ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

RAJAMPET, Annamayya District, A.P – 516126, INDIA.

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

MINUTES of 3rd BoS MEETING

Date & Time
02/05/2026 & 10.30 AM
Venue: EEE Computer Lab

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)
RAJAMPET, YSR Kadapa District, AP – 516126, INDIA

ELECTRICAL AND ELECTRONICS ENGINEERING

3rd BoS Minutes of Meeting

The 3rd meeting of the Board of Studies (BoS) for the Department of Electrical and Electronics Engineering was held in offline mode on 02/05/2026 in EEE Smart Class Room of the PG Block at 10:30 AM.

S. No	Name	Affiliation	Role in BoS	Signature
1	Dr. P.B.Chennaiah	Associate Professor, Dept. of EEE, Annamacharya University, Rajampet Ph:9441112015 Email: pbc@aitsrajampet.ac.in	Chairman	
2	Dr. M Padma Lalitha	Professor & Head, Dept. of EEE, Annamacharya University, Rajampet Ph:9989998643 Email: mpl@aitsrajampet.ac.in	Senior Faculty-Member	
3	Dr. P. Bhaskara Prasad	Assistant Professor, Dept. of EEE, Annamacharya University, Rajampet Ph:8185945663 Email: pbp@aitsrajampet.ac.in	Senior Faculty-Member	
4	Dr.C.Ganesh	Assistant Professor, Dept. of EEE, Annamacharya University, Rajampet Ph:8096671432 7396574766 Email: cgn@aitsrajampet.ac.in	Course Coordinator-Member	
5	Dr. B. Ravi Kumar	Professor, Dept. of EEE, IIIT Hyderabad, Telangana, Ph:9448884013 Email: ravikumar@iiit.ac.in	Subject Expert-Member	02/05/2026
6	Dr. K. Udhaya Kumar	Professor, Dept. of EEE, College of Engineering Guindy, Anna University, Chennai, Ph:8702462210 Email: k.udhay@gmail.com	Subject Expert-Member	02/05/26.
7	Dr. Srikanth N V	Professor & HOD, Department of EEE, NIT Warangal-506004.	University Nominee-Member	ABSENT
8	Dr. Suresh MVJJ	Engineering Manager-GE Gas Power Bengaluru-560048, Karnataka. Ph:9611299888 Email: sureshmvjj@gmail.com	Industry Representative-Member	02/05/26
9	Mr. B. Sai Kumar	Hardware Specialist, Valeo India Private Limited, Chennai-600130 Ph:9573021078 Email: saikumar183@gmail.com	Alumni Representative-Member	ABSENT

P.B.V

BOS Chairman

ANNAMACHARYA UNIVERSITY

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RAJAMPET, Annamayya District, A.P – 516126, INDIA.

Academic Year 2026-2027

3rd BoS MINUTES OF MEETING

The 3rd meeting of the Board of Studies (BoS) for the School of Electrical and Electronics Engineering of the Annamacharya University, Rajampet was held on 02/05/2026 at EEE Computer Lab from 10.30 AM to 01:00 PM, with the following members of the board were present.

Members Present:

S. No	Name	Affiliation	Role in BoS
1	Dr. P. B. Chennaiah	Associate Professor & Head School of EEE, Annamacharya University, Rajampet Ph:9441112015 Email: pbc.sushma@gmail.com	Chairman
2	Dr. M. Padma Lalitha	Professor & School of EEE, Annamacharya University, Rajampet Ph:9989998643 Email: lalithapadma.mareddy@gmail.com	Senior Faculty-Member
3	Dr. P. Bhaskara Prasad	Assistant Professor, School of EEE, Annamacharya University, Rajampet Ph:8185945663 Email: bhaskara.papugari@gmail.com	Senior Faculty-Member
4	Dr. C. Ganesh	Assistant Professor, School of EEE, Annamacharya University, Rajampet Ph:7396574766 Email: ganesh.challa@gmail.com	Course Coordinator-Member
5	Dr. B. Ravi Kumar	Professor, Dept. of EEE, IIT Hyderabad, Telangana, Ph: 94488848013. Email: ravikumar@iith.ac.in	Subject Expert-Member
6	Dr. K. Udhaya Kumar	Professor, Dept. of EEE, College of Engineering Guindy, Anna University, Chennai, Ph:8702462210 Email: k.udhay@gmail.com	Subject Expert-Member
7	Dr. Suresh MVJJ	Engineering Manager-GE Gas Power Bengaluru-560048, Karnataka. Ph: 9611239988 Email: sureshmvjj@gmail.com	Industry Representative-Member

P.B (CP.B. Chennaiah) (Dr. M. Padma Lalitha) (P. Bhaskara Prasad) (C. GANESH)

Members Absent:

S. No	Name	Affiliation	Role in BoS
1	Dr. Srikanth N V	Professor & HoD, Department of EEE, NIT Warangal-506004.	University Nominee-Member
2	Mr. B. Sai Kumar	Hardware Specialist, Valeo India Private Limited, Chennai-600130 Ph: 09573021078, Saikumar183@gmail.com	Alumni Representative-Member

P.BV (CP&B Chennai)

(Dr. M. Padma Lalitha)

(P Bhaskara Prasad)

(C. GANESH)

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AGENDA OF THE MEETING

Item No	Particulars
BoS/2026/EEE/3.1	Welcome and Introduction.
BoS/2026/EEE/3.2	Ratification of the Minutes of the 2nd Board of Studies Meeting.
BoS/2026/EEE/3.3	Ratification of 2nd BoS meeting action taken report.
BoS/2026/EEE/3.4	Discussion on stakeholder's feedback on curriculum.
BoS/2026/EEE/3.5	To discuss and finalize the course structure for B. Tech, AU-24 Regulations.
BoS/2026/EEE/3.6	To discuss and finalize syllabus for III - B. Tech, AU R24 Regulations.
BoS/2026/EEE/3.7	Discussion on the introduction of courses aligned with Sustainable Development Goals (SDGs), cross-cutting issues and Indian Knowledge System (IKS) in the curriculum of the respective departments.
BoS/2026/EEE/3.8	To approve the list of examiners.
BoS/2026/EEE/3.9	Any other item with the permission of the Chair.

P.B.U (P.B. Chennaiah)

(P. Bhaskara Prasad)

(C. Ganesh)

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MINUTES OF THE MEETING

Agenda Item No. BoS/2026/EEE/3.1: Welcome and Introduction

Welcome:

Dr. P. B. Chennaiah, Associate Professor & Head, School of Electrical and Electronics Engineering has extended warm welcome to all the members.

Introduction:

At the outset, Dr. P. B. Chennaiah, introduced all the members of the Board of Studies and thanked them for accepting the invitation to the 3rd BoS meeting.

Agenda Item No. BoS/2026/EEE/3.2: Ratification of the Minutes of the 2nd Board of Studies Meeting.

The external BoS members have ratified the points discussed in the 2nd Board of Studies meeting held on 09/06/2025.

Agenda Item No. BoS/2026/EEE/3.3: Ratification of 2nd BoS meeting action taken report.

The BoS chairman presented the action taken report on changes made in the syllabus as per the suggestions given by the external BoS members and is enclosed in **Annexure-I.** The BoS members approved the same.

Agenda Item No. BoS/2026/EEE/3.4: Discussion on stakeholder's feedback on curriculum.

The BoS chairperson presented the stakeholders feedback on curriculum received from the feedback committee approved by PAC (Programme Assessment Committee). The resolutions are appended in **Annexure-II.**

Agenda Item No. BoS/2026/EEE/3.5: Discussion on course structure of B. Tech, AU R-24 Regulations.

The BoS chairman presented the course structure of B. Tech, AU R24 Regulations, the BoS members approved the course structure and the copy of course structure is enclosed in **Annexure-III.**

Agenda Item No. BoS/2026/EEE/3.6: Discussion on syllabus for the III - B. Tech, AU R-24 Regulations.

The BoS chairman discussed the syllabus of III - B. Tech, AU R-24 Regulations. The BoS members approved the syllabus. The copy of syllabus has been enclosed in **Annexure-IV.** Also, the following recommendations are given.

P. B. Chennaiah

(P. B. Chennaiah)

(P. Bhaskar Prasad)

(C. Ganesh)

Dr. B. Ravi Kumar:

- It was suggested to incorporate standard and authentic web resources as learning references in all relevant courses.
- In the **Linear Control Systems** course, the topic related to the **principle of operation of AC and DC servo motors** may be removed.
- It was recommended to modify the title of **Unit-I** in the **Power Electronics** course as **"Power Semiconductor Devices and Characteristics."**
- The laboratory title **"Power Electronics & Simulation Lab"** is recommended to be renamed as **"Power Electronics Lab."**
- In the **Power Electronics & Simulation Lab**, it was suggested to revise and update the titles of the laboratory experiments.
- In the **Power Systems Lab**, the title of **Experiment No. 8** may be revised as **"Study of Ferranti Effect."**

Dr. K. Udhaya Kumar:

- It was recommended to rename the laboratory **"Power Electronics & Simulation Lab"** as **"Power Electronics Lab."**
- In the course **Electrical Power Transmission and Switchgear**, the book **"Electrical Power Systems" by C. L. Wadhwa** may be included as a **Textbook** instead of being listed under references.
- In the **Sensors and Instrumentation** course, it was recommended to introduce **SCADA basics** in **Unit-IV** and include the topic **Multi-Sensor Data Fusion**.
- In the course **IoT Applications in Smart Energy Systems**, the topic **IoT in Energy Systems** may be included for better alignment with emerging technologies.
- In the **Gender Sensitization** course, it was recommended to include the **Prevention of Sexual Harassment (PoSH) Act**.

Dr. Suresh MVJJ:

- In the **Linear Control Systems** course, it was suggested to include **fundamentals of Digital Control Systems** in **Unit-V**, and accordingly revise the course title to **"Linear & Digital Control Systems."**
- In the **IoT with Arduino & Node MCU** course, an **experiment related to Drones** may be introduced in **Unit-V**.

P. B. Ravi Kumar

P. Bhaskar Prasad

G. Ramesh

- In the **Renewable Energy Systems** course, the introduction of **Grid Integration Techniques** was recommended.
- In the **Sensors and Instrumentation** course, it was suggested to incorporate the topic **Calibration of Sensors**.
- . The course title **"AIML in Electrical Engineering"** may be revised as **"AI & ML in Electrical Engineering."**
- In the **AI & ML in Electrical Engineering** course, it was recommended to include one additional textbook under the **Textbooks** section.
- In the **Battery Management System** course, the topic title in **Unit-I** may be revised from **"Batteries"** to **"Types of Batteries."**
- It was recommended to introduce the topic **"Standards for Battery Testing"** in **Unit-V** of the Battery Management System course.
- In the **EV and RES Lab**, it was recommended to include an experiment on **Simulation of Battery Energy Storage System (BESS) performance characteristics**.
- In the **EV & RES Lab**, the following experiments were suggested for inclusion:

i) Load test on EV ii) Study of RES integrated EV charging station iii) Fast charging of EVs iv) Simulation of Micro Grids and Smart Grids v) Hybrid Energy Control System vi) Simulation of Cyber Security Events

<u>Agenda Item No. BoS/2026/EEE/3.7</u>: To Discuss the inclusion of the courses aligned with SDG's, cross cutting issues and IKS in the curriculum of the department.

The BoS chairman discussed the courses aligned with SDG's, Cross cutting issues and integration with IKS and the BoS members approved the same. The list is enclosed in **Annexure-V.**

<u>Agenda Item No. BoS/2026/EEE/3.8</u>: To approve the list of examiners for III - B. Tech courses

The BoS chairman listed out the external examiners from reputed Universities and the BoS members approved the same. The list of examiners has been presented in **Annexure-VI.**

P. B. Chennaiah

Dr. P. B. Chennaiah
(BoS Chairman)

P B C (A B Chennaiah)

P. Bhaskara Prasad

C. Ganesh

Annexure-I

ANNAMACHARYA UNIVERSITY

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Action Taken Report from the 2nd BoS Meeting

In response to the suggestion made in the previous Board of Studies meeting, the following actions has been taken.

S. No.	Suggestion / Proposal	Action Taken
1	Use descriptive course titles instead of generic labels.	1. Electrical Machines → DC machines and transformers 2. Electrical Circuits-I → Network Analysis and Synthesis 3. Digital circuits → Digital Electronics 4. Induction and synchronous machines → Induction motor and synchronous machines 5. Electrical and Electronics measurements → Electrical measurements and Electronics Instrumentation 6. DC Machines Lab → DC Machines and Transformers Lab
2	Retain tutorial hours in numerically intensive subjects.	Tutorial Hours for the courses 1. Network Analysis and Synthesis and 2. Electromagnetic Field theory.
3	Rename Electrical Measurements and Electronics Instrumentation to Electrical and Electronics measurements and Instrumentation; update lab name and add new experiments.	Renamed as suggested; new experiments added including strain gauge, thermistor, thermocouple, CT/PT burden, LVDT, capacitive transducers; choke coil renamed to inductive coil.
4	Ensure consistency in theory/lab coding.	All courses updated using "(T)" for theory and "(L)" for lab (e.g., Synchronous and Asynchronous Machines (T) and (L)).
5	Update Physics and Chemistry titles to reflect engineering context.	Forwarded to H&S Engineering Physics and Engineering Chemistry.
6	Align COs with all levels of Bloom's Taxonomy.	All COs revised to ensure coverage of all Bloom's levels.
7	Restrict to one main textbook and include quality references/web links.	Each course includes 1 primary textbook (last 10 years) and relevant NPTEL/OER links.
8	Use open educational resources (OERs) with clear links.	Specific OER portals like SWAYAM, AICTE Virtual Labs, and NPTEL linked in syllabi.
9	Revise Electrical Circuits-II content: remove Laplace/Fourier; add analog circuits, filters, synthesis.	Content updated as proposed for improved practical alignment.

P. BV (P. Bhaskara Chennu)

(Dr. M. Padma Lalitha)

(P. Bhaskara Prasad)

(C. GANESH)

S. No.	Suggestion / Proposal	Action Taken
10	Strengthen CO-PO mapping across all courses.	Mapping revised to ensure each CO has at least a weak correlation to each PO.
11	Reframe COs to start with "At the end of the course the student will be able to..."	Applied uniformly across all courses.
12	Update names of Electrical Circuits Lab experiments.	"Mesh/Nodal" → "Kirchhoff's Laws" - "Calibration of two-port" → "Determination of two-port parameters" - Added: 2-wattmeter and 1-wattmeter methods.
13	Add single-phase and special machines in Electrical Machines course.	New Unit 5 added: single-phase motors, servo, stepper, and reluctance motors.
14	Remove IV sem experiment on V & Inverted V curves.	Removed from lab schedule to reduce student workload.
15	BEEE Theory customization for non-EEE branches.	Customized content designed for Civil, Mech, CSE: includes safety, wiring, embedded basics.
16	BEEE Lab customization per branch.	- Mechanical: Motor control, sensors - Civil: Wiring, earthing - CSE: Logic circuits, microcontrollers.
17	Integrate internships with M. Tech project work.	M. Tech guidelines revised to include industry internship as part of project.
18	Introduce Early Exit Certification (Diploma, Advanced Diploma).	Proposal approved in-principle; forwarded to Academic Council and aligned with AICTE/UGC.
19	New M. Tech Specializations: EV & Smart Grid.	Syllabi for E-Mobility Technologies and Smart Grid Integration drafted; industry collaboration (Tata, Hitachi) initiated.
20	Allocate 10% marks for attendance.	Approved. Implementation initiated using biometric/digital attendance tools.
21	Assign 5% syllabus as self-learning component.	Teachers submit 95% teaching plan; remainder covered through research/problem-based individual assignments.
22	In DC Machines & Transformers, incorporate smart transformers, condition monitoring, IoT-based diagnostics; include high-efficiency and renewable-powered machines.	Smart transformers and IoT-based diagnostics will try to be incorporated in the next regulation
23	In Network Analysis & Synthesis, include MATLAB/Simulink-based fault detection and harmonic analysis; power quality applications.	MATLAB/Simulink-based fault detection, harmonic analysis, and power quality applications will try to be incorporated in the next regulation.

P. B Chowdary

Dr. M. Padma Lalitha

P. Bhaskara Prasad

C. GANESH

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S. No.	Suggestion / Proposal	Action Taken
24	In Analog Electronics, include SiC, GaN semiconductors; RF circuits and 5G-related electronics.	SiC and GaN semiconductor devices will try to be incorporated in the next regulation
25	In Digital Electronics, Add FPGA programming, HDL, and edge computing fundamentals.	FPGA programming and HDL concepts will try to be incorporated in the next regulation.
26	In Synchronous & Asynchronous Machines, PMSMs for EVs, vector and DTC motor control.	PMSMs for EV applications will try to be incorporated in the next regulation
27	In Electromagnetic Field Theory, Wireless power, antenna design, EMI/EMC mitigation; FEM-based solvers.	Wireless power transfer, antenna design, EMI/EMC mitigation, and FEM-based solver exposure will try to be incorporated in the next regulation.
28	In DC Machines Lab, Introduce AI-assisted fault detection and VFD control.	AI-assisted fault detection and VFD control experiments will try to be incorporated in the next regulation
29	In PCB Design Lab, upgrade to multi-layer PCBs, RF circuits, IoT-based security hardware.	Multi-layer PCB design, RF circuit exposure, and IoT-based security hardware interfacing will try to be incorporated in the next regulation
30	In AC Machines Lab, IoT condition monitoring, energy-efficient motor testing.	IoT-based condition monitoring and energy-efficient motor testing experiments will try to be incorporated in the next regulation.
31	In Measurements & Instrumentation Lab, Digital sensors, smart meters, AI-based diagnostics.	Digital sensors, smart meters, and AI-based diagnostics experiments will to be incorporated in the next regulation
32	In Analog & Digital Electronics Lab, FPGA-based design, high-speed ADC/DAC testing, AI signal processing.	FPGA-based design, high-speed ADC/DAC testing with updated trainer kits, and AI signal processing using MATLAB will try to be incorporated in the next regulation.

(P.B. Chennaiah) (Dr. M. padma Lalitha) (P Bhaskara Prasad) (C. GANESH)

Annexure-II

ANNAMACHARYA UNIVERSITY

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(Stakeholder's Feedback)

The following recommendations have been forwarded from the feedback committee and PAC to the BoS. The resolutions passed are provided point wise below:

S. No.	Decision About	Resolution
1.	Introduction of **AI & ML** applications in Electrical Engineering	Resolved to offer a new course titled **AI & ML for Electrical Engineering** to address emerging trends.
2.	Allow the students to do **offline Internships.**	Resolved to allow the students to undergo **offline internships.**
3.	Encourage the students to develop **technical models.**	Resolved to guide the students to build **technical models.**
4.	Conduct of **guest lectures and workshops** on contemporary technologies	Resolved to regularly **organize guest lectures and workshops on recent and emerging technologies.**
5.	Organizing **industrial visits** for students	Resolved to facilitate **periodic industrial visits** to enhance students' practical exposure.
6.	Formation of various clubs.	Resolved to form various clubs such as **sports, cultural, coding and competitive examinations clubs** etc.

P.B.V (P.B. Chowdhury) (Dr. M. Padma Lalitha) (P. Bhaskara Prasad) (C. GANESH)

Annexure - III & IV

ANNAMACHARYA UNIVERSITY

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RAJAMPET, Annamayya District, AP – 516126, INDIA

COURSE STRUCTURE FOR ELECTRICAL AND ELECTRONICS ENGINEERING

I YEAR I SEMESTER

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE11T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ES	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ES	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS	24ACHE11L	Chemistry Lab	0	0	2	1
8	ES	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Language Elective	1	0	0	1
						Total credits	19

Category	Credits
Basic Science Course (BS)	11
Humanities and Social Sciences and Management Course (HSM)	01
Engineering Science Course	07
Total Credits	19

I YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24APHY21T	Applied Physics	3	0	0	3
2	BS	24AMAT21T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ES	24AECE21T	Fundamentals of Electronic Devices & Circuits	3	0	3	3
5	ES	24AEEE22T	Electrical Circuits-I	3	0	0	3
6	ES	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS	24APHY21L	Applied Physics Lab	0	0	2	1
8	HSM	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ES	24AECE21L	Fundamentals of Electronics Devices & Circuits Lab	0	0	2	1
						Total credits	21

Category	Credits
Engineering Science Course (ES)	10
Basic Science Course (BS)	07
Humanities and Social Sciences and management course (HSM)	04
Total Credits	21

P.B. — P
C.P.B. Chennaiah

(Dr. M. Padma Lalitha) P Bhaskara Prasad (C. Ganesh)

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II YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE31T	DC Machines and Transformers	3	0	0	3
2	PC	24AEEE32T	Network Analysis and Synthesis	2	1	0	3
3	PC	24AEEE33T	Analog Electronics	3	0	0	3
4	HSM	24AUHV31T	Universal Human Values-II	3	0	0	3
5	HSM	24AMBA31T	Managerial Economics & Financial Analysis	3	0	0	3
6	MC	24AENS31T	Environmental Science	2	0	0	0
7	PC	24AEEE31L	DC Machines and Transformers Lab	0	0	3	1.5
8	PC	24AEEE32L	Electrical Circuits Lab	0	0	3	1.5
9	PC	24AEEE33L	Electrical and Electronics Simulation Lab	0	0	3	1.5
10	SEC	24AEEE34L	PCB Design and Fabrication	1	0	2	2
						Total credits	21.5

Category	Credits
Basic Science Courses (BS)	0
Program Core Courses (PC)	13.5
Engineering Science Courses (ES)	0
Humanities and Social Sciences and Management Courses (HSM)	6
Skill Enhancement Course (SEC)	2
Total Credits	21.5

II YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24AMAT42T	Numerical Methods	3	0	0	3
2	PC	24AEEE41T	Digital Electronics	3	0	0	3
3	PC	24AEEE42T	Induction and Synchronous Machines	3	0	0	3
4	PC	24AEEE43T	Electrical & Electronics Measurements and Instrumentation	3	0	0	3
5	PC	24AEEE44T	Electromagnetic Field Theory	2	1	0	3
6	PC	24AEEE41L	Analog and Digital Electronics Lab	0	0	3	1.5
7	PC	24AEEE42L	Induction and Synchronous Machines Lab	0	0	3	1.5
8	PC	24AEEE43L	Measurements and Instrumentation Lab	0	0	3	1.5
9	SEC	24ACSE45L	JAVA Programming	1	0	2	2
						Total credits	21.5

Category	Credits
Basic Science Courses (BS)	3
Program Core Courses (PC)	16.5
Engineering Science Courses (ES)	0
Humanities and Social Sciences and Management Courses (HSM)	0
Skill Enhancement Course (SEC)	2
Total Credits	21.5

P.B.V
(P.B. Chennaiah)

(Dr. P. Padmalatha) (P. Bhaskara Prasad)

(C. Ganesh)

III YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE51T	Linear Control Systems	3	0	0	3
2	PC	24AEEE52T	Power Electronics	3	0	0	3
3	PC	24AEEE53T	Electrical Power Transmission and Switch Gear	3	0	0	3
4	PE-I	24AEEE5AT	Distribution of Electrical Power	3	0	0	3
		24AEEE5BT	Electric & Hybrid Vehicle Technology				
		24AEEE5CT	Sensors and Instrumentation				
		24AEEE5DT	Renewable Energy Systems				
		24AEEE5ET	IoT Applications in Smart Energy Systems				
5	OE-I	24AEEE5FT	MOOC	3	0	0	3
			Lab Courses				
6	PC	24AEEE51L	Control Systems & Simulation Lab	0	0	3	1.5
7	PC	24AEEE52L	Power Electronics & Simulation Lab	0	0	3	1.5
8	PC	24AEEE53L	Power Systems lab	0	0	3	1.5
9	SEC	24ACSE5ES	Python Programming	1	0	2	2
10	MC	24AAUD51T	Gender Sensitization	2	0	0	0
11	Internship	24AEEE54I	Summer Internship 2 Months after second Year (to be evaluated during V Semester)	0	0	3	2
						Total credits	**23.5**

Category	Credits
Program Core Courses (PC)	13.5
Professional Elective Courses -1 (PEC1)	3
Open Elective Courses-1 (OEC1)	3
Skill Enhancement Courses (SEC)	2
Internship	2
Total Credits	**23.5**

P.B.V (P.B.Chennaiah) Lalitha (Dr.G.Padma Lalitha) Bhaskar (P.Bhaskara Prasad) G (C.Ganesh)

III YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE61T	Power System Analysis	3	0	0	3
2	PC	24AEEE62T	Microprocessors and Microcontrollers	3	0	0	3
3	PC	24AEEE63T	Power System Operation and Control	3	0	0	3
4	PE-II	24AEEE6AT	AC Micro Grid	3	0	0	3
		24AEEE6BT	Power Semiconductor Drives				
		24AEEE6CT	Modern Control Theory				
		24AEEE6DT	Battery Management System				
		24AEEE6ET	AI & ML in Electrical Engineering				
5	OE-II	24AEEE6FT	MOOC	3	0	0	3
6	MC	24AMBA61T	Technical Paper Writing and Intellectual Property Rights	2	0	0	0
Lab Courses							
7	PC	24AEEE61L	EV and RES Lab	0	0	3	1.5
8	PC	24AEEE62L	Microprocessors and Microcontrollers Lab	0	0	3	1.5
9	PC	24AEEE63L	Power System Simulation Lab	0	0	3	1.5
10	SEC	24AEEE64S	IoT with Arduino & Node MCU	1	0	2	2
						Total credits	**21.5**

Category	Credits
Program Core Courses (PC)	13.5
Professional Elective Courses -2 (PEC-2)	3
Open Elective Courses -2 (OEC-2)	3
Skill Enhancement Course (SEC)	2
Mandatory Courses (MC)	0
Total Credits	**21.5**

P.B. Chennaiah (P.B. Chennaiah)

Lalitha (Smt. Padma Lalitha)

Bhaskar (P. Bhaskara Prasad)

G (C. Ganesh)

IV YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE71T	Advanced Power System Protection	3	0	0	3
2	PE-III	24AEEE7AT	Restructured Power Systems	3	0	0	3
		24AEEE7BT	HVDC & FACTS				
		24AEEE7CT	Embedded Systems				
		24AEEE7DT	Energy Auditing Demand Side Management				
		24AEEE7ET	Data Analytics for Electrical Engineers				
3	PE-IV	24AEEE7FT	Smart Grid	3	0	0	3
		24AEEE7GT	Advanced Power Electronics				
		24AEEE7HT	Program Logic Controllers				
		24AEEE7IT	Utilization of Electrical Energy				
		24AEEE7JT	Quantum Technologies for Electrical Engineering				
4	PE-V	24AEEE7KT	Power Quality	3	0	0	3
		24AEEE7LT	Special Electrical Machines				
		24AEEE7MT	Soft Computing Techniques				
		24AEEE7NT	Energy Storage Technology				
		24AEEE7OT	Cyber Security for Energy Systems				
5	OE-III	24AEEE7PT	Electrical Safety and Risk Management	3	0	0	3
		24AEEE7QT	Electrical Machine design				
		24AEEE7RT	Digital Signal Processing				
		24AEEE7ST	High Voltage Engineering				
6	OE-IV	24ACIV7NT	Water Resources and Harvesting	3	0	0	3
		24ACIV7MT	Disaster Management				
		24ACSE7QT	Data Base Management systems				
		24ACSE7RT	Operating system				
		24AMEC7HT	Optimization Techniques				
		24AMEC7GT	Entrepreneurship Development				
		24AECE7VT	Introduction to Image Processing				
		24AECE7TT	Introduction to Communications Systems				
		24AMBA71T	Human Resource Management				
		24AMBA72T	Startup Management				
		24AENG71T	English for competitive examinations				
		24AMAT72T	Complex Variables and Partial Differential Equations				
		24ACHE71T	Chemistry of Energy Systems				
		24PHY71T	Smart Materials and Devices				
7	Intern	24AEEE72L	Industrial/Research Internship 2 Months after third year (to be evaluated during VII semester)	0	0	3	2
					Total Credits		20

P.B.U—P (P.B. Chennaiah) Lalitha (Dr. G. Padma Lalitha) Bhaskar (P. Bhaskara Prasad) (C. Ganesh)

Category	Credits
Program Core Courses (PC)	3
Professional Elective Courses-III (PE-III)	3
Professional Elective Courses-IV (PE-IV)	3
Professional Elective Courses-V (PE-V)	3
Open Elective Courses-III (OEC-III)	3
Open Elective Courses-IV (OEC-IV)	3
Internship	2
Total Credits	**20**

IV YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ		Project Work	0	0	0	12
						Total Credits	**12**

Category	Credits
Project	12
Total Credits	**12**

Track 1: Power Systems & Smart Grid

PE Slot	Professional Elective Title
PE-I	Distribution of Electrical Power
PE-II	AC Micro Grid
PE-III	Restructured Power Systems
PE-IV	Smart Grid
PE-V	Power Quality

Track 2: Power Electronics & Electric Drives

PE Slot	Professional Elective Title
PE-I	Electric & Hybrid Vehicle Technology
PE-II	Power Semiconductor Drives
PE-III	HVDC & FACTS
PE-IV	Advanced Power Electronics
PE-V	Special Electrical Machines

Track 3: Control Systems & Automation

PE Slot	Professional Elective Title
PE-I	Sensors and Instrumentation
PE-II	Modern Control Theory
PE-III	Embedded Systems
PE-IV	Program Logic Controllers
PE-V	Soft Computing Techniques

Track 4: Renewable Energy & Sustainability

PE Slot	Professional Elective Title
PE-I	Renewable Energy Systems
PE-II	Battery Management System
PE-III	Energy Auditing Demand Side Management
PE-IV	Utilization of Electrical Energy
PE-V	Energy Storage Technology

P.B.V (P.B. Chennaiah) Lalitha (Dr. Reddy Lalitha) P. Bhaskara Prasad (P. Bhaskara Prasad) C. Ganesh (C. Ganesh)

Track 5: Emerging & Interdisciplinary Technologies

PE Slot	Professional Elective Title
PE-I	IoT Applications in Smart Energy Systems
PE-II	AI & ML in Electrical Engineering
PE-III	Data Analytics for Electrical Engineers
PE-IV	Quantum Technologies For Electrical Engineering
PE-V	Cyber Security for Power & Energy Systems

Total Credits Distribution

S.NO	Category	EEE
1	BSC	21
2	MC	0
3	ESC	17
4	PC	60
5	PE	15
6	OEC	12
7	HSMC	11
8	SKILL COURSES	8
9	INTERNSHIP	4
10	PW	12
	TOTAL	**160**

P.B.V (P.B. Chennai)

Bhaskar (P. Bhaskara Prasad)

(C. Ganesh)

Title of the Course:		Linear Control Systems
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24AEEE51T
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Merits and demerits of open loop and closed loop systems; the effect of feedback
2. The use of block diagram algebra and Mason's gain formula to find the overall transfer function
3. Transient and steady state response, time domain specifications and the concept of Root loci
4. Frequency domain specifications, Bode diagrams and Nyquist plots
5. State space modelling of Control system

Course Outcomes:

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

1. Apply control concepts for modeling, block diagram/Signal flow graph analysis, and servo motor operation.
2. Analyze time response, steady-state errors, and controller performance.
3. Analyze system stability using Routh's criterion and root locus techniques.
4. Analyze frequency response stability using Bode, Polar, and Nyquist plots and design compensators for stability.
5. Analyze state-space models, system response, controllability, and observability of continuous systems.

Unit 1 Introduction to Control Systems Concepts **12**

Open loop and closed loop control systems and their differences- Examples of control systems, Feedback characteristics; Mathematical models – Differential equations of translational and rotational mechanical systems, Analogous Systems, problems; Block diagram reduction Rules, problems; Signal flow graphs using Mason's gain formula, problems; DC and AC Servo motors, Transfer function of DC servo motor & AC servo motor, Synchros.

Unit 2 Time Response Analysis **8**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems, problems- Time domain specifications, problems – Steady state response - Steady state errors and Static error co-efficients, problems, P, PI, PID Controllers.

Unit 3 Stability Analysis in Time Domain **10**

The concept of stability – Routh's stability criterion, problems-absolute stability and conditional stability – limitations of Routh's stability criterion. The Root locus concept, problems –effects of adding poles and zeros to G(S)H(S) on the root loci.

P.B.V (P.B.Chennaiah) Lalitha (Dr. Padmalatha) Bhaskar (P. Bhaskara Prasad) G.G (C. Ganesh)

Unit 4 Frequency Response Analysis **10**

Frequency domain specifications-Definitions, Bode Diagrams-Stability Analysis from Bode Plots, Problems. Polar Plots-Stability Analysis from polar plots, problems-Nyquist stability criterion-Nyquist Plots, problems. Compensation techniques _ Lag, Lead, and Lag-Lead Compensator design using Bode plots.

Unit 5 State Space Analysis of Continuous Systems **10**

Concept of state, state variables and state model, state models – differential equations & Transfer function models, problems, Transfer function from state model, solving the linear time invariant state equations – State transition Matrix and it's properties. System response through state space models. The concepts of controllability and observability, problems.

Textbooks:

1. I.J.Nagrath and M. Gopal "Control Systems Engineering" New Age International (P) Limited, Publishers, 6th edition, September 2018

Reference Books:

1. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition, 2003.
2. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
3. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.

Web Resources:

1. https://nptel.ac.in/courses/107106081
2. https://www.youtube.com/watch?v=ziu1OTwUrbw
3. https://www.youtube.com/watch?v=jji35E9hyAs
4. https://www.youtube.com/watch?v=C4-auv8J_7E
5. https://www.youtube.com/watch?v=pv3sqbzgTrI

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE51T.1	3	3	3	-	2	1	-	-	-	-	3	3	3
24AEEE51T.2	3	3	2	-	3	1	-	-	-	-	3	3	3
24AEEE51T.3	3	2	3	-	3	3	1	-	-	-	3	3	3
24AEEE51T.4	3	3	3	-	3	3	3	-	-	-	3	3	3
24AEEE51T.5	3	3	2	-	3	3	3	-	-	-	3	3	3

P.BV — (Dr M. Padmalatha) — (P. Bhaskara Prasad) — (C. Ganesh)

CP.BChowdary

Title of the Course:		Power Electronics
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24AEEE52T
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the construction, characteristics, and switching behavior of SCR.
2. To study the working principles, operation modes, and analysis of dc-to-dc converters.
3. To analyzed the operation and performance of single-phase and three-phase controlled rectifiers with R and RL Load.
4. To examine the principles and control strategies of single-phase and three-phase inverters, focusing on PWM techniques, harmonic reduction, and inverter performance.
5. To explore the operation of AC voltage controllers, and cycloconverters, and understand their applications in controlling AC power.

Course Outcomes:

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

1. Understand the I-V Characteristics and Gate Drive Requirements of Power Devices.
2. Analyze steady state waveforms of dc-to-dc converters.
3. Design Single-Phase and Three-Phase Rectifiers with Different Load Conditions.
4. Explore the Operation of single phase and three phase Inverters
5. Analyze the operation of AC Voltage Controllers and Cycloconverters with Various Load Conditions.

Unit 1 **Power Semiconductor devices and Characteristics** **10**

Basic Structure and I-V Characteristics of Thyristor, turn on and turn-off methods and switching characteristics of SCR, series and parallel connection of SCR, R, RC and UJT Firing circuits and commutation circuits for SCR, Snubber circuit, numerical problems, I-V Characteristics of Power Diode, Power MOSFET and IGBT, Introduction to Gallium Nitride (GaN) and Silicon Carbide (SiC) devices.

Unit 2 **Choppers** **10**

Introduction to chopper; classification of choppers – class A, B, C, D, and E, concept of duty ratio; control strategies average output voltage and current, list of applications of DC-DC converters, numerical problems.

Unit 3 **Rectifiers** **10**

Single-phase half controlled and fully controlled bridge thyristor rectifier with R and RL load with relevant waveforms, average output voltage and current; Three-phase half controlled and fully controlled bridge thyristor rectifier with R and RL load with relevant waveforms, average output voltage and current, single Phase dual converter, list of applications of rectifiers and dual converter - numerical problems.

P.B. Chennaly (P.B. Chennaly) (Dr. M. Padmavathi) (P. Bhaskara Prasad) (C. Ganesh)

Unit 4 Inverters **10**

Single phase half bridge and full bridge Voltage Source Inverter (VSI)s, operating principle, voltage control techniques for inverters and Pulse Width Modulation (PWM) schemes for single phase inverters - single pulse, multiple pulse and sinusoidal PWM, basic series inverter, single phase parallel inverter, basic principle of operation, three phase VSI (180^{O} conduction mode) - three phase CSI – list of applications of Inverters.

Unit 5 AC Voltage Controllers & Cycloconverters **12**

Single phase AC voltage controllers – half wave and full wave AC voltage controllers, wave forms RMS load voltage and current - numerical problems. Cycloconverters - Midpoint and Bridge connections - Single phase to single phase step-up and step - down cycloconverters, principle of operation, waveforms, output voltage equation with Resistive load, list of applications of AC voltage controllers and Cycloconverters.

Textbooks:

1. M. D. Singh & K. B. Khanchandani, Power Electronics, Tata MC Graw Hill Publishing Company, 2nd edition 2017.

Reference Books:

1. Power Electronics by P.S. Bimbhra, 7th edition, Khanna Publishers, New Delhi, 2025.
2. Power Electronics: Circuits, Devices and Applications by Muhammad H. Rashid- 2003.
3. Power Electronics: Converters, Applications and Design (An Indian Adaptation) by Ned Mohan, Tore M. Underland, William P. Robbins-2022.
4. Power Electronics by V. R. Murthy, 1st Edition, Oxford University Press, 2005.
5. Power Electronics by P. C. Sen, McGraw Hill Education, 2017.

Web resources:

- https://nptel.ac.in/courses/108102145
- https://onlinecourses.nptel.ac.in/noc22_ee23/preview
- https://www.coursera.org/learn/power-electronics
- https://www.eepower.com/technical-articles/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE52T.1	3	2	1	1	2	-	-	-	-	1	-	3	-
24AEEE52T.2	3	3	1	2	2	-	-	-	-	3	-	3	3
24AEEE52T.3	3	3	3	2	3	-	-	-	-	3	-	3	-
24AEEE52T.4	3	2	1	1	2	-	-	-	-	2	-	3	3
24AEEE52T.5	3	3	2	2	2	-	-	-	-	2	-	3	-

P.B. Chowdary Dr. C. Sobha Lalitha. P. Bhaskara Prasad C. Ganesh

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Electrical Power Transmission and Switch Gear
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24AEEE53T
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To enrich the students with the fair knowledge of transmission line parameters and performance
2. To analyze mechanical design of transmission
3. To understand operation of switchgear equipment.

Course Outcomes:

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

1. Calculate the transmission line parameters for various configurations.
2. Evaluate the Performance of Transmission Lines
3. Recognize the importance of mechanical design in transmission lines.
4. Evaluate parameters for underground transmission lines.
5. Explain various switchgear equipment.

Unit 1 Transmission Line Parameters **10**

Electrical design of Overhead Transmission Lines – Calculation of Line constants of 1- phase, 3-phase system of symmetrical, unsymmetrical and transposed configurations –Calculation of Line constants of stranded conductor, double circuit 3-phase system using GMD and GMR Concepts.

Unit 2 Performance of Transmission Lines **10**

Classification of Transmission Lines -Short, medium and long line and their model representations - Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical networks, Numerical Problems and solutions for estimating regulation and efficiency of all types of lines. – Numerical Problems. Skin and Proximity effects, Ferranti effect, Charging Current

Unit 3 Mechanical Design of Overhead Transmission Line **10**

Corona - factors affecting corona, critical voltages and power loss.

Overhead Line Insulators, Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Numerical Problems. Sag and Tension Calculations: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Stringing chart, Numerical Problems.

Unit 4 Underground Cables **08**

Types of Cables, Construction, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables, Capacitance grading, Inter- sheath grading, Numerical Problems.

P.B.Ch (P.B.Chennaiah) (Dr.Padmalatha) (P.Bhaskar Prasad) (C.Ganesh)

Unit 5 Switchgear **10**

Fuses— Introduction-Definitions-Fuse Characteristics-Types of Fuses- Applications of HRC fuse. Circuit Breakers: Elementary principles of arc interruption, Restriking Voltage and Recovery Voltages-Average and Max. RRRV, Numerical Problems Current Chopping and Resistance Switching -Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum andSF6circuit breakers.

Textbooks:

1. C. L. Wadhwa, -Electrical Power Systems‖, New Age International (P) Limited, Publishers, 1st Edition 1998.

Reference Books:

1. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A.Chakrabarthy,- A Text Book on Power System Engineering, Dhanpat Rai & Co Pvt. Ltd. 1st Edition, 1999.
2. Badari Ram, D.N Viswakarma, Power System Protection and Switchgear TMH Publications.1st Edition, 2012.
3. S. Sivanagaraju S. Satyanarayana, Electric Power Transmission and Distribution 1st edition Pearson Education, 2008.

Web Resources:

- https://nptel.ac.in/courses/108/105/108105067/
- https://nptel.ac.in/courses/108/104/108104051/
- https://nptel.ac.in/courses/108/107/108107167/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE53T.1	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.2	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.3	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.4	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.5	3	3	2	-	-	-	-	-	-	-	-	3	3

(P.B.Chennaiah) (Dr. [illegible]) (P.Bhaskara Prasad) (C.Ganesh)

Title of the Course:		Distribution of Electrical Power
Category	:	PE
Year	:	III
Semester	:	I
Course Code	:	24AEEE5AT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To discuss the basics of the distribution system, different types of loads and their characteristics, and to understand the concept of DC distribution of power in terms of voltage drop and power loss.
2. To explain the concepts of AC distribution of power in terms of load voltage drop and power loss, the need for protection of Distribution systems, and protecting devices.
3. To describe the fundamental components of the substation and bus bar arrangements.
4. To explain the need for Power Factor and Voltage Control in Distribution systems.
5. To discuss the concept of Distribution System Planning and different planning techniques.

Course Outcomes:

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

1. Understand load modeling concepts and characteristics of various consumer loads in distribution systems.
2. Explain the structure, classification, and operational features of distribution substations.
3. Apply design considerations to analyze voltage drop and power losses in distribution systems.
4. Analyze power factor improvement techniques and protection methods used in distribution systems.
5. Understand distribution system planning approaches and the fundamentals of distribution automation.

Unit 1 Load Modeling and Characteristics **08**

Introduction to Distribution Systems and definitions: Daily load curve, load duration curve, peak load estimation, Load Modelling and Characteristics. Diversity Factor, Coincidence Factor, Contribution Factor, Loss Factor - Relationship between the Load Factor and Loss Factor, problems. Classification of Loads (Residential, Commercial, Agricultural and Industrial) and Their Characteristics.

Unit 2 Substations **10**

Location of Substations, Rating of Distribution Substation, Service Area with 'n' Primary Feeders and Comparison of the four and six feeder patterns, Derivation of the K constant. Classification of Substations: Air Insulated Substations - Indoor & Outdoor Substations. Bus Bar Arrangements in the Sub-Stations: Simple Arrangements Like Single Bus Bar, Sectionalized Single Bus Bar, Double bus double breaker, Main and Transfer Bus Bar, Double bus single Breaker – One and Half Breaker System with Relevant Diagrams.

P.B.K (P.B. Chowdary) (Dr. C. Reddy Kalidhar) (P. Bhaskara Prasad) (C. Ganesh)

Unit 3 Design Considerations of Distribution Systems 10

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design Features of Distribution Systems. Design Considerations of Distribution Feeders: Radial and Loop Types of Primary Feeders, Voltage Levels, Feeder Loading, Basic Design Practice of the Secondary Distribution System. Voltage Drop and Power-Loss Calculations: Derivation for Voltage Drop and Power Loss in Lines.

Unit 4 Power Factor Improvement and Distribution System Protection 10

Causes of Low Power Factor -Methods of Improving Power factor -Most Economical Power factor, Numerical Problems. Economic Justification for Capacitors - Procedure to Determine the Best Capacitor Location.

Distribution System Protection: Objectives of distribution system protection, Protective Devices: Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers, Coordination of Protective Devices, General coordination procedure.

Unit 5 Distribution System Planning and Automation 9

Distribution System Planning: Factors Affecting System Planning, Present Distribution System Planning Techniques, Distribution System Planning Models.

Distribution Automation (DA) – Definitions – Alternatives of Communication Systems- Supervisory Control and Data Acquisition (SCADA) – Consumer Information Service (CIS), Outage Management System (OMS).

Textbooks:

1. Electric Power Distribution Engineering, Turan Gonen, CRC Press, 3rd Edition, 2014.

Reference Books:

1. A.S. Pabla, Electric Power Distribution, Tata Mc Graw Hill (India) Pvt. Ltd., 6th Edition, 2011.
2. Dr. M. K. Khedkar and Dr. G. M. Dhole Electric Power Distribution Automation, University Science Press, 2010.
3. Electrical Power Distribution Systems, V. Kamaraju, Jain Book Depot. 2012

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5AT.1	3	2	-	-	-	-	-	-	-	-	1	3	-
24AEEE5AT.2	3	2	1	-	-	-	-	-	-	-	1	3	3
24AEEE5AT.3	3	3	2	1	2	-	-	-	-	-	1	3	-
24AEEE5AT.4	3	3	2	1	1	-	-	-	-	-	1	3	3
24AEEE5AT.5	3	2	2	-	1	2	-	-	-	1	2	3	-

P.B.
(P.B.Chowdary) Lalitha (Padmalalitha) Bhaskar (P.Bhaskar Prasad) (C. Ganesh)

Title of the Course	Electric & Hybrid Vehicle Technology
Category	PE
Couse Code	24AEEE5BT
Year	III
Semester	I
Branch	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals.
2. To analyze various electric drives suitable for hybrid electric vehicles.
3. To discuss the case studies of electric and hybrid electric vehicle.

Course Outcomes:

1. Explain the operation of Hybrid electric vehicle.
2. Identify suitable drive for developing hybrid and electric vehicle depending on resources
3. Discuss the energy storage technologies
4. Discuss the types of hybrid electric vehicle

Unit 1 **Introduction to Electric Vehicles** **08**

Introduction – History of electric vehicle -Components of EV System – Energy storage device for EVs – Performance of EVs – Electric Vehicle drive train– EV Transmission Configurations and components – Types of Electric Vehicle.

Unit 2 **Electric Vehicle Modelling** **10**

Consideration of Rolling Resistance – Transmission Efficiency – Consideration of Vehicle Mass – Tractive Effort – Modelling Vehicle Acceleration – Modelling Electric Vehicle Range - Aerodynamic Considerations – EV Motor Sizing.

Unit 3 **Energy Sources** **10**

Electric vehicle power source - Battery capacity, State of charge and discharge, Specific energy, specific power, Ragone plot. Battery modeling - run time battery model, first principle model, battery management system- SoC Estimation, battery cell balancing- Simple numerical problems. Types of batteries - Li-ion, Li-polymer battery.

Unit 4 **Hybrid Electric Vehicles** **10**

HEV Fundamentals -Architectures of HEVs- State of the Art of HEVs – Advantages and Disadvantages – Types of Hybrid Electric vehicles - Challenges and Key Technology of HEVs – Plug-in Hybrid Electric Vehicles – Design and Control Principles of Plug-In Hybrid Electric Vehicles.

P.B.C. (P. B. Chennaiah) (Dr. M. Padmavathi) (P. Bhaskara Prasad) (G. Ganesh)

Unit 5 **Electric and Hybrid Vehicle – Case studies** **08**

Hybrid vehicle case study –Toyota Prius, Honda Insight. Lightly hybridized vehicles and low voltage systems. systems. Hybrid electric heavy-duty vehicles. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev.

Text Books:

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Fundamentals, Theory and Design – Mehrdad Ehsani, Uimin Gao and Ali Emadi – Second Edition – CRC Press, 2010

Reference Books:

1. Hybrid electric Vehicles Principles and applications with practical perspectives -Chris Mi, Dearborn – M. Abul Masrur, David Wenzhong Gao – A John Wiley & Sons, Ltd., – 2011
2. Review of Battery Charger Topologies, Charging Power Levels, and Infrastructure for Plug-In Electric and Hybrid Vehicles – Murat Yilmaz, and Philip T. Krein, – IEEE transactions on power electronics, vol. 28, no. 5, May 2013
3. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.

Web Resources:

- https://nptel.ac.in/courses/108/106/108106170/
- https://nptel.ac.in/courses/108/102/108102121/
- https://nptel.ac.in/courses/108/103/108103009/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5BT.1	2	2	-	-	-	-	-	-	-	-	-	2	1
24AEEE5BT 2	2	2	1	2	-	-	-	-	-	-	-	2	2
24AEEE5BT.3	3	2	2	2	-	-	-	-	-	-	-	3	2
24AEEE5BT.4	3	2	2	2	2	-	-	-	-	-	-	3	3
24AEEE5BT.5	3	2	2	2	2	-	-	-	-	-	-	3	3

P.B.C (P. B. Chowdhury) (Dr. M. Padmavathy) (P. Bhaskar Prasad) (C. Ganesh)

Title of the Course: Sensors and Instrumentation

Category	:	PE
Year	:	III
Semester	:	I
Course Code	:	24AEEE5CT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the basic concepts, classification, and characteristics of sensors and transducers used in engineering applications.
2. To study the working principles of various sensors used for measurement of physical parameters such as displacement, force, pressure, temperature, flow, and level.
3. To analyze different measurement techniques and select appropriate sensors for specific industrial and automation applications.
4. To introduce data acquisition systems and virtual instrumentation for signal measurement, processing, and monitoring.
5. To understand the concept and applications of intelligent (smart) sensors in modern control and automation systems.

Course Outcomes:

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

1. Explain the principles, classification, and characteristics of sensors and transducers used in measurement systems.
2. Apply appropriate sensors to measure physical parameters such as displacement, force, pressure, temperature, flow, and level.
3. Analyze sensor output characteristics and evaluate measurement errors in practical instrumentation systems.
4. Design and implement basic data acquisition and virtual instrumentation systems for industrial applications.
5. Demonstrate understanding of intelligent (smart) sensors and their applications in automation, robotics, and automotive systems. .

Unit 1 Sensors, Transducers and Calibration **08**

Definition, Classification & Selection of Sensors, Calibration of Sensors, Measurement of displacement using Potentiometer, LVDT & Optical Encoder, Measurement of force using Strain Gauge, Measurement of pressure using LVDT based Diaphragm & Piezoelectric Sensor.

Unit 2 Measurement of Temperature using Thermistor **10**

Thermocouple & RTD, Concept of thermal imaging, Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level Sensors: Ultrasonic & Capacitive

Unit 3 Virtual Instrumentation **10**

Graphical programming techniques, Data types, Advantage of Virtual Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs, Structures: Case, Sequence & Formula nodes, Need of software-based instruments for industrial automation.

P. B. Chowdhury (P. B. Chowdhury) (Dr. M. Padmavathy) (P. Bhaskara Prasad) (C. Ganesh)

Unit 4 **Data Acquisition Methods and SCADA Basics** **09**

Basic block diagram, Analog and Digital IO, Counters, Timers, Types of ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R Ladder type, Use of Data Sockets for Networked Communication, Multi-Sensor Data Fusion.

Unit 5 **Intelligent Sensors** **08**

General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Self- testing & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.

Textbooks:

1. DVS Murthy, Transducers and Instrumentation, PHI 2nd Edition 2013.

Reference Books:

1. Arun K. Ghosh, Introduction to measurements and Instrumentation, PHI, 4th Edition 2012.
2. A.D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation & Measurement Techniques, PHI – 2001
3. Hermann K.P. Neubert, "Instrument Transducers" 2nd Edition 2012, Oxford University Press.
4. Gary Johnson / Lab VIEW Graphical Programing II Edition / McGraw Hill, 1997.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5CT.1	3	2	-	-	-	-	-	-	-	-	3	3	-
24AEEE5CT.2	3	2	-	2	2	-	-	-	-	-	3	3	3
24AEEE5CT.3	3	2	-	-	-	-	-	-	-	-	3	3	-
24AEEE5CT.4	3	2	-	2	2	-	-	-	-	-	3		3
24AEEE5CT.5	3	2	-	-	-	-	-	-	-	-	3	3	-

P.B (P.B Chennaiah) Dr M. Padmavathy (P.Bhaskara Prasad) (C.Ganesh)

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Renewable Energy Systems
Category	:	PE
Year	:	III
Semester	:	I
Course Code	:	24AEEE5DT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To create awareness among the students about the different types of Renewable Energy sources and emphasize its importance.

Course Outcomes:

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

1. Describe fundamentals of solar energy and the basic concepts of solar radiation and its measurements.
2. Describe different types of solar collectors and its applications.
3. Explain design of wind energy conversion systems.
4. Realize power from oceans (thermal, wave, tidal) and conversion devices.
5. Describe biomass conversion technologies, geothermal resources.

Unit 1 Renewable Energy Sources **10**

Different forms of energy, Renewable and non-renewable energy sources, Advantages and Limitations of renewable energy sources, comparison of conventional and nonconventional energy sources, Solar Radiation: solar constant, solar Irradiance, spectral distribution of solar radiation-Beam, Diffuse and Reflected Radiation, Instruments for measuring solar radiation - pyranometer, pyrheliometer and sun shine recorder.

Unit 2 Solar Energy Collection and Its Applications **10**

Solar collector, Flat plate and concentrating collectors, classification of concentrating collectors. Energy Storage: necessity of energy storage methods-, Sensible, latent heat and thermo chemical storage. Solar Applications- solar water heating, solar distillation, solar ponds, drying, solar pumping and solar cookers.

Unit 3 Wind Energy **10**

Wind Energy: Air, wind, Classification of Wind turbines-Lift type and Drag type, Types of rotors-Multiblade, propeller, savonious and Darrieus, Parts of Wind Energy, types, Derivation for Power in the wind-power coefficient and Betz Limit, Performance Characteristics of Wind machines, Advantages and Disadvantages of WECS.

Unit 4 Ocean Energies **10**

Ocean thermal energy sources, working principle, Types of OTEC systems- Closed and open cycles. Advantages. Tidal energy: tidal characteristics, tidal Range, principle of tidal power, types of tidal power plants-single and double basin operation, advantages and disadvantages. Wave energy: wave energy conversion machines-Buoy type and Dolphin type energy generation.

P.B. (P.B. chennaiah) (Dr. M. Padmavathi) 20 (P Bhaskara Prasad) (C. Ganesh)

Unit 5 **Bio-Mass and Geothermal Energy and Grid Integration Techniques** **10**

Bio-Mass: Biomass Classification, Biochemical Conversion-Anaerobic and Ethanol fermentation, Bio gas plants: Floating Drum Type and Fixed Dome Type. Geothermal Energy: Geothermal field, Resources, Geothermal Power Generation and introduction to Grid Integration Techniques.

Textbooks:

1.Renewable Energy Sources and Emerging Technologies by D. P. Kothari, K. C. Singal, 2nd edition, PHI Learning Private Limited Delhi, 2014.

Reference Books:

1. Khan BH, Non-conventional energy resources, TMH, New Delhi, 2006.
2. G. D. Rai, Non-conventional energy sources, Khanna publishers, Delhi, 2007.
3. Ramesh and Kumar, Renewable Energy technologies, Narosa Publications, 2012.
4.G. N. Tiwari & M. K. Ghosal, Fundamentals of Renewable energy resources.
5.Twidell & Wier, Renewable Energy Resources, CRC press (Taylor & Francis).

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5DT.1	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE5DT.2	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE5DT.3	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE5DT.4	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE5DT.5	3	2	-	-	-	-	-	-	-	-	-	3	-

P. B. V (P. B. Chowdary) D. M. Padmalalitha (D. Lalitha) Bhaskar (P. Bhaskara Prasad) (C. Ganesh)

Title of the course: IoT Applications in Smart Energy Systems
Category : PE
Year : III
Semester : I
Course Code : 24AEEE5ET
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understand the evolution of IoT from its predecessors such as WSN, M2M, and Cyber-Physical Systems and analyze the technological interdependence enabling IoT.
2. Explain IoT sensing, actuation, data formats, and processing architectures for efficient IoT system design.
3. Analyze IoT connectivity and communication technologies and evaluate interoperability standards and frameworks.
4. Understand cloud and fog computing paradigms and their role in scalable IoT deployments.
5. Apply IoT concepts to real-world domains and analyze future trends, challenges, and research directions in IoT.

Course Outcomes:

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

1. Understand the evolution of the IoT from Wireless Sensor Networks, Machine-to-Machine communication, and Cyber-Physical Systems, along with IoT enabling technologies.
2. Analyze IoT sensing, actuation, data formats, and processing architectures for effective design and deployment of IoT systems.
3. Evaluate IoT connectivity and communication technologies and assess interoperability standards and frameworks.
4. Understand the role of cloud and fog computing architectures in supporting scalable, reliable, and low-latency IoT applications.
5. Apply IoT concepts to real-world case studies and analyze challenges, paradigms, and future trends in IoT.

Unit 1 M2M to IoT **10**

Introduction - Predecessors of IoT: Wireless Sensor Networks - Machine-to-Machine Communications - Cyber Physical Systems. **Emergence of IoT:** Evolution of IoT-Enabling IoT and the Complex Interdependence of Technologies- IoT Networking Components-Addressing Strategies in IoT.

Unit 2 IoT Fundamentals **10**

IoT Sensing and Actuation: Sensors-Sensor Characteristics -Sensing Types- Actuators-Actuator Characteristics-Actuator Types. **IoT Processing Topologies and Types** Data Format -Importance of Processing in IoT-Processing Topologies-IoT Device Design and Selection Considerations.

P.B (P.B Chowdhury) Dr. Padma Lalitha Bhaskara Prasad C. Ganesh

Unit 3 **IoT Connectivity, Communication Technologies and Interoperability** **10**

Connectivity Technologies: IEEE 802.15.4 129-Zigbee-RFID-Z-Wave-LoRa-Wi-Fi-Bluetooth. **Communication Technologies:** Infrastructure Protocols-Discovery Protocols-Data Protocols-Identification Protocols- Device Management- Semantic Protocols. **Interoperability:** Introduction-Standards-Frameworks.

Unit 4 **IoT Associated Technologies** **8**

Cloud Computing: Introduction Virtualization Cloud Models-Sensor-Cloud: Sensors-as-a-Service **Fog Computing and Its Applications**: Introduction View of a Fog Computing Architecture Fog Computing in IoT Selected Applications of Fog Computing.

Unit 5 **IoT Case Studies, IoT in Energy Systems and Future Trends** **8**

Introduction and case studies: Agricultural IoT — Vehicular IoT — Healthcare IoT — IoT in Energy Systems — Paradigms, Challenges and the Future.

Textbooks:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands - on - Approach), 1st Edition VPT, 2014.

Reference Books:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, Introduction to IoT, 1st edition, Cambridge University Press, 2021.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5ET.1	3	3	3	3	3	-	-	-	-	3	2	3	2
24AEEE5ET.2	3	3	3	3	3	-	-	-	-	1	2	3	2
24AEEE5ET.3	3	3	3	1	3	-	-	-	-	3	1	3	2
24AEEE5ET.4	2	2	3	1	2	-	-	-	-	1	2	2	2
24AEEE5ET.5	2	2	2	3	2	-	-	-	-	2	2	2	2

P.B (P.B. Chennaiah) Lalitha Dr. Padma Lalitha Bhashar (P. Bhashara Prasad) G (C. Ganesh)

Title of the course: Control Systems and Simulation Lab
Category : PC
Year : III
Semester : I
Course Code : 24AEEE51L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To demonstrate the basic concepts of linear control theory
2. To design of control system in time response of systems and steady state error analysis
3. To describe the concept of stability of control system and methods of stability analysis.

Course Outcomes:

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

1. Explain the characteristics of DC/AC servo motors, stepper motors, synchros, and magnetic amplifiers.
2. Apply PLC programming, transfer function modeling, and PSPICE simulation techniques.
3. Analyze time response, steady-state error, and stability using Bode, Root Locus, and Nyquist methods.
4. Evaluate the performance of P, PI, PD, PID controllers, and lag-lead compensators.
5. Design and implement motor speed, temperature, and level control systems using PLCs and PID controllers.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
3. Effect of feedback on DC servo motor
4. Transfer function of DC Machine
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. Temperature controller using PID
8. Characteristics of Magnetic amplifiers
9. Characteristics of Stepper motor
10. Characteristics of Synchros
11. Characteristics of AC servo motor
12. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
13. Linear system analysis (Time domain analysis, Error analysis) using Simulation.
14. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using Simulation.
15. State space model for classical transfer function using Simulation. – Verification.
16. Effect of P-PI-PID controller on level processing unit.

P.B.V (P.B chowdary) Lalitha (Dr. Padmalahitha) P.Bhaskar (P.BhaskaraPrasad) (C.Ganesh)

Web Resources:

- https://www.youtube.com/watch?v=Dyl7OieCbxs
- https://www.youtube.com/watch?v=6-TDhsCUIZA
- https://www.youtube.com/watch?v=-HMhKVZ0EtQ

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE51L.1	3	2	1	2	1	-	-	1	1	-	1	3	2
24AEEE51L.2	3	2	2	2	3	-	-	1	1	-	1	3	3
24AEEE51L.3	3	3	1	3	2	-	-	1	1	-	2	3	2
24AEEE51L.4	3	3	2	2	2	-	-	1	1	-	2	3	3
24AEEE51L.5	3	2	3	2	3	1	-	2	1	1	2	3	3

P.B.Ch (P.B. Chowdary) Lalitha (Dr. PadmaLalitha) Bhaskara (P. Bhaskara Prasad) (C. Ganesh)

Title of the Course:		Power Electronics & Simulation Lab
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24AEEE52L
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To study the operating principles and triggering methods of thyristors and their commutation techniques used in power electronic circuits.
2. To understand the operation and performance of single-phase controlled and semi-controlled rectifier circuits.
3. To analyze the working of single-phase dual converters and inverter circuits under different operating conditions.
4. To simulate and evaluate the performance of DC–DC choppers and AC voltage controllers for power control applications.
5. To examine the operation of single-phase and three-phase power electronic converters and voltage source inverters through simulation studies.

Course Outcomes:

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

1. Analyze firing methods, and commutation techniques of SCRs used in power electronic applications.
2. Analyze the operation and performance characteristics of single-phase half-controlled, fully controlled, and dual converter circuits.
3. Analyze the working principles of series and parallel inverter circuits and evaluate their output characteristics.
4. Simulate DC–DC buck and boost choppers, AC voltage controllers, and cyclo converters to study their control and performance.
5. Analyze and interpret the operation of three-phase fully controlled converters and voltage source inverters using simulation tools.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Study of Gate firing circuits for SCR.
2. Study of Forced commutation circuits for SCR.
3. Analysis of Single phase half-controlled bridge converter.
4. Analysis of Single phase fully-controlled bridge converter.
5. Analysis of Single phase dual converter.
6. Analysis of Single phase series inverter.
7. Analysis of Single phase parallel inverter.
8. Simulation of dc - dc converters.
9. Simulation of single-phase full wave ac voltage controller.
10. Simulation of single-phase cyclo converter.
11. Simulation of three-phase fully controlled converter.
12. Simulation of three-phase voltage source inverter.

(P.B Chennaiah) (Dr. Lalitha) (P. Bhaskara Prasad) (C. Ganesh)

Textbooks:

1. M. D. Singh and K. B. Khanchandani, Power Electronics, Tata Mc Graw Hill Publishing Company, 2nd edition, 2017.

Reference Books:

1. P.S. Bimbhra, Power Electronics, 4th Edition, Khanna Publishing House, 2022.

Web Resources:

- https://www.nielit.gov.in/content/power-electronics-lab

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE52L.1	3	3	1	2	2	–	–	1	1	–	2	3	2
24AEEE52L.2	3	3	2	2	3	–	–	2	2	–	2	3	3
24AEEE52L.3	3	3	2	2	2	–	–	1	1	–	2	3	3
24AEEE52L.4	3	3	3	3	3	–	–	2	2	1	3	3	3
24AEEE52L.5	3	3	2	3	3	1	–	2	2	1	3	3	3

P.B.C (P.B.Chennaiah) Lalitha (Cross Padmalalitha) P.Bhaskar Prasad (P.Bhaskara Prasad) C.Ganesh (C.Ganesh)

Title of the Course:		Power Systems Lab
Category	:	PC
Year	:	III
Semester	:	I
Course Code	:	24AEEE53L
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analyze the performance of relays
2. To demonstrate the Performance of Transmission lines
3. To analyze the performance of AC machines
4. To demonstrate the performance of Renewable Energy sources

Course Outcomes:

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

1. Analyze the performance of relays
2. Demonstrate the Performance of Transmission lines
3. Analyze the performance of AC machines
4. Demonstrate the performance of Renewable Energy sources

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Characteristics of IDMT Over Current relay (Electromagnetic Type).
2. Characteristics of Negative Phase Sequence relay (Static Type).
3. Characteristics of Percentage biased differential relay (static type).
4. Characteristics of Over voltage relay (Electromagnetic Type).
5. Characteristics of Over voltage / Under voltage relay (Microprocessor Based Type).
6. Characteristics of Percentage Biased Differential relay (Electromagnetic Type).
7. Determination of ABCD parameters of transmission lines.
8. Study of Ferranti effect
9. Separation of No-Load Losses of Three Phase Squirrel Cage Induction motor.
10. Equivalent Circuit of three winding transformer.
11. Power Angle Characteristics of Salient pole Synchronous machine.
12. L-G, L-L, L-L-G Fault Analysis of a three-phase alternator.
13. Wind Speed measurement.

Textbooks:

1. Badari Ram, D.N Viswakarma, Power System Protection and Switchgear, TMH Publications, 2011

Reference Books:

1. Bhuvanesh A Oza, Power system protection and switchgear, TMH, 2010.

Web Resources:

https://vp-dei.vlabs.ac.in/Dreamweaver/

P.B (P.B Chennaiah) Lalitha (Dr. Padmalalitha) Bhat (P. Bhashara Prasad) G (C. Ganesh)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE53L.1	3	3	3	3	3	3	–	–	3	–	3	3	2
24AEEE53L.2	3	3	3	3	2	3	–	–	3	–	3	3	3
24AEEE53L.3	3	3	3	3	2	3	–	–	3	–	3	3	2
24AEEE53L.4	3	3	3	3	3	–	–	–	3	–	3	2	2

(P.B.Chennaiah) (Dr.M.Padmalalitha) (P.Bhaskara Prasad) (C.Ganesh)

Title of the Course:		Python Programming
Category	:	SEC
Year	:	III
Semester	:	I
Course Code	:	24ACSESES
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. Introduce core programming concepts of Python programming language
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications.

Course Outcomes:

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

1. Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.
2. Apply Python programming concepts to solve a variety of computational problems
3. Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs
4. Proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas
5. Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries

Unit 1 10

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: If statement, if-else statement, If...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Unit 2 8

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Unit 3 9

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-in Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-in Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozen set.

Unit 4 8

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Unit 5 7

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Text Books:

1. Gowri Shankar S, Veena A., Introduction to Python Programming, CRC Press.

Reference Books:

1. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

- https://www.coursera.org/learn/python-for-applied-data-science-ai
- https://www.coursera.org/learn/python?specialization=python#syllabus

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACSE5ET.1	3	3	2	1	2	-	-	1	1	1	2	2	-
24ACSE5ET.2	3	3	3	2	3	-	-	1	1	1	2	3	-
24ACSE5ET.3	3	3	3	3	3	-	-	2	1	2	3	2	-
24ACSE5ET.4	3	3	3	3	3	2	-	2	1	2	3	3	-
24ACSE5ET.5	3	3	3	3	3	2	-	2	2	2	3	3	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)
RAJAMPET, YSR Kadapa District, AP – 516126, INDIA

Title of the Course: GENDER SENSITIZATION
Category: AC
Couse Code: 24AAUD51T
Branch/es: Common to all branches
Year: III B.Tech
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	0

Course Objectives:

1. To enable students to understand the gender related issues, and foster humane attitude,
2. To familiarize them about constitutional safeguards for gender equality.
3. To expose students to debates on the politics and economics of work related discrimination.
4. To help students reflect critically on gender violence.
5. To make them understand gender identities and gender relations as part of culture.

Course Outcomes:

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

1. Understand the basic concepts of gender and its related terminology.
2. Identify the biological, sociological, psychological and legal aspects of gender.
3. Understand how gender discrimination prevails in our society and how to counter it.
4. Analyze the gender division of labor and its relation to politics and economics.
5. Appraise how gender-role beliefs and sharing behavior are associated with more well-being

Unit 1 UNDERSTANDING GENDER 6

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit 2 GENDER ROLES AND RELATIONS 6

Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio-Demographic Consequences-Gender Spectrum.

Unit 3 GENDER AND LABOUR 7

Division and Valuation of Labor-Housework: The Invisible Labor- "My Mother doesn't Work". "Share the Load"- Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit 4 GENDER-BASED VIOLENCE 7

The Concept of Violence- Types of Gender-based Violence- Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

Unit 5 GENDER AND CULTURE 6

Gender and Films-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Sensitive Language- Just Relationships

Prescribed Textbooks:

1. A.Suneetha, Uma Bhrugubanda, et al. Towards a World of Equals: A Bilingual Textbook on Gender‖, Telugu Akademi, Telangana, 2015.

Reference Books:

1. Watt, Robin and Masood, Nazia, Broken Mirrors: The dowry Problems in India,London : Sage Publications, 2011.
2. Datt, R. and Kornberg, J.(eds), Women in Developing Countries, Assessing Strategies for Empowerment, London: Lynne Rienner Publishers, 2002.

Online Learning Resources:

Understanding Gender chrome-extension:
https://onlinecourses.swayam2.ac.in/nou24_hs53/preview

Gender Roles and Relations
https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes

Gender and Labour
https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed

GENDER-BASED VIOLENCE
https://eige.europa.eu/gender-based-violence/what-is-gender-based

GENDER AND CULTURE
https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AAUD51T.1	-	-	-	-	-	-	3	-	1	-	
24AAUD51T.2	-	-	-	-	-	-	3	-	1	-	
24AAUD51T.3	-	-	-	-	-	-	3	-	1	-	
24AAUD51T.4	-	-	-	-	-	-	3	-	1	-	
24AAUD51T.5	-	-	-	-	-	-	3	-	1	-	

(V.B. CHITHRA) (Dr. P.V.C. [illegible]) (Prof. P. Rama[illegible])

(Dr. L. OBULAPATHI) (M. PRAVEENA) (P. SUNEETHA NAIDU)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AAUD51T.1	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.2	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.3	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.4	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.5	-	-	-	-	-	-	3	-	1	-	-	-	-

Title of the Course:		Power System Analysis
Category	:	PC
Year	:	III
Semester	:	II
Course Code	:	24AEEE61T
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To describe the formation of Y_{bus} and Z_{bus} matrices for Power Systems.
2. To describe the need and formulation of power flow problem.
3. To model various components of power system and carry out the short circuit studies.
4. To acquire basic knowledge about the dynamic mechanisms behind the synchronous machine using steady state and transient stability criterion.

Course Outcomes:

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

1. Discuss various methods to formulate the network matrices (Y_{bus} and Z_{bus}) for a power system network.
2. Apply the iterative Load Flow Techniques to estimate steady state electrical quantities at any bus in a Power System
3. Analyze the behavior of power system under different fault conditions
4. Analyze the behavior of Synchronous machine under steady state stability.
5. Analyze the dynamics of Synchronous machine under transient stability

Unit 1 Power System Network Modeling **10**

Representation of Power System Elements, Bus Incidence matrices (A, B & C), Ybus formation by Direct and Singular Transformation Methods, Formation of Zbus: Partial network, Algorithm for the Modification of Zbus Matrix for addition of elements (Type1 to Type4 modifications) Derivations and Numerical Problems

Unit 2 Power Flow Studies **12**

Necessity of Power Flow Studies, Data for Power Flow Studies, Derivation of Static load flow equations (Polar and Rectangular form).

Power flow solution using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses), Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Power flow solution using Newton Raphson Method (Polar & Rectangular Form): Power Flow Solution with or without PV Buses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Power flow solution using Decoupled and Fast Decoupled Method: Derivation and Numerical Load flow solution for simple 3 bus power system, Comparison of Different Methods.

P. B.Chowdary (P. B. Chowdary) Dr. M. Padmalalitha (Dr. M. Padmalalitha) P. Bhaskara Prasad (P. Bhaskara Prasad) C. Ganesh (C. Ganesh)

Unit 3 Short Circuit Studies: **12**

Per Unit system of representation- Per-unit equivalent reactance network of a three phase power system-Symmetrical Component Transformation, positive, negative and zero sequence components: Voltages, Currents and Impedance-Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems- Symmetrical fault analysis: Short circuit current and MVA Calculations- Unsymmetrical Fault Analysis: LG, LL, LLG faults without impedance, Numerical Problems.

Unit 4 Power System Steady State Stability Analysis: **10**

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

Unit 5 Power System Transient Stability Analysis: **10**

Derivation of Swing Equation- Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion- Critical Clearing Angle Calculation - Solution of Swing equation by Point by Point method - Methods to improve Transient Stability.

Textbooks:

1.Modern Power system Analysis by I. J. Nagrath & D. P. Kothari, Tata McGraw-Hill Publishing Company, 4th Edition, 2011.

Reference Books:

1. "Computer Techniques and Models in Power Systems" by K. Umararao, I. K. International Publishing house Pvt. Ltd, 2nd Edition, 2014.
2. "Power System Analysis" by John J Grainger and William D Stevenson JR,Tata McGraw Hill, New Edition 1 July 2017.
3. "Computer Techniques in Power System Analysis" by M A Pai, Dheeman Chatterjee, Tata McGraw Hill, 3rd Edition, 1 July 2017.
4. "Power System Analysis and Design" by J. Duncan Glover, Mulukutla S. Sarma and Thomas J. Overbye 4th Edition, Nelson Engineering Publisher, 17 June 2007.
5. "Power System Analysis" by Hadi Saadat, PSA PUBLISHING LLC, 3rd Edition, 1 January 2011.
6. Computer Methods in Power Systems" by Stagg & El – Abiad, Medtech Publisher,1 January 2019 Edition

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE61T.1	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.2	3	3	-	-	-	-	3	-	-	-	-	3	-
24AEEE61T.3	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.4	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.5	3	3	-	-	3	-	-	-	-	-	-	3	-

Title of the Course: Microprocessor and Microcontroller

Category : PC

Year : III

Semester : II

Course Code : 24AEEE62T

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To describe the hardware and software details of 8086 microprocessor and 8051 microcontroller.
2. To explain their interfacing with memory and I/O devices.
3. To write assembly level programming on the above to implement real time projects.
4. To describe the hardware and software details of 8051 microcontroller.
5. Learn the fundamental architectural concepts of ARM processor.

Course Outcomes:

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

1. Analyze the hardware design of 8086 microprocessor and is able to write assembly language programs.
2. Describe the programmable (8255-PPI), non-programmable interfacing and interrupt programming of 8086 microprocessor.
3. Discuss the basic communication methods and communication interfacing programming of 8086 microprocessor.
4. Identify the difference between 8086 microprocessor-based system design and 8051 microcontroller.
5. Analyze the advanced microcontroller-based system design.

Unit 1 8086 Architecture and Programming **10**

Architecture of 8086 microprocessor, Register organization, Memory organization, Pin diagram, Minimum mode and Maximum mode of operation with timing diagram approach only, Addressing modes, types of Instruction sets, simple ALP programs on 8086.

Unit 2 Data Transfer methods and I/O Interfacing of 8086 **10**

Programmed I/O Interrupt driven I/O, DMA-Need for DMA, Architecture of DMA-8257, Architecture of 8255 PPI and its Various modes of operation, I/O Interfacing methods-I/O mapped I/O, Memory mapped I/O, Interrupt Structure of 8086, Vector Interrupt table, Interrupt Service routines.8259 PIC architecture only.

Unit 3 Communication Interface **10**

Synchronous and Asynchronous Communication, RS232, SPI, I2C, Introduction to protocols like Blue-tooth and Zig-bee.

Unit 4 8051 Microcontroller **08**

Architecture of 8051, Pin diagram, Memory organization, addressing modes, Instruction set, Simple Programs, Timers/Counters, Serial Communication features, Interrupts.

P.B.C (P.B Chennaiah) (Dr. M. Padmahalitha) (P. Bhaskara Prasad) (C. Ganesh)

Unit 5 **Advanced Microcontrollers** **10**

The ARM Architecture, ARM7, ARM9 Features and applications of ARM only, ARDUINO: Block diagram, Architecture, pin function, overview of main features such as I/O ports, Timers, Interrupts Serial Port, PWM, ADC.

Textbooks:

1. 1. A. K. Ray and K. M. Bhurchandi, Advanced microprocessors and Peripherals, 3rd edition, TMH 2013.
2. Muhammad Ali Mazidi.8051 Microcontroller and Embedded systems using assembly and C.2nd edition, Pearson Education, 2008.

Reference Books:

1. Barry B. Brey the Intel Microprocessors architecture, programming and Interfacing 8th edition, Pearson Education, 2009.
2. Douglas V. Hall, Microprocessors and Interfacing, 2nd edition, TMH, 2007.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE62T.1	3	-	-	-	3	-	-	-	2	-	3	3	3
24AEEE62T.2	3	-	3	3	3	-	-	-	-	-	3	-	3
24AEEE62T.3	3	-	-	2	3	-	-	-	2	-	3	3	-
24AEEE62T.4	-	-	-	-	-	-	-	-	3	3	3	3	2
24AEEE62T.5	-	-	3	3	3	-	-	-	-	3	3	-	3

P.B.V (P.B Chowdary) Dr. M. Padmahalitha (P. Bhaskar Prasad) (C. Ganesh)

Title of the Course: Power System Operation and Control

Category : PC
Year : III
Semester : II
Course Code : 24AEEE63T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To familiarize the students with economic operation of power systems.
2. To provide knowledge about modeling of Power Plant Components.
3. To prepare the students to realize the need of controlling the frequency.
4. To understand importance of voltage and reactive power control in a power system

Course Outcomes:

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

1. Explore the significance of optimal allocation of Thermal units
2. Explore the significance of optimal scheduling of hydrothermal Systems
3. Describe the mathematical models of turbines and governors
4. Analyze the Load Frequency Control problem
5. Explain how shunt and series compensation helps in reactive power control

Unit 1 Economic Operation: **10**

Optimal Operation of Thermal Power Units - Heat Rate Curve – Cost Curve – Incremental Fuel and Production Costs, Input-Output Characteristics, Optimum Generation Allocation with Line Losses Neglected. Optimum Generation Allocation Including the Effect of Transmission Line Losses – Loss Coefficients, General Transmission Line Loss Formula.

Unit 2 Hydrothermal Scheduling: **8**

Optimal Scheduling of Hydrothermal System: Hydroelectric Power Plant Models, Scheduling Problems-Short Term Hydrothermal Scheduling Problem

Unit 3 Modelling Turbine and Governor: **10**

Modeling of Turbine: First Order Turbine Model, Block Diagram Representation of Steam Turbines and Approximate Linear Models. Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of Small Signal Transfer Function – Block Diagram.

Unit 4 Load Frequency Control: **12**

Necessity of Keeping Frequency Constant. Definitions of Control Area – Single Area Control – Block Diagram Representation of an Isolated Power System – Steady State Analysis – Dynamic Response Uncontrolled Case. Load Frequency Control of 2-Area System – Uncontrolled Case and Controlled Case, Tie-Line Bias Control. Proportional Plus Integral Control of Single Area and Its Block Diagram Representation, Steady State Response – Load Frequency Control and Economic Dispatch Control.

P. B. (P. B. Chennaiah) (Smt. Padmalatha) (P. Bhaskara Prasad) (C. Ganesh)

Unit 5 Reactive Power Control: **10**

Overview of Reactive Power Control – Reactive Power Compensation in Transmission Systems – Advantages and Disadvantages of Different Types of Compensating Equipment for Transmission Systems; Load Compensation – Specifications of Load Compensator, Difference between Shunt and Series Compensation.

Textbooks:

1. S. Sivanagaru & G. Sreenivasan, Power System Operation and Control, Pearson Publications, 1st Edition, 2009.

Reference Books:

1. Power System Analysis Operation and Control, Abhijit Chakrabarti and Sunita Halder, PHI Learning Pvt. Ltd, 3rd Edition, 2010.
2. Modern Power System Analysis, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2003, Ninth Reprint 2007.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE63T.1	3	3	3	2	-	-	-	-	-	-	-	3	-
24AEEE63T.2	3	3	3	1	-	-	-	-	-	-	-	3	1
24AEEE63T.3	3	3	3	3	-	-	-	-	-	-	-	3	2
24AEEE63T.4	3	3	3	1	-	-	-	-	-	-	-	3	-
24AEEE63T.5	3	2	2	1	-	-	-	-	-	-	-	3	-

P. B. Chennaiah (P. B. Chennaiah) (Dr. C. Padmavathi) P. Bhaskara Prasad (P. Bhaskara Prasad) (C. Ganesh)

Title of the Course: AC Microgrid

Category	:	PE
Year	:	III
Semester	:	II
Course Code	:	24AEEE6AT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce basic concepts and operation of microgrids.
2. To study management needs of microgrids and micro source control.
3. To understand centralized control of microgrids.
4. To understand protection and islanding issues in microgrids.
5. To study power electronic interfaces used in microgrids.

Course Outcomes:

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

1. Explain microgrid configuration and grid interaction.
2. Analyze micro source control and load management.
3. Apply central controller strategies for microgrids.
4. Identify islanding conditions and protection methods.
5. Explain converter integration and PEBB concepts.

Unit 1 Concept of Microgrid **12**

A typical Microgrid configuration, Interconnection of Microgrids, Technical and economic advantages of Microgrid, Challenges and disadvantages of Microgrid development, Management and operational issues of a Microgrid, Dynamic interactions of Microgrid with main grid.

Unit 2 Microgrid Management-1 **10**

Network management needs of Microgrid- Micro source generation control, Domestic process control, Energy storage, Regulation and load shifting, Ancillary services, Micro source controller-Control functions for Micro source controller.

Unit 3 Microgrid Management-2 **10**

Central controller- Energy manager module (EMM), Protection co-ordination module (PCM), Information needed for central controller operation, Control strategies for central controller design.

Unit 4 Protection issues for Microgrids **10**

Islanding: separation from utility, Different islanding scenarios, Major protection issues of stand-alone Microgrid- Microgrid distribution system protection, Protection of micro sources.

Unit 5 Power Electronic Interfaces **10**

Standard computer architecture, Very Large-Scale Integration (VLSI), Power converter trends-Custom design and manufacturing, Power module integration and component packaging, Power electronic building blocks (PEBB), Packaging framework design.

Textbooks:

1. Microgrids and Active Distribution Networks by S. Chowdhury, S.P. Chowdhury and P. Crossley, IET,1st Edition,2009.

Reference Books:

1. Micro Grids, Sanjeev Kumar Padmanaban.1st edition, CR Press, 2022 edition.
2. Micro Grids and Methods of Analysis Gevork B. Gharehpetian. 1st ed. Pub: Elsevier Academic Press, 2021.
3. Fundamentals of Micro Grid by Stephen A. Roosa CRC press, 2nd Edition, 2014.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6AT.1	3	2	3	-	-	-	-	-	-	3	-	3	-
24AEEE6AT.2	3	2	3	2	2	-	-	-	-	3	-	3	3
24AEEE6AT.3	3	2	3	-	-	-	-	-	-	3	-	3	-
24AEEE6AT.4	3	2	3	2	2	-	-	-	-	3	-	3	3
24AEEE6AT.5	3	2	3	-	-	-	-	-	-	3	-	3	-

P.B.C (P.B.Chowdary) (Dr.G.Padmalalitha) (P.Bhaskara Prasad) (C.Ganesh)

Title of the Course:		Power Semiconductor Drives
Category	:	PE
Year	:	III
Semester	:	II
Course Code	:	24AEEE6BT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the principles and operation of power electronic converters used for DC and AC motor drives.
2. To study various speed control, braking, and four-quadrant operating methods of DC motor drives.
3. To analyze chopper and inverter-based control techniques for DC and induction motor drives.
4. To examine different control strategies for induction and synchronous motor drives.
5. To evaluate the performance characteristics of electric drives under different operating conditions through analytical and numerical methods.

Course Outcomes:

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

1. Analyze single and three-phase controlled rectifier fed DC motor drives and compute output voltage, current, speed, and torque characteristics.
2. Apply electrical braking methods and analyze four-quadrant DC drive operation
3. Analyze single, two, and four-quadrant chopper fed DC motor drives and evaluate their performance using waveforms and speed–torque expressions.
4. Analyze induction motor control techniques including AC voltage control, V/f control, VSI/CSI drives, and slip power recovery methods.
5. Evaluate variable-frequency and load-commutated inverter fed synchronous motor drives.

Unit 1 Controlled Rectifier Fed DC Motor Drives **12**

Introduction to power semiconductor drives, block diagram, single phase semi controlled, single phase fully controlled converter, three phase semi controlled and three phase fully controlled converter fed separately excited DC motor and DC series motor drives – continuous current operation – output voltage and current waveforms – Speed and Torque expressions and characteristics - numerical problems

Unit 2 Electrical Braking & Four Quadrant Operation of DC Drives **12**

Electric Braking – Plugging, Dynamic and Regenerative Braking operations - Speed torque expressions and characteristics – numerical problems on braking methods.

Introduction to Four quadrant operation, four quadrant operation of D.C motors by dual converter-numerical problems on dual converter fed DC motor Drive – closed loop operation of DC motor (Block Diagram Only).

P.B. (CP.B.Chennaiah) (Dr.P.Padmalalitha) (P.Bhaskara Prasad) (C.Ganesh)

Unit 3 Control of DC Motors by Choppers **10**

Single quadrant, two – quadrant and four quadrant chopper fed separately excited dc motor and series motor drives – continuous current operation – output voltage and current wave forms – Speed torque expressions and characteristics – numerical problems on chopper fed dc Motor.

Unit 4 Three Phase Induction Motor Drives **10**

Control of induction motors by AC Voltage Controllers – waveforms – speed torque characteristics, V/f control of induction motor Speed torque equations and characteristics, numerical problems, control of induction motor by Voltage Source Inverter (VSI), and Current Source Inverter (CSI), Static rotor resistance control of wound rotor induction motor – Slip power recovery – Static Scherbius drive – Static Kramer Drive – speed torque characteristics and numerical problems.

Unit 5 Three Phase Synchronous Motor Drives **8**

Variable frequency control, separate & Self-control of synchronous motor drives – closed loop load commutated CSI fed synchronous motor drive – numerical problems.

Textbooks:

1. G K Dubey, Fundamentals of Electric Drives, Narosa Publications, 2nd Edition, 2010.

Reference Books:

1. M. D. Singh & K. B. Khanchandani, Power Electronics, Tata MC Graw Hill Publishing Company, 2nd edition, 2017.
2. P. S. Bimbhra, Power Electronics, Khanna Publishers, 2022.

Web Resources:

- https://nptel.ac.in/courses/108/104/108104140/
- https://nptel.ac.in/courses/108/102/108102046/
- https://swayam.gov.in/nd1_noc19_ee65/preview

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6BT.1	3	3	1	1	–	–	–	–	1	–	2	3	2
24AEEE6BT.2	3	3	2	2	1	–	–	–	1	–	2	3	3
24AEEE6BT.3	3	3	2	2	1	–	–	–	1	–	2	3	3
24AEEE6BT.4	3	3	2	2	1	–	–	–	1	–	3	3	3
24AEEE6BT.5	3	3	2	2	1	1	–	–	1	–	3	3	3

P.B.C (P.B Chowdhury) Lalitha (Dr. Padmalalitha) Bhaskar (P. Bhaskara Prasad) G (C. Ganesh)

Title of the course: Modern Control Theory

Category : PE
Year : III
Semester : II
Course Code : 24AEEE6BT
Branch : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the concept of state and develop state-space models of dynamic systems for continuous-time analysis.
2. To provide knowledge of controllability and observability concepts and their role in system analysis and transformation.
3. To develop skills for designing state feedback controllers and state observers to meet desired performance specifications.
4. To familiarize students with nonlinear system behavior and methods for analyzing nonlinear dynamics and stability.
5. To impart an understanding of stability concepts using Lyapunov methods and related analytical techniques.

Course Outcomes:

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

1. Apply state-space concepts to model and analyze linear continuous-time dynamic systems using state transition matrices.
2. Analyze controllability and observability of continuous-time systems using appropriate mathematical tests and state transformations.
3. Design state feedback controllers and state observers using pole placement techniques to achieve specified system performance.
4. Analyze nonlinear systems and evaluate their stability using describing function and phase-plane methods.
5. Evaluate the stability of linear continuous-time systems using Lyapunov's direct method and construct suitable Lyapunov functions.

Unit 1 State Variable Analysis **10**

The concept of state – State space model of Dynamic systems – Time invariance and Linearity – Non uniqueness of state model – State diagrams for Continuous-Time State models – Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and it's properties. Complete solution of state space model due to zero input and due to zero state.

Unit 2 Controllability and Observability **10**

General concept of controllability – Controllability tests, different state transformations such as diagonalization, Jordon canonical forms and Controllability canonical forms for Continuous-Time Invariant Systems – General concept of Observability – Observability tests for Continuous-Time Invariant Systems – Observability of different State transformation forms.

Unit 3 State Feedback Controllers and Observers **10**

State feedback controller design through Pole Assignment, using Ackkermans formula– State observers: Full order and Reduced order observers

Unit 4 Non-Linear Systems **10**

Introduction – Non-Linear Systems – Types of Non-Linearities – Saturation – Dead-Zone – Backlash – Jump Phenomenon etc; Linearization of nonlinear systems, Singular Points and its types– Describing function– describing function of different types of nonlinear elements, – Stability analysis of Non-Linear systems 180 through describing functions. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Stability analysis of nonlinear systems based on phase-plane method.

Unit 5 Stability Analysis **10**

Stability in the sense of Lyapunov, Lyapunov's stability, and Lyapunov's instability theorems – Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasovsky's method.

Textbooks:

1. Modern Control Engineering — Katsuhiko Ogata, Edition: 5th Edition, Pearson Education Inc. 2021

Reference Books:

1. Modern Control Systems by Richard C. Dorf and Robert H. Bishop, 14th Edition, published by Pearson Education Inc. (Global Edition, 2021)
2. Modern Control System Theory by Dr. M. Gopal, 5th Edition (2024), published by New Age International Pvt. Ltd.
3. Modern Control Systems: Theory, Design and Applications by Zhou Gaofeng and Zhang Qi, 1st Edition (2025), published by BP International.

Web resources:

1. https://controleducation.sites.sheffield.ac.uk/statespacemethods/statespaceobsvState space observability & controllability notes (with PDFs/examples)
2. https://edurev.in/t/187274/State-Space-Representation-of-Control-System State-space representation and controllability/observability notes (PDF option)
3. https://edurev.in/p/416570/Short-Notes-State-Space-Analysis Short notes on state-space analysis (PDF available)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6BT.1	2	3	-	1	1	-	-	-	-	-	3	1	3
24AEEE6BT.2	3	3	-	1	2	-	-	-	-	-	2	1	3
24AEEE6BT.3	2	3	2	1	1	-	-	-	-	-	3	3	3
24AEEE6BT.4	3	3	1	1	2	-	-	-	-	-	2	3	3
24AEEE6BT.5	3	3	1	2	2	-	-	-	-	-	2	3	3

P.B. Chennaiah Bhaskar C. Ganesh

Title of the Course:		Battery Management System
Category	:	PE
Year	:	III
Semester	:	II
Course Code	:	24AEEE6DT
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the different types of energy storage system.
2. To study about the battery characteristic & parameters.
3. To know the concepts of battery management system
4. To know the concepts of Battery Testing, Disposal & Recycling

Course Outcomes:

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

1. Discuss about the different types of energy storage system
2. Describe about the battery characteristic & parameters.
3. Apply the concepts of battery management systems.
4. Explain about the battery testing, disposal and recycling.

Unit 1 Types of Batteries 8

Batteries: Lead Acid Battery, Nickel based Batteries, Sodium based Batteries, Lithium based Batteries – Li-ion & Li-poly, Metal Air Battery, Zinc Chloride Battery.

Unit 2 Battery Characteristics 10

Cells and Batteries- principle of energy conversion- Battery Specifications: Variables to characterize Battery operating conditions and Specifications to characterize, Battery nominal and maximum characteristics; Efficiency of Batteries. Simple numerical problems.

Unit 3 Battery Parameters 10

Electrical parameters- Heat generation- Battery design- Performance criteria for Electric vehicles Batteries- Vehicle propulsion factors- Power and energy requirements of Batteries Meeting Battery performance criteria- setting new targets for Battery performance.

Unit 4 Battery Management System 10

Battery thermal management system, Battery Management System: Definition, Parts: Power Module, Battery, DC/DC Converter, load, communication channel, Battery Pack Safety, Battery Standards.

Unit 5 Battery Testing, Disposal & Recycling 8

Battery testing, limitations for transport and storage of cells and Batteries, Disposal and Reuse of Batteries. Recycling, Methods of recycling of EV Batteries, General recycling issues. Environment and Human Health, Impact assessments of Batteries, Standards for Battery Testing.

P.B.C (P.B.Chowdary) (for) Lalitha (P.Bhaskara Prasad) G (C.Ganesh)

Text Books:

1. Yongping Zhai. Handbook on Battery Energy Storage System Asian Development Bank.2018.

Reference Books:

1. G. Pistoia, J.P. Wiaux, S.P. Wolsky, "Used Battery Collection and Recycling", Elsevier, 2001. (ISBN: 0-444-50562-8)

2. Guangjin Zhao, "Reuse and Recycling of Lithium-Ion Power Batteries", John Wiley & Sons. 2017. (ISBN: 978-1-1193-2185-9)

3. T R Crompton, "Battery Reference Book-3rd Edition", Newnes- Reed Educational and Professional Publishing Ltd., 2000.

4. Arno Kwade, Jan Diekmann, "Recycling of Lithium-Ion Batteries: The LithoRec Way", Springer, 2018.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6DT.1	3	2	1	1	-	-	-	-	-	-	-	2	1
24AEEE6DT.2	3	2	1	1	-	-	-	-	-	-	-	2	2
24AEEE6DT.3	3	2	2	1	-	-	-	-	-	-	-	2	1
24AEEE6DT.4	3	2	2	2	1	-	-	-	-	-	-	3	2
24AEEE6DT.5	3	2	2	3	1	-	-	-	-	-	-	3	2

P. B. Chennaiah (P. B. Chennaiah) Lalitha (Dr. M. Lalitha) (P. Bhaskara Prasad) (C. Ganesh)

Title of the course: AI & ML in Electrical Engineering

Category : PE
Year : III
Semester : II
Course Code : 24AEEE6ET
Branch : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the fundamentals of Artificial Intelligence and Machine Learning concepts relevant to engineering applications.
2. To develop an understanding of data representation, learning paradigms, and model evaluation techniques.
3. To enable students to apply supervised and unsupervised learning techniques to electrical engineering problems.
4. To familiarize students with deep learning concepts and their applications in power systems, control, and signal processing.
5. To expose students to real-world AI/ML applications in electrical engineering domains.

Course Outcomes:

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

1. Explain the basic concepts of Artificial Intelligence and Machine Learning and their relevance to electrical engineering applications.
2. Apply data pre-processing and supervised learning techniques to solve regression and classification problems in electrical systems.
3. Analyse unsupervised learning methods for pattern recognition and clustering in electrical engineering data.
4. Design simple neural network models for electrical engineering applications such as load forecasting and fault diagnosis.
5. Evaluate AI/ML models and identify suitable techniques for real-time electrical engineering problems.

Unit 1 Introduction to Artificial Intelligence and Machine Learning **10**

Introduction to Artificial Intelligence, history and applications of AI, scope of AI in electrical engineering, introduction to Machine Learning, types of learning: supervised, unsupervised and reinforcement learning, AI vs ML vs Deep Learning, data-driven modeling in electrical systems.

Unit 2 Data Processing **10**

Data collection and preprocessing, over fitting and under fitting issues, feature extraction and feature selection.

Unit 3 Supervised Learning **10**

Regression techniques: linear regression and multiple regression, classification techniques: k-Nearest Neighbors, decision trees, support vector machines, performance metrics and model validation.

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Dr. Padma Lalitha

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Unit 4 Unsupervised Learning **10**

Clustering techniques: k-means and hierarchical clustering, dimensionality reduction: PCA, anomaly detection.

Unit 5 AI & ML Applications in Electrical Engineering **10**

AI/ML in power systems (load forecasting, economic dispatch, fault diagnosis), applications in control systems (adaptive and intelligent control), AI in renewable energy systems, smart grids, condition monitoring and predictive maintenance, future trends and challenges.

Textbooks:

1. M. N. Murty, V.S. Ananthanarayana Machine Learning: Theory and Practice, University Press, 1st Edition, 2023
2. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson, 2021.

Reference Books:

1. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 4th Edition.
2. Pradeep Singh, Tapan K Gandhi and Balasubramanian Raman, Artificial Intelligence and Machine Learning, McGraw Hill, 2025
3. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, The MIT Press, 2012

Web Resources:

- https://ocw.mit.edu/courses/6-036-introduction-to-machine-learning-fall-2020/
- https://developers.google.com/machine-learning/crash-course
- https://www.coursera.org/learn/machine-learning
- https://nptel.ac.in/courses/106/106/106106139
- https://www.mathworks.com/solutions/machine-learning.html

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6ET.1	3	2	–	–	1	–	–	–	–	–	–	1	3
24AEEE6ET.2	3	3	2	–	3	–	–	–	–	–	–	1	3
24AEEE6ET.3	3	3	–	2	2	–	–	–	–	–	–	3	3
24AEEE6ET.4	3	2	3	–	3	–	–	–	–	–	–	3	3
24AEEE6ET.5	3	3	2	2	3	–	1	–	–	–	–	3	3

P.B.C (P.B.Chennaly)

(Dr.M.Padma Lalitha)

(C.Ganesh)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	TECHNICAL PAPER WRITING AND INTELLECTUAL PROPERTY RIGHTS
Category:	MC
Year	III Year
Semester:	II Semester
Course Code:	24AMBA61T
Branch/es:	EEE, ECE, CSE & CSE Allied Branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	0

Course Objectives:

1. To enable the students to practice the basic skills of research paper writing.
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review.
4. To help them in knowing the significance of real-life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks.

Course Outcomes:

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

1. Identify key secondary literature related to their proposed technical paper writing.
2. Explain various principles and styles in technical writing.
3. Use the acquired knowledge in writing a research/technical paper.
4. Analyze rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.
5. Evaluate different forms of IPR available at national & international level and search of various forms of IPR by using modern tools and techniques.

Unit 1	Principles of Technical Writing	6

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

Unit 2	Research Paper Writing	6

Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature- Problems and Framing Research Questions- Synopsis.

Unit3	Process of research	6

Process of research: publication mechanism: types of journals- indexing-seminars- conferences- proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules.

Unit 4	Introduction to Intellectual property	6

Introduction, types of intellectual property, International organizations, agencies and treaties, Importance of intellectual property rights Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Unit 5	Fundamentals of copy right law	6
Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, Intellectual property audits.		
Prescribed Textbooks:		
1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013.		

Reference Books:
1. R.Myneni, Law of Intellectual Property, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli, Intellectual Property Rights Tata McGraw Hill, 2001.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMBA61T-1	3	2	2	2	1	2	-	-	-	1	-	2	1
24AMBA61T-2	2	3	3	2	2	1	-	-	-	-	-	2	2
24AMBA61T-3	3	2	3	2	2	1	1	-	-	-	-	1	1
24AMBA61T-4	2	3	2	2	2	1	1	-	-	-	-	1	2
24AMBA61T-5	2	2	2	1	3	1	1	-	-	1	1	1	2

1.	2.	3.	4.	
5.	6.	7.	8.	9.

Title of the Course:		EV and RES Lab
Category	:	PC
Year	:	III
Semester	:	II
Course Code	:	24AEEE61L
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To provide practical exposure to solar, wind, hydro, fuel cell, and hybrid energy systems.
2. To analyze performance characteristics of standalone, grid-connected, and hybrid renewable energy systems.
3. To introduce simulation tools and intelligent control techniques for renewable energy applications

Course Outcomes:

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

1. Simulate and analyze the performance of renewable and hybrid energy systems.
2. Experimentally evaluate efficiency and operating characteristics of solar and wind energy systems.
3. Apply intelligent control methods for effective operation of hybrid renewable energy systems.

List if Experiments:

Any 10 of the following experiments are to be conducted:

1. Simulation study on solar PV energy system.
2. Experiment on "VI-Characteristics and Efficiency of 1kWp solar PV system".
3. Experiment on "Shadowing effect & diode-based solution in1kWp solar PV system".
4. Experiment on performance assessment of Grid connected and standalone 1kWp solar power system.
5. Simulation study on wind energy generator.
6. Experiment on performance assessment of micro wind energy generator.
7. Simulation study on hybrid (Solar-Wind) power system.
8. Experiment on performance assessment of hybrid (Solar-Wind) power system.
9. Simulation study on hydel power.
10. Experiment on performance assessment of 100W fuel Cell.
11. Simulation study on intelligent controllers for hybrid systems.
12. Simulation of Battery energy storage systems performance characteristics
13. Load test on EV
14. Study of RES integrated EV charging Station
15. Fast charging EV stations
16. Simulation of micro and smart grids
17. Simulation of hybrid energy control system
18. Simulation of cyber security events
19. Simulation of Battery Energy Storage System (BESS) performance characteristics
20. Load test on EV
21. Study of RES integrated EV charging station

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22. Fast charging of EVs
23. Simulation of Micro Grids and Smart Grids,
24. Hybrid Energy Control System 25. Simulation of Cyber Security Events

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE61L.1	3	2	3	3	3	2	-	3	-	3	-	3	-
24AEEE61L.2	3	2	3	3	3	2	-	2	-	3	-	3	3
24AEEE61L.3	3	2	3	3	3	2	-	2	-	3	-	3	-

Title of the Course:		Microprocessors and Microcontrollers Lab
Category	:	PC
Year	:	III
Semester	:	II
Course Code	:	24AEEE62L
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To become skilled in 8086 Assembly Language programming.
2. To understand the detailed software and hardware structure of the microprocessor.
3. To Train their practical knowledge through laboratory experiments.
4. To understand and learn 8051 Microcontroller.
5. To acquire knowledge on microprocessors and microcontrollers, interfacing of various peripherals.

Course Outcomes:

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

1. Formulate a program and implement algorithms using Assembly language.
2. Describe an Assembly language program for the 8086 Microprocessor.
3. Develop programs for different applications in the 8086 Microprocessor.
4. Interface peripheral devices with 8086 and 8051.
5. Use an Assembly/Embedded C programming approach for solving real-world problems.

List of Experiments

Any 10 of the following experiments are to be conducted:

EXP 1 **Programs for 16 Bit Arithmetic Operations** (Using various addressing modes)

a) Write an ALP to Perform Addition and Subtraction of Multi-byte numbers.
b) Write an ALP to Perform Multiplication and division of unsigned Hexadecimal numbers.
c) Write an ALP to find square, cube and factorial of a given number.

EXP 2 **Programs ASCII Arithmetic Operations**

a) Write an ALP to Perform Addition and Subtraction of two ASCII numbers.
b) Write an ALP to Perform Multiplication and division of two ASCII numbers.

EXP 3 **Programs Involving Bit Manipulation Instructions**

a) Write an ALP to find the given data is positive or negative.
b) Write an ALP to find the given data is odd or even.
c) Write an ALP to find Logical ones and zeros in a given data.

EXP 4 **Programs on Arrays for 8086**

a) Write an ALP to find Addition/subtraction of N numbers.
b) Write an ALP for finding largest/smallest no.

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(P. B. Chowdeswara Reddy P. Bhaskara Prasad)

EXP 5 Programs on String Manipulations for 8086

a) Write an ALP to find String length.
b) Write an ALP for Comparing two Strings.
c) Write an ALP to reverse String

EXP 6 Interfacing Stepper Motor with 8086

Write an ALP to 8086 processor to Interface a stepper motor and operate it in clockwise/ Anti-clockwise by choosing variable step-size.

EXP 7 Interfacing ADC/DAC with 8086

Write an ALP to 8086 processor to Interface DAC and generate Square Wave/Triangular Wave/Step signal.

EXP 8 Programs using Arithmetic Instructions for 8051

Write an ALP to 8051 Microcontroller to perform Arithmetic operations like addition, subtraction, Multiplication and Division

EXP 9 Programs using Logical Instructions for 8051

Write an ALP to 8051 Microcontroller to perform Logical operations like AND, OR and XOR.

EXP 10 8051 Port Reading & Writing

a) Write an ALP to Perform Reading data from Port,
b) Write an ALP to Perform Writing data to Port.

EXP 11 Programs for Digital Clock Design Using 8086

a) Write an ALP for Designing clock using INT 21H Interrupt.
b) Write an ALP for Designing clock using DOS Interrupt Functions.
c) Write an ALP for Designing clock by reading system time.

EXP 12 Communication between Two Microprocessors

a) Write an ALP to have Parallel communication between two microprocessors using 8255
b) Write an ALP to have Serial communication between two microprocessor kits using 8251.

EXP 13 Programs to Verify Timers/Counters of 8051

a) Write a program to create a delay of 25msec using Timer0 in mode 1 and blink all the Pins of P0.
b) Write a program to create a delay of 50 µsec using Timer1 in mode 0 and blink all the Pins of P2.
c) Write a program to create a delay of 75msec using counter0 in mode 2 and blink all the Pins of P1.
d) Write a program to create a delay of 80 µsec using counter1 in mode 1 and blink all the Pins of P3.

EXP 14 UART Operation in 8051

a) Write a program to transfer a character serially with a baud rate of 9600 using UART.
b) Write a program to transfer a character serially with a baud rate of 4800 using UART.
c) Write a program to transfer a character serially with a baud rate of 2400 using UART.

EXP 15 Programs for 16 Bit Arithmetic Operations (Signed Numbers)

a) Write an ALP to Perform Addition and Subtraction of Multi-byte numbers.
b) Write an ALP to Perform Multiplication and division

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Textbooks:

1. Advanced microprocessors and peripherals - A. K Ray and K. M. Bhurchandani, TMH, 2nd edition2006.

Reference Books:

1. Kenneth. J. Ayala. The 8051 microcontroller, 3rd edition, Cengage learning, 2010.
2. The 8051 Microcontroller and Embedded Systems: Using Assembly and C by Muhammad AliMazidi, Janice Gillispie Mazidi, Second Edition.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE62L.1	3	3	3	2	3	–	–	1	1	–	2	3	1
24AEEE62L.2	3	2	1	1	2	–	–	1	2	–	2	2	1
24AEEE62L.3	3	3	3	2	3	–	–	2	2	–	2	3	1
24AEEE62L .4	3	3	3	3	3	1	–	2	2	1	3	3	2
24AEEE62L.5	3	3	3	3	3	1	1	2	2	1	3	3	2

(P. B. Chowdary) (Dr. M. Padma Lalitha) (P. Bhaskara Prasad) (C. Ganesh)

Title of the Course:		Power System Simulation Lab
Category	:	PC
Year	:	III
Semester	:	II
Course Code	:	24AEEE63L
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analyze the efficiency, regulation and stability of transmission system.
2. To enable the students to know about different load flow techniques and fault analysis.
3. To acquire the knowledge on formation of bus impedance and bus admittance matrices.
4. To study the Ferranti effect and optimum loading of generators.

Course Outcomes:

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

1. Analyze the efficiency, regulation and stability of transmission system
2. Describe the formation of Admittance and Impedance matrices
3. Analyze Load Flow analysis of transmission systems
4. Evaluate Symmetrical and unsymmetrical faults
5. Estimate optimum loading of generators and study of Ferranti effect.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Performance of Short/Medium Transmission Lines using Simulation
2. Computation of parameters and modeling of Long Transmission Lines using Simulation
3. Determination of GMD and GMR of a Transmission Line using Simulation
4. Formation of Admittance matrix using Direct Inspection method in Simulation
5. Formation of Impedance matrix using Z_{bus} Building Algorithm in Simulation
6. Gauss Seidal method of Load Flow Analysis using Simulation
7. Newton Raphson method of Load Flow Analysis using Simulation
8. Decouple method of Load Flow Analysis using Simulation
9. Short Circuit Analysis for LG and LL faults using Simulation
10. Short Circuit Analysis for DLG and symmetrical faults using Simulation
11. Transient Stability Analysis of SMIB system using Equal Area Criteria in Simulation
12. Transient Stability Analysis of SMIB system using Swing equation in Simulation
13. Simulation of Power Quality Problems (Voltage Sag and Swell, Harmonics, Transients)
14. Simulation Program to find the optimum loading of generators neglecting transmission losses
15. Simulation Program to find the optimum loading of generators with penalty factor

Textbooks:

1. Electrical Power Systems by C. L. Wadhwa, 7th Multi Color Edition, New Age International Publishers, 2016.

Reference Books:

1. Modern Power System Analysis, by I. J. Nagrath & D. P. Kothari. 4th edition. Tata McGraw-Hill Publishing Company, 2011 Edition.

Web Resources:

https://www.ee.iitb.ac.in/~vlabsync/template/vlab/index.html

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE63L.1	3	3	1	2	2	–	–	1	1	–	2	3	2
24AEEE63L.2	3	3	2	2	3	–	–	2	2	–	2	3	3
24AEEE63L.3	3	3	2	2	2	–	–	1	1	–	2	3	2
24AEEE63L.4	3	3	3	3	3	–	–	2	2	1	3	3	3
24AEEE63L.5	3	3	2	3	3	1	–	2	2	1	3	3	3

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Title of the course: IoT with Arduino & Node MCU

Category : SEC
Year : III
Semester : II
Course Code : 24AEEE64S
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. To impart knowledge on Hardware Architecture of Arduino & Node MCU
2. To impart knowledge on Programming Tools of Arduino
3. To impart knowledge on Internet of Things

Course Outcomes:

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

1. Design hardware and software for specific application using Arduino
2. Recognize various devices, sensors and applications
3. Summarize general concepts of Internet of Things (IoT)
4. Design hardware and software for specific application using Node MCU
5. Create IoT solutions using sensors, actuators and Devices

Unit 1 Introduction to Arduino 8

Introduction to Arduino, Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, familiarizing with Arduino Interfacing Board, few examples where a Microcontroller is used, Installation of Arduino IDE windows OS, Run the Arduino executable file.

Unit 2 Interfacing of LED, LCD and Push button 8

Default program environment, Arduino Libraries, Serial Communications.

Project 1: write an Arduino program to blink an LED, Arduino program is saved as Sketch. Write a program to blink tricolor LED.

Project 2: Connect an LCD to Arduino board, Installation of LCD Library. write a program to display a text message on the LCD.

Project 3: Connect an LCD and a Push button to Arduino board, write a program to increase count on LCD when push button was pressed.

Unit 3 Interfacing of seven segment display, DC Motor, Temperature & Humidity 8

Project 4: Types of seven segment display, Interface a seven-segment display to Arduino board, Installation of LCD Library. Write a Program to display digits 0 to 9 in seven segment display.

Project 5: Pulse Width Modulation, duty cycle and frequency, Formula to calculate the duty cycle. Experiment to control the brightness of LED by varying the duty cycle, Experiment to control the speed and direction of a DC motor. Circuit connection explanation of the above experiments

Project 6: Circuit connection details of DHT11 sensor and Arduino, Installation DHT11 Arduino library, write a Code to detect the temperature and humidity using DHT11 sensor and display the output in the Serial Monitor screen.

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Unit 4 **Introduction to IoT and Thing speak** **10**

Working of IoT, IoT system components, About Thing speak platform, create an account in Thing speak, Generate 224 the API keys, Importance of Write API key and Read API key. About MQTT Protocol.

Project 7: Various pins of ESP8266-01 Wi-Fi module Circuit connection of ESP8266 - 01 module with Arduino install ESP8266 Wi-Fi of Library, Establish a connection between Wi-Fi modules.

Project 8: Circuit connection of DHT11 and Wi-Fi module with Arduino, write a program to upload temperature and humidity values from the DHT11 sensor in Thing Speak platform. Data Import/Export option to download the data as CSV file

Unit 5 **Introduction to Node MCU, Blynk cloud, Arduino IoT Cloud and Drone Technology** **10**

Introduction to Node MCU, Pin configuration and architecture, Concept of digital and analog ports, few examples where a Microcontroller is used. Create an account in Blynk cloud. Create an account in Arduino IoT cloud.

Project 9: Circuit connection of DHT11 with Node MCU, write a program to upload temperature and humidity values from the DHT11 sensor in Blynk cloud.

Project 10: Circuit connection of DHT11 with Node MCU, write a program to upload temperature and humidity values from the DHT11 sensor in Arduino IoT cloud.

Project 11: Identification and study of Drone components — Frame, Brushless Motors, ESC, Flight Controller and Battery connections.

Project 12: ESC Calibration and Motor Direction Testing using Arduino.

Project 13: Circuit connection of Ultrasonic Sensor with Arduino, write a program for Obstacle Detection and display alert.

Project 14: Integration of Node MCU with Drone Flight Controller for real-time GPS/telemetry data upload to Blynk Cloud.

Textbooks:

1. Massimo Banzi, Getting Started with Arduino, Second Edition
2. Manoj R. Thakur, NodeMCU ESP8266 Communication Methods and Protocols

Reference Books:

1. Sooriyan, Nithukanth - Arduino Exodus Beginner Arduino Projects_ ESP8266 Arduino IDE Guide Basic Arduino Coding (2021)
2. Michael Margolis - Arduino Cookbook (Oreilly Cookbooks) (2011, OReilly Media)
3. Boxall, John - Arduino Workshop_ a Project-based Introduction (2013, Oreilly & Associates Inc)
4. Michael McRoberts (auth.) - Beginning Arduino (2013, Apress)

Web Resources

- https://www.arduino.cc/
- https://thingspeak.com/
- https://blynk.io/
- Sooriyan, Nithukanth - Arduino Exodus Beginner Arduino Projects_ ESP8266 Arduino IDE Guide Basic Arduino Coding (2021)
- Michael Margolis - Arduino Cookbook (Oreilly Cookbooks) (2011, OReilly Media)
- Boxall, John - Arduino Workshop_ a Project-based Introduction (2013, Oreilly & Associates Inc) 7. Michael McRoberts (auth.) - Beginning Arduino (2013, Apress)
- https://spoken-tutorial.org

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE64L.1	3	3	3	-	3	3	-	-	-	-	3	3	3
24AEEE64L.2	3	3	3	-	3	-	-	-	-	-	3	3	3
24AEEE64L.3	3	3	3	-	3	3	-	-	-	-	3	3	3
24AEEE64L.4	3	3	3	3	3	3	-	-	-	-	3	3	3
24AEEE64L.5	3	3	3	3	-	-	-	-	-	-	3	3	3

P.B.U.D (P.B.Chennaiah) (Dr.CH.Padmakalitha) (P.Bhaskara Prasad) (C.Ganesh)

Annexure-V

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

RAJAMPET, Annamayya District, A.P – 516126, INDIA.

SDG Goals, Cross Cutting Issues and IKS Integration

Course Title	Relevant SDG Goals	Cross Cutting Issues	Integration with IKS (Indian Knowledge Systems)
Linear Control Systems	SDG-4 (Quality Education), SDG-9 (Industry & Innovation)	Employability, Innovation, Problem Solving Skills	Traditional Indian engineering approaches in stability concepts, system thinking in ancient Indian mathematics
Power Electronics	SDG-7 (Clean Energy), SDG-9 (Industry & Innovation), SDG-13 (Climate Action)	Energy efficiency, Sustainable technologies, Green manufacturing	Application of energy conversion concepts linked to traditional Indian scientific contributions
Electrical Power Transmission and Switchgear	SDG-7, SDG-9, SDG-11 (Sustainable Cities)	Safety, Reliability, Disaster management	Safety practices aligned with traditional Indian community-based protection practices
Distribution of Electrical Power	SDG-7, SDG-11, SDG-13	Rural electrification, Smart distribution, Sustainability	Rural energy distribution concepts inspired by Indian village development models
Electric & Hybrid Vehicle Technology	SDG-7, SDG-9, SDG-11, SDG-13	Green mobility, Pollution reduction, Sustainable transport	Indian traditional transport evolution and sustainable mobility practices
Sensors and Instrumentation	SDG-3 (Good Health), SDG-9, SDG-11	Automation, Industry 4.0, Safety	Traditional Indian measurement systems and precision instruments used historically
Renewable Energy Systems	SDG-7, SDG-12 (Responsible Consumption), SDG-13	Sustainability, Climate change mitigation	Traditional Indian solar energy utilization, wind energy usage, water harvesting practices
IoT Applications in Smart Energy Systems	SDG-7, SDG-9, SDG-11	Smart cities, Digital transformation, Cyber security	Indian traditional community-based resource management mapped to smart monitoring
Control Systems & Simulation Lab	SDG-4, SDG-9	Skill development, Simulation-based learning	Use of Indian mathematical models in simulation and system design
Power Electronics & Simulation Lab	SDG-7, SDG-9, SDG-13	Energy efficiency, Green innovation	Application of sustainable design thinking inspired by Indian traditional efficiency practices
Power Systems Lab	SDG-7, SDG-9, SDG-11	Safety, Reliability, Practical skill development	Indian grid development history and indigenous power practices

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RAJAMPET, Annamayya District, A.P – 516126, INDIA.

Course Title	Relevant SDG Goals	Cross Cutting Issues	Integration with IKS (Indian Knowledge Systems)
Power System Analysis	SDG-7, SDG-9, SDG-11	Reliability, Load forecasting, Energy planning	Indian contributions in mathematics for network analysis and computational methods
Microprocessors and Microcontrollers	SDG-4, SDG-9	Digital skills, Embedded innovation	Indian logic and computational thinking roots from ancient mathematics
Power System Operation and Control	SDG-7, SDG-9, SDG-11, SDG-13	Smart grid, Load management, Energy security	Indian traditional community-based energy management and planning concepts
AC Micro Grid	SDG-7, SDG-11, SDG-13	Decentralized energy, Rural electrification	Village-based energy autonomy models in India
Power Semiconductor Drives	SDG-7, SDG-9, SDG-12	Industrial energy saving, Automation	Efficient motor drive concepts supporting sustainable industrial practices
Modern Control Theory	SDG-4, SDG-9	Innovation, Research orientation	Indian mathematical heritage supporting optimization and control concepts
Battery Management System	SDG-7, SDG-9, SDG-12, SDG-13	EV sustainability, Energy storage, Waste reduction	Traditional Indian knowledge on material use and sustainable resource handling
AIML in Electrical Engineering	SDG-4, SDG-9, SDG-11	AI ethics, Digital transformation, Smart systems	Indian knowledge tradition in logic, reasoning, and decision-making systems
Technical Paper Writing and Intellectual Property Rights	SDG-4, SDG-9, SDG-16 (Strong Institutions)	Research ethics, Patents, Innovation ecosystem	Traditional Indian scholarly writing culture and knowledge documentation methods
EV and RES Lab	SDG-7, SDG-9, SDG-11, SDG-13	Green technology, Practical skills	Indian sustainable living practices supporting clean mobility and renewable integration
Microprocessors and Microcontrollers Lab	SDG-4, SDG-9	Skill development, Innovation	Hands-on learning aligned with Indian traditional experiential learning methods
Power System Simulation Lab	SDG-7, SDG-9, SDG-11	Smart grid modeling, Reliability	Indian computational and mathematical practices applied in simulation
IoT with Arduino & Node MCU	SDG-9, SDG-11, SDG-7	Smart monitoring, Automation, Cyber security	Traditional Indian resource monitoring approaches mapped to IoT-based modern solutions

(P.S. Chowdhary)

(Dr. M. Padma Lalitha)

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Annexure-VI

ANNAMACHARYA UNIVERSITY

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(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

RAJAMPET, Annamayya District, A.P – 516126, INDIA.

List of External Examiners

S. No.	Examiner Name	Address
1	Dr. T. Vinopraba	Associate Professor, EEE Department, NIT Puducherry
2	Dr. V. Nagabhaskar Reddy	Professor & HoD, Department of EEE, RGMCET, Nandyal
3	Dr. R. Sridhar	Professor, Department of EEE, SRMIST, Chennai.
4	Dr. M. Sushma	Professor, Department of EEE, JNTUCEH, Hyderabad
5	Dr. D. Sri Vidhya	Associate Professor, K. S. Rangasamy College of Technology, Tiruchengode
6	Dr. M. N. Giri Prasad	Professor, Dept of E.C.E, JNTUACEA, Anantapur.
7	Dr. M. Janardhan Raju	Principal, SIET, Puttur
8	Dr. H. Devanna	Professor, SJCET, Yemmiganur
9	Dr. K. Sudhakar	HoD, Dept of E.C.E., SJCET, Yemmiganur
10	Dr. M. Padmaja Rani	Associate Professor, SJCET., Yemmiganur
11	Dr K. Narasimha Rao	Professor & Head, Department of EEE, GVP College of Engineering (Autonomous), Visakhapatnam
12	Dr. V.C. Veera Reddy	Professor, Department of EEE, SPMVV, Tirupati
13	Dr. V. S. Vakula	Assistant Professor & HOD, Department of EEE, JNTUK, Vizianagaram
14	Dr. G. V. Sivakrishna Rao	Professor, Department of EEE, AU, Visakhapatnam
15	Dr. K. Jithendra Gowd	Assistant Professor, Department of EEE, JNTUCEA, Anantapur
16	Dr. N. Naga Raja Rao	Professor & HOD, GPREC, Kurnool
17	Dr. D. Vishnuvardhan	Assistant Professor, JNTUACEA, Anantapuramu
18	Dr. B. Polaiah	Professor, KLU, Vijayawada
19	Dr. P. V. Ramana	HOD, Dept of E.C.E., SVNEC, Rangampet
20	Dr. M. Venkata Narayana	Professor, KSRM College of Engineering, Kadapa
21	Dr. P. Sujatha	Professor, Department of EEE, JNTUCEA, Anantapur
22	Dr. Ch. Chengaiah	Professor, Department of EEE, SVUCE, SVU, Tirupati
23	Dr. B. Urmila	Associate Professor, Department of EEE, GPREC, Kurnool
24	Dr. V. Maheswari	Associate Professor, Department of EEE, SITAMS, Chittoor.
25	Dr. S. Ravindra	Professor, Department of EEE, Vasireddy Venkatadri Institute of Technology, Guntur.
26	Dr. G. Venkateswarlu	Professor & HoD, Department of EEE, Narayana Engineering College, Nellore.
27	Dr. P. Nagaraju	Professor, Dept. of EEE, SITAMS, Chittoor.
28	Dr. S. Suresh Reddy	Professor & HoD, Department of EEE, NBRIST, Vakadu.
29	Dr. B. Mouli Chandra	Professor & HoD, Department of EEE, QISCET, Ongole.
30	Dr. K. S. R. Krishna Prasad	Professor, Department of EEE, NIT Warangal

P.S. Chowdary

(DY. M. Padma Lalitha)

(G GANESH)

S. No.	Examiner Name	Address
31	Dr. T. Sreenivasulu Reddy	Associate Professor, Department of ECE, SVUCE, Tirupathi
32	Dr. R. Srinivasa Rao	Professor, Dept. of EEE, JNTU, Kakinada
33	Dr. M. Sivasatya Narayana	Associate Professor, Department of EEE, GPREC, Kurnool
34	Dr. C. Kamal Basha	Professor, Department of EEE, MITS, Madanapalle
35	Dr. Y .V. Siva Reddy	Professor, Department of EEE, GPREC, Kurnool
36	Dr. R. Rathinam	Professor, Department of EEE, SRMIST, Chennai.
37	Dr. I. Prabhakara Reddy	Professor, Department of EEE, NBRIST, Vakadu
38	Dr. K. Amaresh	Professor, Department of EEE, St. Peters Engineering College, Hyderabad
39	Dr. R. Kiranmayi	Professor, Dept. of EEE, JNTUCEA, Anantapur
40	Dr. P. V. Prasad	Professor, Department of EEE, CBIT, Hyderabad
41	Dr. P. Chandra Sekhar	Associate Professor, Department of EEE, MGIT, Hyderabad
42	Dr. N. Chellammal	Associate Professor, Department of EEE, SRM University, Chennai.
43	Dr. D. Suresh	Professor, RNSIT, Bengaluru
44	Dr. S. Shafiulla Basha	Assistant Professor, Dept. of ECE, YVU, Proddatur
45	Dr. C. Chandrasekhar	Professor, HOD, SVCEW, Tirupathi
46	Dr. M. V. Subramanyam	Professor, Shantiram Engg College, Nandyal
47	Dr. J. Siva Vara Prasad	Professor, Dept. of EEE, LBRCE, Krishna
48	Dr. G. Sambasiva Rao	Professor, R. V. R. & J. C. College of Engineering, Guntur
49	Dr. P. Ramkishore Kumar Reddy	Professor, Dept. of EEE, MGIT, Hyderabad
50	Dr. O. Chandra Sekhar	Associate Professor, Dept. of EEE, NIT, Delhi
51	Dr. M. Senthilkumar	Professor, Department of EEE, Sona college of Technology, Salem, Tamilnadu
52	Dr. Y. N. Vijay Kumar	Professor, Dept. of EEE, SVCET, Chittoor
53	Dr. P. Srinivas Varma	Associate Professor, Department of EEE, K L University, Guntur
54	Dr. M. Damodar Reddy	Professor, Department of EEE, SVUCE, SVU, Tirupati
55	Dr. S. S. Dash	Professor, Department of EEE, Government College of Engineering, Orissa
56	Dr. D. Satya Narayana	Professor, Dept of E.C.E, RGMCET, Nandyal
57	Dr. K. Hari Kishore	Professor, KLU, Vijayawada
58	Dr. S. Chandra Mohan Reddy	Assistant Professor, Dept. of E.C.E, JNTUCEP, Pulivendula
59	Dr. C. Srinivasarao	Professor, Dept. of EEE, GPCET, Kurnool
60	Dr. D. Lenine	Professor, Dept. of EEE, RGMCET, Nandyal
61	Dr. V.V.K Reddy	Professor, Dept. of EEE, NBKRIST, SPSR, Nellore
62	Dr. K. Nagireddy	Professor, NBKR, Vakadu
63	Dr. R. Sumalatha	Professor, VCE, Hyderabad

(Dr. K. Chennaiah) (Dr. M. Padma Lalitha) (C. GANESH)

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65	Dr. B. Vijaya Krishna	Associate Professor, Department of EEE, Bapatla Engineering College, Bapatla
66	Dr. J. Sreenivasulu	Assistant Professor, Department of EEE, JNTUCEA, Anantapur
67	Dr. K. Vaisakh	Professor, Department of EEE, Andhra University, Visakhapatnam
68	Dr. V. Somasekhar	Professor, Dept. of EEE, NIT Warangal
69	Dr. K. Udhayakumar	Professor, Department of EEE, Anna University, Chennai
70	Dr. M. Kiran Kumar	Associate Professor, Department of EEE, K L University, Guntur
71	Dr. Sailaja Kumari M	Professor, Department of EEE, NIT Warangal
72	Dr. K. Chandra Sekhar	Professor, Department of EEE, RVR & JC college of Engineering, Guntur.
73	Dr. V. Usha Reddy	Associate Professor, Department of EEE, SVUCE, SVU, Tirupati
74	Dr. E. Vidya Sagar	Professor, Department of EEE, Osmania University, Hyderabad
75	Dr. Madhuri Avinash Chaudhari	Professor, Department of EEE, Visvesvaraya National Institute of Technology, Nagpur

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