodicity, linearity, circular time and Frequency shift, Symmetry for Real Sequence. (Problems only on 4 point)circular convolution and linear convolution, overlap add & save method.	08
3.	**Fast Fourier Transforms Algorithms:** Introduction, Decimation in time algorithm, decimation in frequency algorithm number of computations, inverse DIT and DIF (Illustrative examples only). convolutins, (Problems only on 4 point).	08
4.	**Realizations of digital systems:** Introduction, Realization of IIR systems-direct form, cascade form, Parallel form, Realization of FIR systems-direct form, cascade form, linear phase realizations.	08
5.	**Design of Digital filters:**Introduction,Design of IIR Filter using impulse invariant and by Bi-Linear transformations. Introduction to FIR Filter, Design of FIR Filter using windowing technique (Rectangular hamming), Frequency Sampling technique.	08

LAB CONTENT

SL.	Description
I	Generate different types of signals.
II	Perform signal processing operations
III	Verification of sampling theorem.
IV	Computation of n point DFT of a given sequence and to plot magnitude and phase spectrum
V	Circular convolution of two given sequences
VI	Linear convolution of two sequences
VII	Design and implementation of IIR filter to meet given specifications.
VIII	Design and implementation of FIR filter to meet given specifications.

Course Outcomes:

After completion of course, student will be able to:

1.Explain the concept of signals and systems in terms of both the time and frequency domain

2. Analyze the concept of discrete Fourier transforms, fast Fourier transforms and digital Filters

3. Apply DFT and Inverse DFT to find the convolution of the given sequence.

4.Design different methods of realizing a digital IIR and FIR filter and design digital filters using different windowing techniques.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3			3							3	3	3	
CO2	3	3		1	2								3	1	
CO3	3	3											3		
CO4	3	3	3										3		

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Signals and systems	Simon Haykin and Barry Van Veenjohn Wiley & son's	2001. reprint 2022
2	Digital Signal Processing Principle, Algorithms and Applications	John D Proakis	3rd edition, PHI, 2004.
Reference Books:			
1	Signals and systems	Ganesh Rao and Sathish Tunga	Sanguine Technical Publishers,2004
2	Signals and sysyems	Alan V Oppenheim, Alan S Wilsky and A hamid Nawab	2nd edition, 1997. Indian Reprint 2002.
3	Introduction to digital signal Processing	Johnny R Johnson	3rd edition, PHI 2003
4	Digital Signal Processing	Sanjith K Mithra	3rd edition TMH,2005

NPTEL: https://nptel.ac.in/courses/117/101/117101055

https://nptel.ac.in/courses/108/104/108104100

https://nptel.ac.in/courses/117/104/117104070

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: SWITCHGEAR AND HIGH VOLTAGE ENGINEERING Subject Code: PC-22EE603 L-P-C: 3-2-4

Course Objectives:

1. To Summarize the basic Protection schemes in power systems and need for High voltage study.
2. To apply the knowledge of circuit breakers and protective relays in their operation.
3. To analyze the generation of high voltages AC and DC.
4. To evaluate the techniques for measurement of high voltages.

UNIT	Description	Hours
I	**Circuit breakers:** Arcing phenomenon and arc interruption, DC and AC circuit breaking, Re- striking voltage and Recovery voltage, Rate of rise of re- striking voltage, Resistance switching, Current chopping, Interruption of capacitive current, Types of circuit breaker: Air blast, SF_6 circuit breakers.	**08**
II	**Relays:** Introduction, types, essential qualities of relay: sensitivity, selectivity, speed and time, reliability & dependability, principles of power system protection, zones of protection. Thermal relay, Over current relays, Impedance relay, Differential protection: Percentage differential relay.	**08**
III	**INTRODUCTION:** Introduction to HV technology, advantages of transmitting electrical power at high voltages, need for generating high voltages in laboratory. Important applications of high voltage. **BREAKDOWN PHENOMENA:** Classification of HV insulating media. Gaseous dielectrics: Ionizations: primary and secondary ionization processes. Criteria for gaseous insulation breakdown based on Townsend's theory. Limitations of Townsend's theory. Streamer's theory breakdown in non- uniform fields. Paschen's law and its significance. Time lags of Breakdown. Breakdown in solid dielectrics: Intrinsic, avalanche, thermal, and electro mechanic breakdown. Breakdown of liquids dielectric dielectrics: Suspended particle theory, electronic, cavity (bubble's theory) and electro convection breakdown.	**08**
IV	**GENERATION OF HVAC AND HVDC VOLTAGE:** HVAC-High Voltage transformer; Need for cascade connection and working of transformers units connected in cascade. Series resonant circuit- principle of operation and advantages. Tesla coil. HVDC- voltage doubler circuit, Cock croft- Walton type high voltage DC set. Calculation of high voltage regulation, ripple and optimum number of stages for minimum voltage drop	**08**

V	**MEASUREMENT OF HIGH VOLTAGES:** Electrostatic voltmeter- principle, construction and limitation. Chubb and For tescue method for HVAC measurement. Generating voltmeter- Principle, construction. Series resistance micro ammeter for HVDC measurements. Standard sphere gap measurements of HVAC, HVDC, and impulse voltages; Factors affecting the measurements.	**08**

Lab Content:

SI	Description
1.	I-T Characteristics of Inverse over current relay.
2.	IDMT Characteristics of Over / Under Voltage Relay.
3.	Operating Characteristics of Over Voltage / Under Voltage Relay.
4.	Current-Time Characteristics of Fuse.
5	Operating Characteristics of Microprocessor Based (Numeric) Over Current Relay.
6	Spark over Characteristics of Air Insulation Subjected to High Voltage AC/DC withSpark Over Voltage Corrected to STP.
7.	Measurement of High Voltage AC/DC using Sphere gap arrangements.
8	Breakdown Strength of Transformer Oil Using Oil-Testing Unit.

Course Outcomes:

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

1. Summarize the basic Protection schemes in power systems and need for High voltage study.
2. Apply the knowledge of circuit breakers and protective relays in their operation.
3. Analyze the generation of high voltages AC and DC
4. Evaluate the techniques for measurement of high voltages.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2		1		2	2					2	2	1	2
CO2	3	2	3			2	2					2	3	1	2
CO3	3	2	2			2	2					2	1	2	2
CO4	3	2				2	2					2	3	2	2

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Switchgear & Protection	Sunil S. Rao	Khanna Publication. 11th Edition, 1998
2	High Voltage Engineering	M.S.Naidu and Kamaraju	3rd Edition, THM, 2007
Reference Books:			
1	Power System Protection & Switchgear	Badriram&Vishwa Karma	2nd Edition, TMH, 2011
2	Power System Protection & Switchgear	Ravindranath&Chander	New Age Publications, 1st Edition, 2018.
3	High Voltage Engineering	C.L.Wadhwa	New Age International Private limited 1995
4	High Voltage Engineering Fundamentals	E. Kuffel and W.S. Zaengl	2nd edition, Elsevier, press, 2005.
NPTEL: https://nptel.ac.in/courses/108/104/108104048			

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: ADVANCED POWER ELECTRONICS
Subject Code: PE-22EE6PE41 **L-P-C: 3-0-3**

Course Objectives:

1. To Explain the concept of dc-dc converters.
2. To illustrate the operation of resonant converters.
3. To articulate the design procedure of high frequency inductor, transformer and UPS.
4. To design resonant converters, SMPS, Multilevel inverters for various applications.

UNIT	Description	Hours
I	D.C-D.C Switched mode converter topologies: Buck, boost, buck-boost, Cuk D.C-D.C converter (Operation of theabove converters is CCM-mode only).	**08**
II	Derived converters: Forward, flyback, push-pull converters, full bridge andhalf-bridge DC-DC converter.	**08**
III	Classification of resonant converters, Series and parallel loaded resonant converters, Zero voltage and Zero current resonant switch converters.	**08**
IV	High frequency Inductor and transformers, on line, off line UPS, reliability ofUPS and batteries for UPS.	**08**
V	Multilevel Inverters: Introduction, types, diode clamped multi-level inverters, cascaded H-bridge inverter, flying capacitor clamped inverter andapplications.	**08**

Course Outcomes:

After completion of course, student will be able to:

1. Explain the concept of dc-dc converters.
2. Illustrate the operation of resonant converters.
3. Articulate the design procedure of high frequency inductor, transformer and UPS.
4. Design resonant converters, SMPS, Multilevel inverters for various applications.

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Power Electronics	M H Rashid	3rdEdition, PHI publishers
2	Power Electronics	M D Singh	K B, Khanchandani, TMH.
Reference Books:			
1	Power Electronics Converters, Application & Design	Mohan N Undeboud, T M, Robins, W P	John Wiley 1989
2	Power Electronics Control in A C Motors	Murplhy JM D Turnnbull	F.G. Pergamon 1988
NPTEL: https://nptel.ac.in/courses/108/105/108105066			

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3			2					2	3	3	1	1
CO2	3	2	2			2	2				2	2	3	1	1
CO3	3	2	2			2	2				2	2	3	1	1
CO4	3	2	2			2	2				2	2	3	1	1

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025

Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: Solar and Wind Energy Systems
Subject Code: PE-22EE6PE42 **L-P-C: 3-0-3**

Course Objectives:

1. To summarize the importance of wind and Solar energy systems and the concept of Battery Storage System
2. To apply the concept of Maximum Power Point Tracking for optimization
3. To analyze Stand-Alone & Grid-Connected System for solar and wind energy systems.
4. To design the control and conversion system components of Wind Energy systems.

UNIT	Description	Hours
I	**Basic Concepts of Solar Energy & Solar Cells:** Introduction to solar energy, Terrestrial and Extraterrestrial Solar Radiation, Characteristics of Solar Radiation & Radiation Spectrum, Solar Constant, Air mass ratio, Geometry of Earth and Sun, Atmospheric effects on solar radiation, Solar radiation measurement & Instrumentation. **Solar Cells:** Types, Energy requirement, Basic operation, construction & concepts.	**08**
II	**Solar Cell Characteristics, BOS and Classification of PV Systems:** **Solar cell Characteristics:** I-V characteristics, Maximum Power Point, Cell efficiency & Fill factor, Effect of Irradiation and Temperature, Principles of Maximum Power Point Trackers, PV Arrays and Modules. **Balance of Systems (BOS)** - Inverters, Batteries, Charge controllers. **Classification of PV Systems** - Standalone PV system - Grid Interactive PV System- Hybrid Solar PV system.	**08**
III	**Wind Energy Systems:** **Wind Energy**: Basics & Power Analysis, Wind resource assessment, Power Conversion Technologies and applications. **Wind Turbine Generators**: Induction, Synchronous machine, constant V & F and variable V & F generations, Reactive power compensation.	**08**
IV	**Stand-Alone Systems:** PV Stand-Alone, Wind Stand-Alone. **Grid Connected System:** Interface Requirements, Synchronizing with Grid, Inrush Current, Synchronous Operation, Load Transient, Safety, Operating Limit, Voltage Regulation, Stability Limit -Grid connection Issues -Grid Integrated PMSG and SCIG Based WECS.PMSG and SCIG Based WECS.	**08**
V	**Battery Storage System:** Basic concepts, components of cells and batteries, Classification of cells and batteries, Operation of a cell, Specifications, free energy, theoretical cell voltage, specific capacity, specific energy, energy density, memory effect, cycle life, shelf life, state of charge (SOC) and depth of discharge (DOD), internal resistance and coulombic efficiency, lithium batteries, lead-acid batteries.	**08**

Course Outcomes:

After completion of course, student will be able to:

1. To summarize the importance of wind and Solar energy systems and the concept of Battery Storage System.
2. To apply the concept of the Maximum Power Point Tracking for optimization.
3. To analyze Stand-Alone & Grid-Connected System for solar and wind energy systems.
4. To design the control and conversion system components of Wind Energy systems.

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2				3	3			1	2	3	2	2	2
CO2	3	2	1		2	2	1			1	1	2	2	2	
CO3	3	2	1	1		2	2		2	1	2	2	2	1	
CO4	3	3	2	1	1	2	2	1			2	1	2	1	

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Wind and Solar Power Systems	Mukund R. Patel	CRC Press Boca Raton-London-New York, Washington, D.C. 1999
2	Renewable and Efficient Electric Power Systems	G. M. Masters	John Wiley and Sons, 2004
	Reference Books:		
1	Non- Conventional Energy Resources	B.H.Khan	2nd edition, Tata McGraw-Hill, New Delhi
2	Solar Cells from Basics to Advanced Systems	Chenming Hu and Richard M. White	Tata McGraw Hill Education Private Limited, ISBN 0-07-030745-8.
3	Wind Power in Power Systems	T. Ackermann	John Wiley and Sons Ltd., 2005
4	Grid integration of wind energy conversion systems	H. Siegfried and R. Waddington	John Wiley and Sons Ltd., 2006.
NPTEL: https://nptel.ac.in/courses/108/108/108108078/			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: PYTHON PROGRAMMING
Subject Code: PE-22EE6PE43 **L-P-C: 3-0-3**

Course Objectives:

1. To understand lists Dictionaries and Regular expressions in Python.
2. To apply Strings and Files in Python
3. To analyze Syntax and Semantics and create Functions in Python
4. To Implement Object Oriented Programming concepts in Python

UNIT	Description	Hours
1	**The Context of Software Development:** About Python, Installing Python, The Python Interpreter, Python editors and IDEs, Learning Programming with Python, Writing a Python Program, A Longer Python program. **Values and Variables:** Integer Values, Variables and Assignment, Identifiers, Floating-point Numbers, Control Codes within Strings, User Input, Controlling the print Function, String Formatting, Multi line Strings.	**08**
2	**Expressions and Arithmetic:** Expressions, Mixed Type Expressions, Operator Precedence and Associativity, Formatting Expressions, Comments, Errors, Syntax Errors, Run-time Errors, Logic Errors, Arithmetic Examples, More Arithmetic Operators	**08**
3	**Conditional Execution:** Boolean Expressions, The Simple if Statement The if/else Statement, Compound Boolean Expressions, The pass Statement, Floating-point Equality, Nested Conditionals, Multi-way Decision Statements, Conditional Expressions, Errors in Conditional Statements. **Iteration**: The while Statement, Definite Loops vs. Indefinite Loops, The for Statement, Nested Loops, Abnormal Loop Termination, while/else and for/else, Infinite Loops, Iteration Examples, Computing Square Root, Drawing a Tree, Printing Prime Numbers, Insisting on the Proper Input	**08**
4	**Lists:** Motivation, List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python, More on Python Lists. **Objects:** Using Objects, String Objects, List Objects.	**08**
5	**Tuples, Dictionaries, and Sets:** Tuples, Arbitrary Argument Lists, Dictionaries, Using Dictionaries, Counting with Dictionaries, Grouping with Dictionaries, Keyword Arguments, Sets, Set Quantification with all and any, Enumerating the Elements of a Data Structure	**08**

Course Outcomes:

At the end of the course, the students will be able to:

1. Understand Python syntax and semantics and be fluent in the use of Python flow control and functions-
2. Demonstrate proficiency in handling Strings and File Systems Strings and Files in Python

3. Analyze Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Implement exemplary applications related to Network Programming and Web Services

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3		3							2		3	
CO2	3	3	2		3							2		3	
CO3	3	3	2		3							2		3	
CO4	3	3	2		3							2		3	

Learning Resources:

Sl.	Title	Author	Publishers
	Text Book:		
1	Python for Everybody	Charles R. Severance	1 st Edition, CreateSpace Independent Publishing Platform, 2016.
2	Think Python	Allen B. Downey	2nd Edition, Green Tea Press, 2015
	Reference Books:		
1	Introduction to Computer Science Using Python	Charles Dierbach	1st Edition, Wiley India Pvt Ltd, 2015. , ISBN-13: 978-8126556014
2	Introduction to Python Programming	Gowrishankar S, Veena A	1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
3	Programming Python	Mark Lutz	4th Edition, 2011, ISBN-13: 978-9350232873
4	Grid integration of wind energy conversion systems	H. Siegfried and R. Waddington	John Wiley and Sons Ltd., 2006.
NPTEL: https://nptel.ac.in/courses/106106212 https://youtu.be/c235EsGFcZs			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: Programmable Logic Controllers
Subject Code: OE-22EE6OE61 **L-P-C: 3-0-3**

Course Objectives:

1. To Explain PLC system, advantages and disadvantages, hardware components, ladderdiagram and its programming.
2. To apply identification of common operating modes found in PLCs, writing and entering theladder logic programs using FBD, SFC and ST.
3. To analyze the functions of Relays, Motor Starters, Switches, Sensors, Output devices,Timer and counters
4. To design PLC systems using ladder logic and programs for different industrial process

UNIT	Description	Hours
1.	**Introduction:** Introduction to Programmable Logic Controller (PLC), role inautomation, advantages and disadvantages, hardware, internal architecture, sourcing and sinking, characteristics of I/O devices, input and output devices,signal conditioning, remote connections, networks.	08
2.	**Programming:** Ladder programming- ladder diagrams, logic functions, latching, multiple outputs, entering programs, functional blocks, programmeon location of fail safe and limit switches.	08
3.	**Programming Statement:** Instruction list, sequential functions charts &structured text, jump and call subroutines.	08
4.	**Internal Relays:** Battery- backed relays, one - shot operation, set-reset,master control relay.	08
5.	**Timers and Counters:** ON and OFF- delay timers, pulse timers, up, down,up-down counting, timers with counters, sequencer.	08

Course Outcomes:

After completion of course, student will be able to:

1. Explain history of PLC, its sequence of operation, advantages and disadvantages, mainparts and their functions
2. Apply ladder logic, FBD, SFC and ST concept for the systems
3. Analyze Relays, Motor Starters, Switches, Sensors, Output devices, timer and counters
4. Design PLC systems using ladder logic and programs for different industrial process

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3				1								3		
CO2		3											3		
CO3			3										3		
CO4			3										3		

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Programmable Logic controllers	W Bolton	Elsevier- Newness, 4thedition, 2006
Reference Books:			
1	Programmable Logic Controllers	John W Webb	Ronald A, 2nd impression, Pearson education, 2007, 5th edition
2	Programmable Controller Theory and Applications	L. A Bryan	E. A Bryan An industrial text company publication, 1997, 2nd edition.
NPTEL: https://nptel.ac.in/courses/108/105/108105063			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Syllabus for the Academic Year – 2024 – 2025
Department: Electrical & Electronics Engineering
Semester: VI
Subject Name: Fundamental of Renewable Energy Sources
Subject Code: OE-22EE6OE62 **L-P-C: 3-0-3**

Course Objectives:

1. To understand the processing and limitations of fossil fuels. (coal, petroleum and natural gas.)
2. To demonstrate the concept of energy conversion techniques in Non-Conventional Energy Sources.
3. To analyze the effective utilization techniques in Non-Conventional Energy Sources.
4. To acquire the knowledge of modern energy conversion techniques

UNIT	Description	Hours
1.	**Introduction to Energy Sources:** Energy consumption as a measure of prosperity, World energy futures- brief discussion of conventional energysources and their availability, Non-conventional energy sources.	08
2.	**Solar Energy:** Solar radiation, Beam and Diffuse radiation, types of collectors, advantages and disadvantages, solar electric power generation. **Application of Solar Energy:** Solar water heating, solar distillation, solarcooking, solar green house, solar furnace.	08
3.	**Wind Energy:** Principle of wind energy conversion system (WECS), components of WECS, classification of WECS, Types of wind energy collectors, site selection, advantages and disadvantages of WECS.	08
4.	**Energy from Biomass:** Different types of biomass fuels, biomass conversiontechnologies, classification of biogas plants, KVIC digester.	08
5.	**Energy from Oceans:** Principle of ocean thermal energy conversion (OTEC),open cycle, closed cycle & hybrid cycle, OTEC. **Energy from Tides:** Tidal power, components of tidal power plants, single basin arrangement, double basin arrangement, advantages and limitation oftidal power.	08

Course Outcomes:

After completion of course, student will be able to:

1. Understand the processing and limitations of fossil fuels. (Coal, petroleum and natural gas.)
2. Demonstrate the concept of energy conversion techniques in Non-Conventional EnergySources.
3. To analyze the effective utilization techniques in Non-Conventional Energy Sources.
4. To acquire the knowledge of modern energy conversion techniques

Course Articulation Matrix

PO/PSO CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												3	2	2
CO2		1		1			2						3	2	2
CO3			2									1	3	2	2
CO4						1					2		3	2	2

Learning Resources:

Sl.	Title	Author	Publishers
Text Book:			
1	Non conventional energy sources	G. D. Rai	Khanna Publication, 1st Edition, 2011
Reference Books:			
1	solar energy	Sukhatme	TMH Publication, 2nd Edition
2	Solar Energy	William C Dikkinson	
3	Renewable Energy Sources	Twiddleelbs	
NPTEL: https://nptel.ac.in/courses/108/108/108108078			

*** Note:** Visit to Related Industry/ Power Plant and Report Submission is Mandatory and Carries 20% of CIE.

Department: Humanities and Sciences		Semester:	6th Semester
Subject: SKILL DEVELOPMENT- III(TECHNICAL SKILLS)(For NON-IT branches)			
Subject Code:	22SK608	L – T – P - C:	0-0-2-1

Course Objectives:

Sl. No	This course will enable the students to learn
1	Fundamental Understanding of C Programming
2	Proficiency in Advanced C Programming Concepts
3	Mastery of File Management and Preprocessor Directives in C
4	Introduction to Object-Oriented Programming with C++

Unit	Description	Hrs
I	**C programming (A) :** Data Types, Operators and Expressions, Input and output Operations, Control Flow – Branching, Control Flow – Looping · Statements and Blocks · If..Else, Switch, Nesting of If..Else · GOTO statement · The while statement · The For statement · The Do statement · Jumps in loops **C programming (B) :** Arrays, Strings · One-dimensional arrays · Initialization of one-dimensional arrays · Two-dimensional Arrays · Initializing Two-dimensional arrays · Multi-dimensional arrays · Dynamic arrays · Declaring and Initializing string variables · Reading Strings from Terminal · Writing Strings to screen · String handling functions · Operations on strings	6

	C programming (C) : User-defined Functions, Structures · Basics of Functions · Functions Returning Non-integers · External Variables, Scope Rules · Header Files, Static Variables, Register Variables · Block Structure, Initialization, Recursion · Category of functions, Functions that return multiple values · Nesting functions, Multi-file programs · Structures and Functions, Arrays of Structures · Pointers to Structures, Self-referential structures **C Programming (D) :** Unions, Pointers · Difference between Structures and Unions · Accessing the address of a variable · Declaring and Initializing pointer variables · Accessing a variable through its pointers · Chain of pointers · Pointer Expressions · Pointer Increments and Scale Factors · Pointers and character strings · Array of pointers · Pointers as function arguments · Functions returning pointers · Pointers to functions, Drawback of Pointers	6
III	**C Programming (E) :** File Management in C, The Preprocessor Defining and Opening a File, Closing a File, Input / Output Operations on Files, Random Access to Files, Command Line Arguments. Macro Substitution, File Inclusion, Compiler Control Directives, ANSI Additions.	4
IV	The syllabus begins with an **introduction to Python**, emphasizing its importance for Mechanical, Civil, and Aeronautical Engineers. It covers the installation of Python using various platforms such as IDLE, Anaconda, and Pip, and provides an overview of using Jupiter Notebook, including folder creation and saving work. The programming methodology section introduces fundamental concepts like variables, writing the first program, and executing it. It also covers basic data types, including integers, floats, and strings.The five-day training program on Python programming for mechanical engineers includes various key topics and practical sessions. The first day focuses on Python programming basics, such as boolean operations, type conversions, and input statements, with hands-on practice. The second day delves into functions and flow control, covering if-else-elif statements, loops, and functions, along with lists, slicing, comprehensions, dictionaries, tuples, and exceptions.	6

V	The third day introduces essential Python libraries like Numpy, Pandas, and Matplotlib, with definitions, examples, and practical exercises. The final day applies Python programming to domain-specific areas, including Mechanics of Materials, Machine Design, Fluid Mechanics, Theory of Machines, and Manufacturing, ensuring practical relevance to the engineering field.	6

Course Outcomes:

Course Outcome	At the end of the course students will be able to
CO1	Solid Foundation in C Programming
CO2	Advanced Problem-Solving Skills in C
CO3	Competence in C++ and Object-Oriented Programming
CO4	Ability to Apply Programming Knowledge Practically

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					2		3	3	3				
CO2	1					2		3	3	3				
CO3	1					2		3	3	3				
CO4	1					2		3	3	3				

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Let Us C by Yashavant Kanetkar	Yashavant Kanetkar	ISBN-10: 8183331637 ISBN-13: 978-8183331630
2	**Python Crash Course" by Eric Matthes**	Eric Matthes	**ISBN-10: 1593276036 ISBN-13: 978-1593276034**

Reference Books:

Sl	Reference Book title	Author	Volume and Year of Edition
1	The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie	Dennis M. Ritchie	ISBN-10: 0131103628 ISBN-13: 978-0131103627
2	**Python Crash Course" by Eric Matthes**	Eric Matthes	**ISBN-10: 1593276036 ISBN-13: 978-1593276034**