SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT
OF
ELECTRICAL AND ELECTRONICS ENGINEERING

Minutes of 8th Meeting of BoS (UG)

Venue	:	Seminar Hall,Third Floor Department of Electrical and Electronics Engineering Engineering Block, Sri Manakula Vinayagar Engineering College
Date and Time	:	28th August at 10.30 A.M

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Minutes of 8th Meeting of BoS (UG)

Table of Contents

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Minutes of 8th Meeting of Board of Studies (UG)

The Eighth meeting of Board of Studies in Electrical and Electronics Engineering Department was held on **28th August 2024 at 10:30 A.M** in the EEE Seminar Hall, Department of Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College, with Head of Department in the Chair.

The following members were present for the BoS meeting

Sl. No.	Name of the Member	Designation
1. Head of the Department concerned (Chairperson)		
1	**Dr. P. Jamuna, M.E., Ph.D.,** Professor Specialization: Power Electronics and Drives Years of Experience:18 Sri Manakula Vinayagar Engineering College jamuna@smvec.ac.in 9789544379	Chairperson
2. All faculty members of the Department		
2	**Dr. D. Raja, M.Tech., Ph.D.,** Professor Specialization: Electrical Drives and Control Years of Experience: 17 Sri Manakula Vinayagar Engineering College rajaapeee@gmail.com 9944337970	Member
3	**Dr. S. Ganesh Kumaran, M.E., Ph.D.,** Associate Professor Specialization: Electrical Machines Years of Experience:13 Sri Manakula Vinayagar Engineering College ganeshphd4u@gmail.com 9677624378	Member
4	**Dr. D. Sivaraj, M. Tech., Ph.D.,** Associate Professor Specialization: Electrical Drives and Control Years of Experience:14 Sri Manakula Vinayagar Engineering College sivarajdeee@smvec.ac.in **9043117533**	Member

5	**Mr.B. Parthiban. M.E.,** Assistant Professor Specialization: Power Electronics and Drives Years of Experience:17 Sri Manakula Vinayagar Engineering College parthibaneee@smvec.ac.in **9842102111**	Member
6	**Mr.S.John Powl, M.Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:16 Sri Manakula Vinayagar Engineering College johnpowl@smvec.ac.in **9894817748**	Member
7	**Mr. A. Janagiraman, M.E.** Assistant Professor Specialization: Power Electronics and Drives Years of Experience:16 Sri Manakula Vinayagar Engineering College janagiraman16@smvec.ac.in **9965597940**	Member
8	**Mr.K. Thangaraj, M.Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:12 Sri Manakula Vinayagar Engineering College thangaraj@smvec.ac.in **8056477840**	Member
9	**Mr.J.Muruganandham, M.Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:12 Sri Manakula Vinayagar Engineering College muruganandham,jeeva@smvec.ac.in **9994358048**	Member
10	**Mr.C.Adrien Perianayagam, M.Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:15 Sri Manakula Vinayagar Engineering College adrienferen@smvec.ac.in **9952472285**	Member
11	**Mr. R. Ragupathy, M.E.,** Assistant Professor Specialization: Power Electronics and Drives Years of Experience: 9 Sri Manakula Vinayagar Engineering College ragupathy@smvec.ac.in **9600785649**	Member

12	**Mr.I.Shivasankkar, M.Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:7 Sri Manakula Vinayagar Engineering College shivasankkar@smvec.ac.in **8682936091**	Member
13	**Mr.G.Rajavel, M. Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:10 Sri Manakula Vinayagar Engineering College g.rajavel61@gmail.com **7871678713**	Member
14	**Mr.R.Vignesh, M.E.,** Assistant Professor Specialization: High Voltage Engineering Years of Experience:7 Sri Manakula Vinayagar Engineering College vickieee21@gmail.com **9791058626**	Member
15	**Ms.T.Abinayasaraswathy, M. Tech.,** Assistant Professor Specialization: Power Electronics and Drives Years of Experience:8 Sri Manakula Vinayagar Engineering College abinayasaraswathy.eee@smvec.ac.in **9487639243**	Member
16	**Mr. S. Elanthamizh. M.E.,** Assistant Professor Specialization: Power Electronics and Drives Years of Experience: 5 Sri Manakula Vinayagar Engineering College elanthamizh.eee@smvec.ac.in **6381903843**	Member
17	**Mrs. D.Meena, M.E., (Ph.D)** Assistant Professor Specialization: Power Electronics and Drives Years of Experience:8 Sri Manakula Vinayagar Engineering College meena.eee@smvec.ac.in **8148547731**	Member
18	**Mr. J. Gnanavel, M. Tech.,** Assistant Professor Specialization: Electrical Drives and Control Years of Experience:9 Sri Manakula Vinayagar Engineering College gnanavel.eee@smvec.ac.in **9944354561**	Member

19	**Mrs. A. S. Amathullah, M.E.,** Assistant Professor Specialization: Power Electronics and Drives Years of Experience: 0.6 Sri Manakula Vinayagar Engineering College amathullah.eee@smvec.ac.in **9943858320**	Member
20	**Dr. K. Raja** Associate Professor, Dept. of Mathematics, SMVEC raja@smvec.ac.in **9361122495**	Member
21	**Mrs. S. Parameswari** Assistant Professor, Dept. of Chemistry, SMVEC parameswari.sas@smvec.ac.in **9655481494**	Member
22	**Dr. P. Rajeswari** Associate Professor, Dept. of English, SMVEC rajeswary18@gmail.com **6381555356**	Member
23	**Mrs. S. Geetha** Assistant Professor, Dept. of Physics, SMVEC geethaphysics@smvec.ac.in **9942355656**	Member
3. Two subject experts from outside the Parent University are nominated by the Academic Council.		
24	**Dr. R. Gunabalan, M. Tech, Ph.D.,** Professor / EEE Specialization: Electrical Drives and Control Years of Experience:20 School of Electrical Engineering, Vellore Institute of Technology Chennai -600127. gunabalan.r@vit.ac.in **9894919269**	Subject Expert
25	**Dr. S. Karthick, M.E., Ph.D.,** Professor / EEE Specialization: Applied Electronics Years of Experience:22 Erode Sengunthar Engineering College (Autonomous) Perundurai, Erode – 638 057. resumekarthick@gmail.com **9486937253 / 9842557879**	Subject Expert

2.A.1.5

4. One expert is nominated by the Vice-Chancellor from a panel of six recommended by the Autonomous College Principal as a University Nominee.		
26	**Dr. M. Sudhakaran, M.E., Ph.D.,** Professor Specialization: Smart Grid Years of Experience:23 Department of EEE, Puducherry Technological University, Puducherry-605 014. sudhakaran@ptuniv.edu.in **9994071997**	Subject Expert
5. One representative from industry/corporate sector/allied areas is nominated by the Principal as a Industry Nominee.		
27	**Dr. Raghu Selvaraj, M.Tech., Ph.D.,** Scientist, Years of Experience:10 CSIR-Central Mechanical Engineering Research Institute Mahatma Gandhi Avenue, Durgapur - 713209, West Bengal. r.selvaraj@cmeri.res.in, **946063240**	Member
6. One member of the College alumni is nominated by the Principal.		
28	**Dr. Srinivasan Pradabane, M.E., Ph.D.,** Assistant Professor Years of Experience:14 Department of Electrical Engineering National Institute of Technology, Warangal. spradabane@nitw.ac.in, **8702462244, 8332969289**	Member
7. Experts from outside the Autonomous College, whenever special courses of studies are to be formulated, is nominated by the Principal.		
29	**Dr. P. Samundiswary, M.Tech., Ph.D.,** Professor / ECE Specialization: Wireless Communication & Networks, VLSI Design and Optical Communication Years of Experience:25 Department of Electronics Engineering, School of Engineering and Technology, Pondicherry University sam.dee@pondiuni.edu.in **9443268949**	Member

Agenda of the Meeting	
Agenda 1/ BoS / 8 /2024 /EEE /UG	Welcome Address, Confirmation of minutes of 7th meeting of BoS.
Agenda 2/ BoS / 8 /2024 /EEE /UG	To Apprise the BoS about Curriculum and Syllabi followed for the students admitted in the academic year 2021-22 and 2022-23 under autonomous regulations R-2020.
Agenda 3/ BoS / 8 /2024 /EEE /UG	To discuss the syllabi of II Year (IV Semester) and III Year (V and VI semesters), under Autonomous Regulations R-2023 for the B.Tech – Electrical and Electronics Engineering students admitted from the Academic Year 2023-24 onwards.
Agenda 4/ BoS / 8 /2024 /EEE /UG	To discuss about Honour and Minor Degree Programme. i. The syllabi of Honour and Minor Degree programmes offered by the department of Electrical and Electronics Engineering. ii. The Minor Degree programmes offered to the students of Electrical and Electronics Engineering by other departments.
Agenda 5 / BoS / 8 /2024 /EEE /UG	To approve the Academic Calendar for the Odd Semester of Academic year 2024-25.
Agenda 6 / BoS / 8 /2024 /EEE /UG	To approve the Professional and Open Elective courses offered to the III year (Batch: 2022 – 2026) and IV year (Batch: 2021 – 2025) students under R-2020 Regulations.
Agenda 7 / BoS / 8 /2024/EEE /UG	To approve the Certification Courses offered to the III year / V semester (Batch: 2022 – 2026) students under R-2020 regulations and II Year / III semester (Batch: 2023 – 2027), I Year / I semester (Batch: 2024 – 2028) Students under R-2023 regulations.
Agenda 8 / BoS / 8 /2024 /EEE /UG	To approve the online SWAYAM/ MOOCS courses for students and Staff.
Agenda 9 / BoS / 8 /2024 /EEE /UG	To apprise the Result Analysis of Even Semester of the academic year 2023 – 2024
Agenda 10 / BoS / 8 /2024 /EEE /UG	To apprise about the Silver Jubilee Celebrations of our college.
Agenda 11 / BoS / 8 /2024 /EEE /UG	To discuss and recommend the panel of examiners to the Academic Council.
Agenda 12 / BoS / 8 /2024 /EEE /UG	To discuss various activities carried out in the department i. Faculty development programme (FDP) ii. Engineering Clinic activities iii. MoU with TVS Training and Services Limited, Chennai for Electric Vehicle centre of excellence
Agenda 13 / BoS / 8 /2024 /EEE /UG	To discuss various Research activities in the department i. Patents Publication and submission ii. Submission of research proposals iii. Journal Paper publications and submission
Agenda 14 / BoS / 8 /2024 /EEE /UG	To apprise the institution credentials, Students and Faculty Achievements for the academic year 2023-2024
Agenda 15 / BoS / 8 /2024 /EEE /UG	Any other additional points to be discussed with the permission of Chair.

2.A.1.7

Minutes of the Meeting

Dr. P. Jamuna, Chairperson, BoS opened the meeting by welcoming the External members, Internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairperson.

Agenda 1 / BoS / 8 / 2024 / EEE / UG

Confirmation of minutes of 7th meeting of BoS.

Chairperson confirmed the Minutes of 7th meeting of BoS and its implementation.

BoS noted the Agenda.

Agenda 2 / BoS / 8 / 2024 / EEE / UG

To Apprise the BoS about Curriculum and Syllabi followed for the students admitted in the academic year 2021-22 and 2022-23 under autonomous regulations R-2020

The chairperson of BoS apprised the Highlights of R-2020 Curriculum and Syllabi to the BoS members and the **BoS noted the Agenda.**

Agenda 3 / BoS / 8 / 2024 / EEE / UG

To discuss the syllabi of II Year (IV Semester) and III Year (V and VI semesters), under Autonomous Regulations R-2023 for the B.Tech – Electrical and Electronics Engineering students admitted from the Academic Year 2023-24 onwards

The modifications to be carried out in the syllabus of II-year, IV semester, under R-2023 Regulations are discussed and the following suggestions were given by BoS members

S. No.	Regulation	Year / Semester	Course Name with Code	Unit	Changes Incorporated
1.	R-2023	II /IV	Control Systems / U23EEB402	III	• The topics under the title, **"Compensator Design"** are removed
				IV	• The experiment **"Simulation for Stability analysis using Routh- Hurwitz method"** is included
				V	• The experiment **"Design and simulation of Lead-Lag Compensator for DC Motor "** is removed

The changes in curriculum and syllabi of III year (V and VI semester) of R-2023 regulations are discussed and the following modifications were suggested by the BoS members

S. No.	Regulation	Year / Semester	Course Name with Code	Unit	Changes Incorporated
Modifications in Curriculum					
1.	R-2023	IV/VII	Electric and Hybrid Vehicles / U23EEDC02	-	Course Name **"Electric Vehicles" is changed to "Electric and Hybrid Vehicles" (U23EEDC02)** and made as Common Course for all departments.
Modifications in Professional Core Courses					
2.	R-2023	III /V	Electrical Measurements and Instrumentation / U23EET509	II	• Unit Title is changed from **"Electrical Instruments"** to **"Analog Instruments"**
				IV	• Unit Title and sub title are changed from **"Display Devices" to "Display Units"**
				V	• The topics under the sub title, **Level: DP cell, Ultrasonic** are removed

2.A.1.8

3	R-2023	III /V	Microprocessor and Microcontroller / U23EET510	III	• The topics, "**External Interrupt programming and EEPROM programming**" are removed
				IV	• The topics, **"IR sensor interfacing – PIR sensor interfacing**" are included
4	R-2023	III /VI	Power System Analysis / U23EET611	V	• The topic, **"Numerical integration methods"** is removed.
5	R-2023	III /VI	Electrical Machine Design / U23EEB603	I	• The topics, **"Design of Magnetic circuit, Magnetizing current, and Calculation of MMF"** have been replaced by **"Calculation of Magnetic circuits".**
				II	• The topic **"Magnetic leakage calculations"** is removed.
Modifications in Professional Elective Courses					
6	R-2023	III /V	Utilization of Electrical Energy / U23EEE506	III	• The topic, **"Laws of Thermodynamics"** is included
				V	• The topic, "**Domestic Appliances"** is removed and the topic **"Batteries and its types"** are included
				-	• The text Book, "S.S.UPPAL, **Utilization of Electrical Energy**, Khanna Publishers, 4th Edition, 2022" is included
7	R-2023	III /VI	Internet of Things for Smart System / U23EEE615	II	• The processors,**"ESP8266 and ESP32"** are included

The above corrections were incorporated and the updated Syllabi of IV, V and VI Semesters under Autonomous regulations R-2023 including Professional and Open Electives were approved by the BoS members for the students admitted from the Academic Year 2023-24 onwards. **(given in Annexure- I)**

Agenda 4 / BoS / 8 / 2024 / EEE / UG

To discuss about Honour and Minor Degree Programme.

i. The syllabi of Honour and Minor Degree programmes offered by the department of Electrical and Electronics Engineering.
ii. The Minor Degree programmes offered to the students of Electrical and Electronics Engineering by other departments.

The Honour / Minor degree programme is introduced in the autonomous regulations R-2023. The interested students those who are fulfilling the requirements can undergo the Honour/ Minor degree programme by completing 5 additional courses (18 to 20 Credits) which will be offered from IV Semester onwards.

The approval for the Honour / Minor degree programme offered by the department of Electrical and Electronics Engineering under R-2023 Regulations was received in the 7th meeting Board of Studies with the Name of **"Electric Vehicle Technology".** The Nomenclature for the Honour / Minor degree programme offered by the department of Electrical and Electronics Engineering is **"Electric Vehicles"** as per AICTE Approval process Handbook. Hence, the Honour / Minor degree programme name is modified to **"Electric Vehicles"** and submitted for the approval of Board of Studies – **BoS Noted and approved.**

2.A.1.9

The Honour / Minor degree programme offered by Department of Electrical and Electronics Engineering is given in Table 2.

Table 2: List of Honour / Minor degree Programme

S. No.	Name of the Honours / Minor Programme	Offering Departments	Name of the Departments opting for Honours Degree	Name of the Departments opting for Minor Degree
1	ELECTRIC VEHICLES	EEE & MECH	EEE & MECH	ECE, CSE, IT, CIVIL, ICE, BME, CCE, CSE&BS, AI&DS, MCTR

- The students of Electrical and Electronics Engineering are also eligible to undergo Minor degree programme offered by other department who fulfilling eligibility criteria.
- The courses offered for the Honour/Minor degree programme by the department of Electrical and Electronics Engineering were presented **(given in Table 3)** and **approved by the BoS members.**

Table 3: List of courses for Honour / Minor degree Programme- "Electric Vehicles"

Semester	Course Title	Periods			Credits
		L	T	P	
IV	Electrical Vehicles: Design, Dynamics and Testing	3	1	0	4
V	Energy Storage and Battery Management System	3	1	0	4
VI	Electric Drives and Controls	3	1	0	4
VII	Modelling and Simulation of EHV	3	1	0	4
VIII	Autonomous and Connected Vehicles	3	1	0	4

The Syllabi of courses offered for Honour / Minor degree Programme - "Electric Vehicles" were discussed and approved by the BoS members. (given in Annexure- II)

2.A.1.10

Agenda 5 / BoS / 8 / 2024 / EEE / UG

To approve the Academic Calendar for the Odd Semester of Academic year 2024-25.

The Academic Calendars for ODD Semester (I, III, V and VII) of Academic year 2024-25 which includes the schedule for CAT, Model Exam, QCM, Various Events, Continuous Assessment Mark distributions, were presented and **approved by the BoS members. (Given in Annexure – III).**

Agenda 6 / BoS / 8 / 2024 / EEE / UG

To approve the Professional and Open Elective courses offered to the III year (Batch: 2022 – 2026) and IV year (Batch: 2021 – 2025) students under R-2020 Regulations.

The Professional and Open Elective courses opted by the students of III year / V semester (Batch: 2022 – 2026) and IV year / VII semester (Batch: 2021 – 2025) students under R-2020 regulations were presented **(Given in Table 4)** and **approved by the BoS members. (Given in Annexure – IV).**

Table 4: List of Professional and Open Elective Courses opted by the Students

S. No.	Year/Sem	Course Name	Course Code
Professional Elective – II			
1	III / V	Utilization of Electrical Energy	U20EEE506
2	III / V	Electrical Energy Audit and Conservation	U20EEE508
Open Elective – II			
1	III / V	Product Development and Design	U20HSO501
Professional Elective – IV			
1	IV / VII	Fuzzy Logic and Neural Networks	U20ICCM01
Open Elective – IV			
1	IV / VII	Internet of Things	U20ECCM04

Agenda 7 / BoS / 8 / 2024 / EEE / UG

To approve the Certification Courses offered to the III year / V semester (Batch: 2022 – 2026) students under R-2020 regulations and II Year / III semester (Batch: 2023 – 2027), I Year / I semester (Batch: 2024 – 2028) Students under R-2023 regulations.

The Certification courses offered to the III year / V semester (Batch: 2022 – 2026) students under R-2020 regulations and II year / III semester (Batch: 2023 – 2027), I year / I semester (Batch: 2024 – 2028) students under R-2023 regulations were presented **(given in Table 5)** and **approved by the BoS members.**

Table 5: Certification Courses for ODD Semester of Academic Year 2024-2025

S. No.	Regulations	Year/Sem	Course Name	Course Code
Certification Course – I				
1	R-2023	I / I	Web Applications, Development (HTML, CSS, JS)	U23EEC176
Certification Course – III				
1	R-2023	II / III	Angular JS	U23EEC338
Certification Course – V				
1	R-2020	III / V	Web Programming - 1	U20EEC590

2.A.1.11

Agenda 8 / BoS / 8 / 2024 / EEE / UG

To approve the online SWAYAM/ MOOCS courses for students and Staff.

- The details of online SWAYAM / MOOCS courses completed by the Faculties and students for the academic year 2023-2024 were presented to the BoS members.
- The details of online SWAYAM / MOOCs courses registered by the Faculty and students during the period July 2024 to December 2024 was presented and **approved by the BoS members. (given in Annexure- V)**

Agenda 9 / BoS / 8 / 2024 / EEE / UG

To apprise the Result Analysis of Even Semester of the academic year 2023 – 2024

The Result Analysis of both ODD and EVEN Semesters of I year (Batch: 2023 – 2027), II year (Batch: 2022 – 2026), III year (Batch: 2021 – 2025) and IV year (Batch: 2020 – 2024) for the Academic year 2023-24 were presented and the **BoS noted the Agenda.**

Agenda 10 / BoS / 8 / 2024 / EEE / UG

To apprise about the Silver Jubilee Celebrations of our college

The Silver Jubilee celebrations are Kicked Off with a series of events, like banner drops, a marathon, and a flash mob on July 24, 2024. This was followed by a lecture series, hands-on training sessions, guest lectures, Yoga Day celebrations, National Sports Day celebration, a Glow Fest event and Kargil Vijay Diwas celebrations, etc., Similar type of events were scheduled around the year in four different quarters from July 2024 to June 2025 was presented and the **BoS noted the Agenda.**

Agenda 11 / BoS / 8 / 2024 / EEE / UG

To discuss and recommend the panel of examiners to the Academic Council.

The panel of examiners for Question Paper Setting and Evaluation (**given in Annexure-VI)** were presented to the BoS members**. The BoS approved and recommended to the Academic Council.**

Agenda 12 / BoS / 8 / 2024 / EEE / UG

To discuss various activities carried out in the department

i. Faculty development programme (FDP)
ii. Engineering Clinic activities
iii. MoU with TVS Training and Services Limited, Chennai for Electric Vehicle centre of excellence

The various activities like Faculty Development Programme, Engineering Clinic and MoUs carried out during 2023-24 in the department of Electrical and Electronics Engineering were presented (**given in Annexure-VII)** and the **BoS noted the Agenda.**

Agenda 13 / BoS / 8 / 2024 / EEE / UG

To discuss various Research activities in the department

i. Patents Publication and submission
ii. Submission of research proposals
iii. Journal Paper publications and submission

The efforts taken to improve the Research activities in the department were presented and the **BoS noted the Agenda**.

- 23 Product and Copyright patents has been submitted during the academic year 2023 – 2024.
- A research proposal titled **"EEG and EMG Signal-Based Control of Transhumeral Robotic Prosthetic Arm Using Non-Negative Matrix Factorization Algorithms"** was submitted to the SERB-POWER Grant with amount of Rs. 30 lakhs.
- 03 International Journals had published and 07 journals had applied during the academic year 2023-2024.
- 02 International Conference had published in the academic year 2024-2025.

Agenda 14 / BoS / 8 / 2024 / EEE / UG

To apprise the Institution Credentials, Students and Faculty Achievements for the academic year 2023-2024

The Institutional Credentials, Students and Faculty achievements for the academic year 2023 – 2024 were presented and **BoS noted the Agenda.**

2.A.1.12

Agenda 15 / BoS / 8 / 2024 / EEE / UG

Any other additional points to be discussed with the permission of Chair.

- The details of NAAC Reforms 2024 - Binary Accreditation for Colleges was presented and **BoS noted the Agenda.**
- The Courses with same contents among the various departments were identified and those courses were made as common to all departments. Due to this, some of the Course Name/ Code of Core and Professional/Open Elective of Electrical and Electronics Engineering department were modified / rearranged. The syllabi of Common Courses offered by the Department of Electrical and Electronics Engineering to the other branches of Engineering **(given in Table 6)** were discussed **(given in Annexure – VIII)** and **approved by the BoS members.**

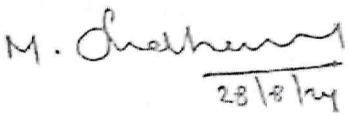
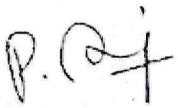
Table 6: Common Courses offered by department of EEE

Sl. No	Name of the Departments offering the Courses	Year / Semester	Course Code	Name of the Course	Name of the Departments opting the Courses
1	EEE	I / I	U23EETC01	Electrical Technology	ECE
2	EEE	I / I	U23EEPC01	Electrical Technology Laboratory	ECE
3	EEE	II / IV	U23EETC02	Power Electronics and Drives	Mechatronics
4	EEE	II / IV	U23EEPC02	Power Electronics and Drives Laboratory	Mechatronics
5	EEE / ECE	I / I	U23ESTC03	Basics of Electrical and Electronics Engineering	CCE, MECH, CSE&BS, Mechatronics, CSE, IT, AI&DS
6	EEE / ECE	I / I	U23ESPC01	Basics of Electrical and Electronics Engineering Laboratory	CCE, MECH, CSE&BS, Mechatronics, CSE, IT
Professional / Open Elective					
7	EEE	VI	U23EEDC01	Electrical Safety Engineering	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS
8	EEE	VI	U23EEOC01	Solar Photovoltaic Fundamentals and Applications	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS
9	EEE	VII	U23EEDC02	Electric and Hybrid Vehicles	ECE, ICE, MECH, CCE, BME, AI&DS, MECHATRONICS
10	EEE	VII	U23EEOC02	Energy Conservation and Management	ECE, ICE, MECH, CIVIL, CCE, BME, IT, CSE, AI&DS, MECHATRONICS

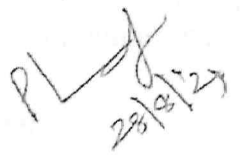
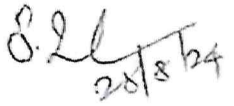
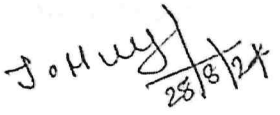
- The Equivalent Courses among R - 2020 and R - 2023 Regulations were identified and submitted to the BoS **(given in Annexure – IX). The BoS noted and approved.**

2.A.1.13

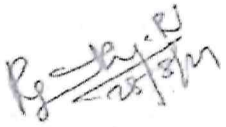
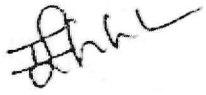
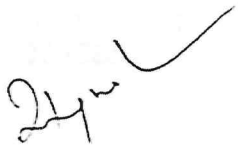
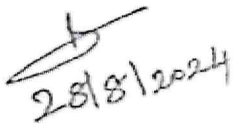
The Eighth Meeting of BoS approval was concluded at 3.00 P.M by Dr. P. Jamuna, Chairperson, Board of Studies, Department of Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College.

Sl.No.	Name of the Member	Designation	Signature
1.	**Dr. P. Jamuna, M.E., Ph.D.,** Professor Sri Manakula Vinayagar Engineering College jamuna@smvec.ac.in 9789544379	Chairperson	
2.	**Dr. M. Sudhakaran, M.E., Ph.D.,** Professor Department of EEE, Puducherry Technological University, Puducherry-605 014. sudhakaran@ptuniv.edu.in **9994071997**	Subject Expert (University Nominee)	
3.	**Dr. R. Gunabalan, M. Tech, Ph.D.,** Professor School of Electrical Engineering, Vellore Institute of Technology Chennai -600127. gunabalan.r@vit.ac.in **9894919269**	Subject Expert (Academic Council Nominee)	
4.	**Dr. S. Karthick, M.E., Ph.D.,** Professor / EEE Erode Sengunthar Engineering College (Autonomous) Perundurai, Erode – 638 057. resumekarthick@gmail.com **9486937253 / 9842557879**	Subject Expert (Academic Council Nominee)	
5.	**Dr. Raghu Selvaraj, MTech., Ph.D.,** Scientist, CSIR-Central Mechanical Engineering Research Institute Mahatma Gandhi Avenue, Durgapur - 713209, West Bengal. r.selvaraj@cmeri.res.in, **946063240**	Industry Nominee	
6.	**Dr. Srinivasan Pradabane, M.E., Ph.D.,** Assistant Professor Department of Electrical Engineering National Institute of Technology, Warangal. spradabane@nitw.ac.in, **8702462244, 8332969289**	Alumnus Nominee	

2.A.1.14

7.	**Dr. P. Samundiswary, M.Tech., Ph.D.,** Professor / ECE Department of Electronics Engineering, School of Engineering and Technology, Pondicherry University sam.dee@pondiuni.edu.in **9443268949**	Academic Expert	
8.	**Dr. D. Raja, M.Tech., Ph.D.,** Professor Sri Manakula Vinayagar Engineering College rajaapeee@gmail.com 9944337970	Member	
9.	**Dr. S. Ganesh Kumaran, M.E., Ph.D.,** Associate Professor Sri Manakula Vinayagar Engineering College ganeshphd4u@gmail.com 9677624378	Member	
10.	**Dr. D. Sivaraj, M. Tech., Ph.D.,** Associate Professor Sri Manakula Vinayagar Engineering College sivarajdeee@smvec.ac.in **9043117533**	Member	
11.	**Mr.B. Parthiban. M.E.,** Assistant Professor Sri Manakula Vinayagar Engineering College parthibaneee@smvec.ac.in **9842102111**	Member	
12.	**Mr.S.John Powl, M.Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College johnpowl@smvec.ac.in **9894817748**	Member	
13.	**Mr. A. Janagiraman, M.E.** Assistant Professor Sri Manakula Vinayagar Engineering College janagiraman16@smvec.ac.in **9965597940**	Member	
14.	**Mr.K. Thangaraj, M.Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College thangaraj@smvec.ac.in **8056477840**	Member	
15.	**Mr.J.Muruganandham, M.Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College muruganandham,jeeva@smvec.ac.in **9994358048**	Member	

2.A.1.15

16.	**Mr.C. Adrien Perianayagam, M.Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College adrienferen@smvec.ac.in **9952472285**	Member	
17.	**Mr. R. Ragupathy, M.E.,** Assistant Professor Sri Manakula Vinayagar Engineering College ragupathy@smvec.ac.in **9600785649**	Member	
18.	**Mr. I. Shivasankkar, M.Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College shivasankkar@smvec.ac.in **8682936091**	Member	
19.	**Mr. G. Rajavel, M. Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College g.rajavel61@gmail.com **7871678713**	Member	
20.	**Mr. R. Vignesh, M.E.,** Assistant Professor Sri Manakula Vinayagar Engineering College vickieee21@gmail.com **9791058626**	Member	
21.	**Ms.T. Abinayasaraswathy, M. Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College abinayasaraswathy.eee@smvec.ac.in **9487639243**	Member	
22.	**Mr. S. Elanthamizh. M.E.,** Assistant Professor Sri Manakula Vinayagar Engineering College elanthamizh.eee@smvec.ac.in **6381903843**	Member	
23.	**Mrs. D.Meena, M.E., (Ph.D)** Assistant Professor Sri Manakula Vinayagar Engineering College meena.eee@smvec.ac.in **8148547731**	Member	
24.	**Mr. J. Gnanavel, M. Tech.,** Assistant Professor Sri Manakula Vinayagar Engineering College gnanavel.eee@smvec.ac.in **9944354561**	Member	

25.	**Mrs. A. S. Amathullah, M.E.,** Assistant Professor Sri Manakula Vinayagar Engineering College amathullah.eee@smvec.ac.in **9943858320**	Member	28/08/2024
26.	**Dr. K. Raja** Associate Professor, Dept. of Mathematics, SMVEC raja@smvec.ac.in **9361122495**	Member	
27.	**Mrs. S. Parameswari** Assistant Professor, Dept. of Chemistry, SMVEC parameswari.sas@smvec.ac.in **9655481494**	Member	28/8/24
28.	**Dr. P. Rajeswari** Associate Professor, Dept. of English, SMVEC rajeswary18@gmail.com **6381555356**	Member	28/8/24
29.	**Mrs. S. Geetha** Assistant Professor, Dept. of Physics, SMVEC geethaphysics@smvec.ac.in **9942355656**	Member	

ANNEXURE – I

R-2023 CURRICULUM

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)

Puducherry

B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC REGULATIONS 2023
(R-2023)

CURRICULUM AND SYLLABI
Volume – III

2.A.1.18

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation:

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

Mission

M1: Quality Education:

To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal Needs:

To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation:

To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship:

To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

2.A.1.19

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:
Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics:
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning:
Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2.A.1.20

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge:
To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility

PEO2: Innovative Skills:
To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment

PEO3: Ethics:
To actively embrace leadership qualities for achieving professional goals with ethical values

PEO4: Adaptability:
To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency:
Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of Power Electronics, Electrical Machines and Power Systems.

PSO2: Cutting Edge Technologies:
Explore the new cutting-edge technologies in the field of Electric Vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market

PSO3: Design and Evolution:
Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

2.A.1.21

STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Humanities and Social Sciences including Management courses (HS)	15
2	Basic Science Courses (BS)	20
3	Engineering Science including workshop, drawing, basics of electrical / mechanical / computer etc. (ES)	24
4	Professional Core Courses (PC)	71
5	Professional Electives Courses (PE)	18
6	Open Electives Courses (OE)	09
7	Project Work and Internship (PA)	13
8	Ability Enhancement Courses (AEC*)	-
9	Mandatory Courses (MC*)	-
Total		**170**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl. No	AICTE Suggested Course Category	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	Humanities and Social Science (HS)	3	5	1	1	2	-	-	3	15
2	Basic Sciences (BS)	7	4	5	4	-	-	-	-	20
3	Engineering Sciences (ES)	4	8	4	4	4	-	-	-	24
4	Professional Core (PC)	8	4	13	11	8	15	12	-	71
5	Professional Electives (PE)	-	-	-	3	3	3	3	6	18
6	Open Electives (OE)	-	-	-	-	3	3	3	-	09
7	Project Work (PA)	-	-	-	-	1	1	2	8	12
8	Internship (PA)	-	-	-	-	-	-	1	-	01
9	Ability Enhancement Courses (AEC*)	-	-	-	-	-	-	-	-	-
10	Mandatory courses (MC*)	-	-	-	-	-	-	-	-	-
Total		**22**	**21**	**23**	**23**	**21**	**22**	**21**	**17**	**170**

**** AEC and MC are not included for CGPA calculation***

HONOUR / MINOR DEGREE PROGRAMME:

The student is permitted to opt for earning an Honour / Minor degree in the same discipline of engineering in addition to the degree in his/her own discipline. To earn an Honour / Minor degree the student is required to earn an additional 18 - 20 credits (over and above the total 170 credits prescribed in the curriculum) starting from fourth semester onwards by completing 5 additional courses offered in respective semesters. A student is eligible to exercise this option if he/she has passed all the courses offered upto third semester in the first attempt itself and has earned a CGPA / GPA* (*for lateral entry) of not less than 8.0. The prescribed courses offered for Honour / Minor degree are given in Annexure – IV

2.A.1.22

SEMESTER – I										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC01	Engineering Mathematics – I	BS	3	1	0	4	25	75	100
2	U23BSTC01	Physical Science for Engineers	BS	3	0	0	3	25	75	100
3	U23ESTC02	Engineering Mechanics	ES	2	1	0	3	25	75	100
4	U23EET101	Electrical Engineering	PC	3	0	0	3	25	75	100
5	U23EET102	Electronics – I	PC	3	0	0	3	25	75	100
Theory cum Practical										
6	U23ENBC01	Communicative English – I	HS	2	0	2	3	50	50	100
Practical										
7	U23ESPC02	Design Thinking and IDEA Lab	ES	0	0	2	1	50	50	100
8	U23EEP101	Electrical Engineering Laboratory	PC	0	0	2	1	50	50	100
9	U23EEP102	Electronics – I Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
10	U23EEC1XX	Certification Course – I**	AEC	0	0	4	-	100	-	100
Mandatory Course										
11	U23EEM101	Induction Programme	MC	2 Weeks			-	-	-	-
							22	**425**	**575**	**1000**

SEMESTER – II										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC02	Engineering Mathematics – II	BS	3	1	0	4	25	75	100
2	U23CSTC01	Programming in C	ES	3	0	0	3	25	75	100
3	U23ESTC01	Basics of Civil and Mechanical Engineering	ES	3	0	0	3	25	75	100
4	U23EET203	Electronics – II	PC	3	0	0	3	25	75	100
5	U23HSTC01	Universal Human Values – II	HS	2	0	0	2	25	75	100
Theory cum Practical										
6	U23ENBC02	Communicative English – II	HS	2	0	2	3	50	50	100
Practical										
7	U23ESPC03	Engineering Graphics using AutoCAD	ES	0	0	2	1	50	50	100
8	U23CSPC01	Programming in C Laboratory	ES	0	0	2	1	50	50	100
9	U23EEP203	Electronics – II Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
10	U23EEC2XX	Certification Course – II **	AEC	0	0	4	-	100	-	100
Mandatory Course										
11	U23EEM202	Sports Yoga and NSS	MC	0	0	2	-	100	-	100
							21	**525**	**575**	**1100**

 # Professional Electives are to be selected from the list given in Annexure I
$ Open electives are to be selected from the list given in Annexure II
***** Certification courses are to be selected from the list given in Annexure III (A)***
**** Skill Enhancement Courses (I and II) are to be selected from the list given in Annexure III (B)***

2.A.1.23

SEMESTER – III										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC03	Probability and Statistics	BS	3	1	0	4	25	75	100
2	U23ADTC01	Programming in Python	ES	3	0	0	3	25	75	100
3	U23EET304	Electromagnetic Theory	PC	2	1	0	3	25	75	100
4	U23EET305	Electrical Machines – I	PC	3	0	0	3	25	75	100
5	U23EET306	Electronics – III	PC	3	0	0	3	25	75	100
Theory cum Practical										
6	U23EEB301	Electric Circuit Analysis	PC	2	0	2	3	**50**	**50**	100
Practical										
7	U23ENPC01	General Proficiency – I	HS	0	0	2	1	50	50	100
8	U23MAPC01	Engineering Mathematics Laboratory	BS	0	0	2	1	50	50	100
9	U23ADPC01	Programming in Python Laboratory	ES	0	0	2	1	50	50	100
10	U23EEP304	Electrical Machines – I Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
11	U23EEC3XX	Certification Course – III **	AEC	0	0	4	-	100	-	100
12	U23EES301	Skill Enhancement Course – I*	AEC	0	0	2	-	100	-	100
Mandatory Course										
13	U23EEM303	Climate Change	MC	2	0	0	-	100	-	100
							23	**675**	**625**	**1300**

SEMESTER – IV										
Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC04	Numerical Methods and Optimization	BS	3	1	0	4	25	75	100
2	U23CSTC03	Data Structures	ES	3	0	0	3	25	75	100
3	U23EET407	Electrical Machines – II	PC	3	0	0	3	25	75	100
4	U23EET408	Transmission and Distribution	PC	2	1	0	3	25	75	100
5	U23EEE4XX	Professional Elective – I #	PE	3	0	0	3	25	75	100
Theory cum Practical										
6	U23EEB402	Control Systems	PC	2	0	2	3	50	50	100
Practical										
7	U23ENPC02	General Proficiency – II	HS	0	0	2	1	50	50	100
8	U23CSPC02	Data Structures Laboratory	ES	0	0	2	1	50	50	100
9	U23EEP405	Electrical Machines – II Laboratory	PC	0	0	2	1	50	50	100
10	U23EEP406	Electronics - III Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
11	U23EEC4XX	Certification Course – IV **	AEC	0	0	4	-	100	-	100
12	U23EES402	Skill Enhancement Course – II*	AEC	0	0	2	-	100	-	100
Mandatory Course										
13	U23EEM404	Right to Information and Good Governance	MC	2	0	0	-	100	-	100
							23	**675**	**625**	**1300**

2.A.1.24

SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23HSTC02	Research Methodology	HS	2	0	0	2	25	75	100
2	U23ITTC02	Programming in Java	ES	3	0	0	3	25	75	100
3	U23EET509	Electrical Measurements and Instrumentation	PC	3	0	0	3	25	75	100
4	U23EET510	Microprocessor and Microcontroller	PC	3	0	0	3	25	75	100
5	U23EEE5XX	Professional Elective – II #	PE	3	0	0	3	25	75	100
6	U23XXO5XX	Open Elective – I $	OE	3	0	0	3	25	75	100
Practical										
7	U23ITPC02	Programming in Java Laboratory	ES	0	0	2	1	50	50	100
8	U23EEP507	Electrical Measurements and Instrumentation Laboratory	PC	0	0	2	1	50	50	100
9	U23EEP508	Microprocessor and Microcontroller Laboratory	PC	0	0	2	1	50	50	100
Project Work										
10	U23EEW501	Micro Project	PA	0	0	2	1	100	-	100
Ability Enhancement Course										
11	U23EEC5XX	Certification Course – V **	AEC	0	0	4	-	100	-	100
Mandatory Course										
12	U23EEM505	Essence of Indian Traditional Knowledge	MC	2	0	0	-	100	-	100
							21	**600**	**600**	**1200**

SEMESTER – VI										
Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23EET611	Power System Analysis	PC	2	1	0	3	25	75	100
2	U23EET612	Embedded System	PC	3	0	0	3	25	75	100
3	U23EET613	Power Electronics	PC	3	0	0	3	25	75	100
4	U23EEE6XX	Professional Elective – III #	PE	3	0	0	3	25	75	100
5	U23XXO6XX	Open Elective – II $	OE	3	0	0	3	25	75	100
Theory cum Practical										
6	U23EEB603	Electrical Machine Design	PC	2	0	2	3	50	50	100
Practical										
7	U23EEP609	Power System Analysis Laboratory	PC	0	0	2	1	50	50	100
8	U23EEP610	Embedded System Laboratory	PC	0	0	2	1	50	50	100
9	U23EEP611	Power Electronics Laboratory	PC	0	0	2	1	50	50	100
Project Work										
10	U23EEW602	Mini Project	PA	0	0	2	1	100	-	100
Ability Enhancement Course										
11	U23EEC6XX	Certification Course – VI **	AEC	0	0	4	-	100	-	100
Mandatory Course										
12	U23EEM606	Gender Equality	MC	2	0	0	-	100	-	100
							22	**625**	**575**	**1200**

2.A.1.25

SEMESTER – VII										
Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23EET714	Industrial Automation and Control	PC	3	0	0	3	25	75	100
2	U23EET715	Renewable Energy Sources	PC	3	0	0	3	25	75	100
3	U23EEDC02	Electric and Hybrid Vehicles	PC	3	0	0	3	25	75	100
4	U23EEE7XX	Professional Elective – IV #	PE	3	0	0	3	25	75	100
5	U23XXO7XX	Open Elective – III $	OE	3	0	0	3	25	75	100
Practical										
6	U23EEP712	Industrial Automation and Control Laboratory	PC	0	0	2	1	50	50	100
7	U23EEP713	Renewable Energy Sources Laboratory	PC	0	0	2	1	50	50	100
8	U23EEP714	Electric Vehicles Laboratory	PC	0	0	2	1	50	50	100
Project Work										
9	U23EEW703	Project Phase – I	PA	0	0	4	2	50	50	100
10	U23EEW704	Internship / Inplant Training	PA	0	0	2	1	100	-	100
							21	**425**	**575**	**1000**

SEMESTER – VIII										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23HSTC03	Entrepreneurship and Business Management	HS	3	0	0	3	25	75	100
2	U23EEE8XX	Professional Elective – V #	PE	3	0	0	3	25	75	100
3	U23EEE8XX	Professional Elective – VI #	PE	3	0	0	3	25	75	100
Project Work										
4	U23EEW805	Project Phase – II	PA	0	0	16	8	50	100	150
							17	**125**	**325**	**450**

2.A.1.26

Annexure – I

PROFESSIONAL ELECTIVE COURSES

Professional Elective – I (Offered in Semester IV)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEDC01	Electrical Safety Engineering
2	U23EEE401	Nano Electronics
3	U23EEE402	Conventional Power Engineering
4	U23EEE403	Energy Storage Technology
5	U23EEE404	Digital Logic Design using VHDL
Professional Elective – II (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEE505	Utilization of Electrical Energy
2	U23EEE506	Special Electrical Machines
3	U23EEE507	High Voltage Engineering
4	U23EEE508	Automotive Electronics for Electrical Engineering
5	U23EEE509	Modern Control Systems
Professional Elective – III (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEE610	Finite Element Analysis for Electrical Engineering
2	U23EEE611	Electric Traction
3	U23EEE612	Electrical Energy Audit and Conservation
4	U23EEE613	Intelligent Control Techniques for Electrical Applications
5	U23EEE614	Internet of Things for Smart System
Professional Elective – IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEE715	Advanced Electric Drives and Control
2	U23EEE716	Multilevel Power Converters
3	U23EEE717	Power System Operation and Control
4	U23EEE718	Flexible AC Transmission System
5	U23EEE719	Modelling and Simulation of Green Energy Systems
Professional Elective – V (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEE820	SMPS and UPS
2	U23EEE821	Robotics and Automation
3	U23EEE822	Protection and Switchgear
4	U23EEE823	Digital Signal Processing for Electrical Engineering
5	U23EEE824	AI Techniques in Electrical System
Professional Elective – VI (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U23EEE825	Industrial Electrical System
2	U23EEE826	Power Electronics for Renewable Energy Systems
3	U23EEE827	Restructured Power System
4	U23EEE828	Optimization Techniques
5	U23EEE829	Smart Grid

2.A.1.27

Annexure – II

OPEN ELECTIVE COURSES

Sl. No.	Course Code	Course Title	Offering Department	Permitted Department
Open Elective – II (Offered in Semester VI)				
1.	U23EEDC01	Electrical Safety Engineering	EEE	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS
2.	U23EEOC01	Solar Photovoltaic Fundamental and Applications	EEE	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS
Open Elective – III (Offered in Semester VII)				
1.	U23EEDC02	Electric and Hybrid Vehicles	EEE	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS
2.	U23EEOC02	Energy Conservation and Management	EEE	ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS, CSE&BS

Annexure – III
ABILITY ENHANCEMENT COURSES – (A) CERTIFICATION COURSES

S. No	Course Code	Course Title
1	U23EECX01	Adobe Photoshop
2	U23EECX02	Adobe Animate
3	U23EECX03	Adobe Dreamweaver
4	U23EECX04	Adobe After Effects
5	U23EECX05	Adobe Illustrator
6	U23EECX06	Adobe InDesign
7	U23EECX07	Autodesk AutoCAD -ACU
8	U23EECX08	Autodesk Inventor - ACU
9	U23EECX09	Autodesk Revit - ACU
10	U23EECX10	Autodesk Fusion 360 - ACU
11	U23EECX11	Autodesk 3ds Max - ACU
12	U23EECX12	Autodesk Maya - ACU
13	U23EECX13	Cloud Security Foundations
14	U23EECX14	Cloud Computing Architecture
15	U23EECX15	Cloud Foundation
16	U23EECX16	Cloud Practitioner
17	U23EECX17	Cloud Solution Architect
18	U23EECX18	Data Engineering
19	U23EECX19	Machine Learning Foundation
20	U23EECX20	Robotic Process Automation / Medical Robotics
21	U23EECX21	Advance Programming Using C
22	U23EECX22	Advance Programming Using C ++
23	U23EECX23	C Programming
24	U23EECX24	C++ Programming

2.A.1.28

25	U23EECX25	CCNP Enterprise: Advanced Routing
26	U23EECX26	CCNP Enterprise: Core Networking
27	U23EECX27	Cisco Certified Network Associate - Level 2
28	U23EECX28	Cisco Certified Network Associate- Level 1
29	U23EECX29	Cisco Certified Network Associate- Level 3
30	U23EECX30	Fundamentals Of Internet of Things
31	U23EECX31	Internet Of Things / Solar and Smart Energy System with IoT
32	U23EECX32	Java Script Programming
33	U23EECX33	NGD Linux Essentials
34	U23EECX34	NGD Linux I
35	U23EECX35	NGD Linux II
36	U23EECX36	Advance Java Programming
37	U23EECX37	Android Programming / Android Medical App Development
38	U23EECX38	Angular JS
39	U23EECX39	Catia
40	U23EECX40	Communication Skills for Business
41	U23EECX41	Coral Draw
42	U23EECX42	Data Science Using R
43	U23EECX43	Digital Marketing
44	U23EECX44	Embedded System Using C
45	U23EECX45	Embedded System with IOT / Arduino
46	U23EECX46	English For IT
47	U23EECX47	Plaxis
48	U23EECX48	Sketch Up
49	U23EECX49	Financial Planning, Banking and Investment Management
50	U23EECX50	Foundation Of Stock Market Investing
51	U23EECX51	Machine Learning / Machine Learning for Medical Diagnosis
52	U23EECX52	IOT Using Python
53	U23EECX53	Creo (Modelling & Simulation)
54	U23EECX54	Soft Skills, Verbal, Aptitude
55	U23EECX55	Software Testing
56	U23EECX56	MX-Road
57	U23EECX57	CLO 3D
58	U23EECX58	Solid works
59	U23EECX59	Staad Pro
60	U23EECX60	Total Station
61	U23EECX61	Hydraulic Automation
62	U23EECX62	Industrial Automation
63	U23EECX63	Pneumatics Automation
64	U23EECX64	Agile Methodologies
65	U23EECX65	Block Chain
66	U23EECX66	Devops
67	U23EECX67	Artificial Intelligence
68	U23EECX68	Cloud Computing
69	U23EECX69	Computational Thinking
70	U23EECX70	Cyber Security
71	U23EECX71	Data Analytics
72	U23EECX72	Databases

2.A.1.29

73	U23EECX73	Java Programming
74	U23EECX74	Networking
75	U23EECX75	Python Programming
76	U23EECX76	Web Application Development (HTML, CSS, JS)
77	U23EECX77	Network Security
78	U23EECX78	MATLAB
79	U23EECX79	Azure Fundamentals
80	U23EECX80	Azure AI (AI-900)
81	U23EECX81	Azure Data (DP -900)
82	U23EECX82	Microsoft 365 Fundamentals (SS-900)
83	U23EECX83	Microsoft Security, Compliance and Identity (SC-900)
84	U23EECX84	Microsoft Power Platform (PI-900)
85	U23EECX85	Microsoft Dynamics Fundamentals 365 – CRM
86	U23EECX86	Microsoft Excel
87	U23EECX87	Microsoft Excel Expert
88	U23EECX88	Securities Market Foundation
89	U23EECX89	Derivatives Equinity
90	U23EECX90	Research Analyst
91	U23EECX91	Portfolio Management Services
92	U23EECX92	Cyber Security
93	U23EECX93	Cloud Security
94	U23EECX94	PMI – Ready
95	U23EECX95	Tally – GST & TDS
96	U23EECX96	Advance Tally
97	U23EECX97	Associate Artist
98	U23EECX98	Certified Unity Programming
99	U23EECX99	VR Development

ABILITY ENHANCEMENT COURSES – (B) SKILL ENHANCEMENT COURSES

Sl. No.	Course Code	Course Title
1	U23EES301	**Skill Enhancement Course 1 ***
		1) Testing of Electronics Devices and PCB Board Designing
		2) Design of Solar power plant and Installation
		3) Demonstration / Troubleshooting of Electrical and Electronics Equipments
2	U23EES402	**Skill Enhancement Course 2 ***
		1) Mobile Phone Servicing
		2) Autonomous Robotics
		3) Repair and Maintenance of Power Supply, Inverter and UPS

** Any one course to be selected from the list*

2.A.1.30

Annexure – IV

Honour/Minor Programme - Electric Vehicles

COURSE DETAILS											
Sl. No.	Semester	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
					L	T	P		CAM	ESM	Total
Theory											
1	IV	U23MEX401	Electrical Vehicles: Design, Dynamics and Testing	PC / IC	3	1	0	4	25	75	100
2	V	U23MEX502	Energy Storage and Battery Management System	PC / IC	3	1	0	4	25	75	100
3	VI	U23EEX603	Electric Drives and Controls	PC / IC	3	1	0	4	25	75	100
4	VII	U23EEX704	Modelling and Simulation of EHV	PC / IC	3	1	0	4	25	75	100
5	VIII	U23EEX805	Autonomous and Connected Vehicles	PC / IC	3	1	0	4	25	75	100
Total								**20**	**125**	**375**	**500**
Equivalent NPTEL courses[##]											
1	**Course Code** U23XXXN01		Electric Vehicles and Renewable Energy					3	**12 WEEKS COURSE**		
2			Electrochemical Energy Storage					3			
3			Design of Photovoltaic Systems					3			
4			Design of Electric Motors					3			
5			Digital Control in Switched Mode Power Converters and FPGA -based Prototyping					3			

[##] The student shall be given an option to earn 3 credits through one 12-week NPTEL course (Equivalent) instead of any one course listed for honours degree programme and shall be completed before the commencement of eighth semester. The equivalent courses are subject to change based on its availability as per NPTEL course list.

2.A.1.31

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	**IV**	Course Category: **PC**			End Semester Exam Type: **TE**			
Course Code	**U23EEB402**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**CONTROL SYSTEMS**	**2**	**0**	**2**	**3**	**50**	**50**	**100**

EEE

Prerequisite	Electrical Engineering, Engineering Mathematics	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret different electrical and mechanical systems with its modelling	**K2**
	CO2 Predict the time and frequency domain parameters for stability	**K3**
	CO3 Demonstrate with the tuning procedures of P/I/D controllers for various applications	**K3**
	CO4 Determine the transfer function of control systems and verification through simulation	**K3**
	CO5 Examine the stability of the systems by various plots through simulation	**K3**

UNIT – I	**Modeling of Linear Time Invariant Systems**	**Periods:10**
Control Systems: Open loop and Closed loop – Transfer functions – Feedback control system characteristics - Mathematical modelling of Electrical and Electro-Mechanical systems - Electrical analogues systems - Block diagrams - Reduction Techniques - Signal flow graphs		**CO1**
UNIT – II	**Time and Frequency Domain Analysis**	**Periods:10**
Time Domain Analysis: Standard test signals – Transient analysis of first order systems using step input - Time responses – Time domain specifications – Stability analysis - Concept of stability – Routh Hurwitz stability criterion. **Frequency Domain Analysis:** Frequency response analysis – Correlation between frequency response and time-response analysis - frequency domain specifications - Bode plot, Nyquist stability criterion.		**CO2**
UNIT – III	**Controller Design and State Variable Analysis**	**Periods:10**
Controller Design: Introduction - P-I-D controllers - Tuning methods - Ziegler-Nichol's Tuning - Performance criteria **State Space Representation:** Concept of state variables – State models for linear and time invariant Systems – Jordan Canonical Forms - Solution of State Equation – Transfer function to State space model.		**CO3**
UNIT – IV	**Control Systems Practice - I**	**Periods:15**
1. Simulation of Mechanical physical systems 2. Simulation for Time domain analysis of First order system 3. Simulation for Time domain analysis of Second order system 4. Simulation for Stability analysis using Routh- Hurwitz method 5. Simulation Analysis of Root Locus plot 6. Simulation for Frequency Domain Analysis using Polar Plot		**CO4**
UNIT – V	**Control Systems Practice - II**	**Periods:15**
1. Simulation of Open loop and closed loop control of Single-Phase Half Wave Controlled Rectifier 2. Simulation and Analysis of Time Response of Systems with P and PI Controllers 3. Simulation and Analysis of Time Response of Systems with PID Controllers 4. Simulation of Controllability and Observability of a system 5. Simulation of State space model for classical transfer function 6. State space analysis of second order system by simulation method		**CO5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 60**

Text Books

1. I. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International Publishers, 6th Edition, 2018.
2. Katsuhiko Ogata, "Modern Control Engineering", Pearson, 5th Edition, 2015.
3. Hasan Saeed, "Automatic Control Systems (With MATLAB Programs)", S. K. Kataria & Son, 6th Edition, 2010

Reference Books

1. M. Gopal, "Control Systems- Principles and Design", Tata McGraw Hill, 4th Edition, 2016.
2. Benjamin C. Kuo, "Automatic Control Systems", PHI Learning Private Ltd, 9th Edition, 2014.
3. John J. D'Azzo, Constantine H. Houpis and Sttuart N. Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor and Francis Reprint, 6th Edition, 2014.
4. R. Anandha Natarajan and B. Ramesh Babu, "Control System Engineering" Scitech Publication, 3rd Edition, 2009.

2.A.1.32

Web References
1. http://saadat.us/control_systems_labs.html
2. https://www.quanser.com/solution/control-systems/
3. http://ncr.mae.ufl.edu/papers/te02.pdf
4. https://futureengineering.in/control-system-lab/
5. http://vlabs.iitb.ac.in/vlab

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	2	-	-	2	3	3	3
2	3	3	3	2	3	-	-	-	2	-	-	2	3	3	3
3	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3
4	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3
5	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

9.A.1.33

Department	Management Studies		Programme: B. Tech.						
Semester	V		Course Category Code: HS			*End Semester Exam Type: TE			
Course Code	U23HSTC02		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	RESEARCH METHODOLOGY		2	0	0	2	25	75	100
Common to ALL Branches									
Prerequisite	Nil								
Course Outcomes	On completion of the course, the students will be able to								BT Mapping (Highest Level)
	CO1	Interpret the different types of research and explain how research methods can be used to address engineering problems.							K2
	CO2	Discuss the research problems, conduct comprehensive literature reviews, and utilize tools and services for effective information retrieval.							K2
	CO3	Apply appropriate methods to design experiments, analyze data, and interpret results using both numerical and graphical techniques.							K3
	CO4	Analyze and apply ethical guidelines to structure and write research papers and dissertations, ensuring academic integrity and avoiding plagiarism.							K4
	CO5	Examine the fundamentals of intellectual property rights to protect and enforce them, with emphasis on their role in fostering innovation and entrepreneurship in engineering.							K3

UNIT- I	Introduction to Research	Periods:06
Meaning and Importance of Research, Types of Research: Overview of Basic, Applied, and Developmental Research, Overview of the Research Process, Defining a Research Problem: Key Considerations, Setting Research Objectives and Research Questions, Introduction to Research Design: Basic Concepts, Approaches to Research: Quantitative vs. Qualitative.		CO1
UNIT- II	**Problem Formulation and Literature Review**	**Periods:06**
Identifying and Formulating Research Problems, conducting a Literature Review: Essential Steps, Referencing and Citation Methods: Basic Techniques. Sources of Information: Overview of Libraries and Online Databases.		CO2
UNIT- III	**Research Methods and Data Analysis**	**Periods:06**
Introduction to Experimental Research, Developing Hypotheses: Basic Approach. Data Collection Methods: Sampling and Surveys, Basics of Data Analysis: Numerical and Graphical Analysis, Introduction to Inferential Statistics.		CO3
UNIT- IV	**Writing and Presenting Research**	**Periods:06**
Preparing a Research Report: Key Sections (Abstract, Introduction, Methodology, Results, Discussion, Conclusion). Referencing and Citation: Brief Overview.		CO4
UNIT-V	**Ethics and Intellectual Property in Research**	**Periods:06**
Ethical Considerations in Research: Introduction to Scientific Misconduct. Basics of Intellectual Property Rights - Introduction to Patents, Copyrights, and Trademarks – Case studies on ethical dilemmas in research		CO5

Lecture Periods: 30	Tutorial Periods: -	Practical Periods: -	Total Periods: 30

Text Books

1. Kumar, R. "Research Methodology: A Step-by-Step Guide for Beginners", SAGE Publications, 5th Edition, 2019.
2. Ram Ahuja, "Research methods", Rawat Publications, 2nd Edition, 2022.
3. Creswell, J. W., and Creswell, J. D. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches", SAGE Publications, 5th Edition, 2018.

Reference Books

1. DV. Thiel, "Research methods for engineers", Cambridge University Press, 1st Edition, 2014.
2. R. Ganesan, "Research methodology for engineers", MJP Publishers, 2024.
3. C.Agarwal, V.Sharma, "Research methodology in sociology", Commonwealth Publishers, 2012.
4. A. Thody, "Writing and presenting research", SAGE Publications, 2nd Edition, 2006.
5. C.R.Kothari, "Research methodology – methods and techniques", New Age International Publishers, 5th Edition, 2023.

Web References

1. https://conjointly.com/kb/
2. https://owl.purdue.edu/owl/research_and_citation/conducting_research/writing_a_literature_review.html
3. https://files.eric.ed.gov/fulltext/ED536788.pdf
4. https://researcheracademy.elsevier.com/
5. https://www.wipo.int/
6. https://www.scholastic.com /7-steps-to-successful-research-report.html
7. https://www.futurelearn.com/info/courses/business-research-methods- investigation.
8. https://articles.manupatra.com/article-details/Patent-Types-Laws-related-to-them-in-India

2.A.1.34

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	2	-	2	-	-	2	2	3	1	1	1
2	3	1	1	3	1	-	2	-	-	1	2	-	1	1	1
3	1	3	3	1	3	-	2	-	-	2	2	-	1	1	1
4	-	-	1	2	-	-	2	3	2	2	-	2	1	1	1
5	2	2	2	2	2	2	3	3	2	2	3	2	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Information Technology	Programme: B. Tech.						
Semester	V	Course Category Code: ES			*End Semester Exam Type: TE			
Course Code	U23ITTC02	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	PROGRAMMING IN JAVA	3	0	0	3	25	75	100

Common to ALL Branches

Prerequisite	Basic knowledge of Object-Oriented Programming Principles	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Articulate the concept of Java fundamentals, OOPs and Strings	**K2**
	CO2 Demonstrate the principles of inheritance, packages and interfaces with real time applications	**K2**
	CO3 Create real time applications using exception handling and thread programming.	**K3**
	CO4 Build distributed applications using Collections and IO streams	**K3**
	CO5 Design and build simple GUI programs using AWT, Swings and build database applications	**K3**

UNIT – I	**Introduction**	**Periods:09**
Introduction: Java: History – Features – JVM - JRE – JDK – Java Compilation and Execution – Data Types - Variables, Types, Expressions, Assignment Statements, Input / Output Statements: Scanner/System class, Type Casting (Primitives to Primitives), Conditional and Iterative Control Structures - Arrays **OOPs with Java:** Introduction to OOPs Concepts - Class – Objects – Methods - Access Modifiers – Creating Class and Objects, Object Life-Cycle - Garbage Collection-Constructors - this – static – Array of Objects – Nested Classes. **String:** String Class– Built-in Methods – String Builder – String Buffer		**CO1**
UNIT – II	**Inheritance, Interfaces and Packages**	**Periods:09**
Inheritance: Types of Inheritance – is-a Relationship, has-a Relationship – super keyword – final keyword – Polymorphism - Method overloading and Method overriding – Abstract Class **Interfaces:** Define – Extend – Implement – Access - Interfaces vs Abstract classes, Type Conversions (Primitives to Objects vice-versa) Autoboxing and Auto unboxing **Packages:** Define – Create – Access – Import		**CO2**
UNIT – III	**Exception Handling and Multithreading**	**Periods:09**
Exception Handling: Exception Hierarchy – Checked and Unchecked Exceptions – try, catch, throws, throw and finally – User Defined Exceptions. **Multithreading:** Thread – Life cycle – Defining and Running – Implementation Types – Thread Priorities – Thread Synchronization - Inter-Thread Communication		**CO3**
UNIT – IV	**Collections and I/O Streams**	**Periods:09**
Collections: List: Array List and Linked List. Set: Hash Set and Tree Set. Map: Hash Map – Stack – Queue. Lambda Expressions. **I/O Streams:** Streams – Byte Streams and Character Streams – File Input Stream and File Output Stream – File Reader and File Writer. Object Serialization: Object Input Stream and Object Output Stream		**CO4**
UNIT – V	**GUI and JDBC**	**Periods:09**
AWT: Components – Controls – Event Handling **SWING:** Swing Components – Layout Management. **JDBC:** JDBC Architecture – JDBC Driver Types – Implementation of JDBC.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Allen B. Downey and Chris Mayeld, "Think Java - How to Think Like a Computer Scientist", Green Tea Press, 2nd Edition, 2020.
2. Herbert Schildt, "Java: The Complete Reference", TMH Publishing Company Ltd, 11th Edition, 2018.
3. H.M.Dietel and P.J.Dietel, "Java How to Program", Pearson Education/PHI, 11th Edition, 2017

Reference Books

1. Cay S. Horstmann, Gary Cornell, "Core Java Volume - I Fundamentals", Prentice Hall, 9th Edition, 2013.
2. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Press Private Ltd, 2018.
3. Poaul Deitel, Harvey Deitel, "Java SE 8 for programmers", Pearson, 3rd Edition, 2015.
4. P.J. Dietel and H.M Dietel, "Java for Programmers", Pearson Education, 9th Edition, 2011.
5. Steven Holzner, "Java 2 Black book", Dreamtech Press, 2011.

Web References

1. https://www.javatpoint.com/java-tutorial
2. https://docs.oracle.com/en/java/
3. https://www.studytonight.com/java/
4. https://onlinecourses.nptel.ac.in/

2.A.1.36

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	-	1	-	-	-	-	-	-	2	2	2	1
2	3	3	3	-	3	-	-	-	-	-	-	2	2	2	1
3	3	3	3	1	3	-	-	-	-	-	-	2	2	2	1
4	3	3	3	1	3	-	-	-	-	-	-	2	2	2	1
5	3	3	3	1	3	-	-	-	-	-	-	2	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.37

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	V	Course Category Code: **PC**			*End Semester Exam Type: **TE**			
Course Code	U23EET509	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

EEE

Prerequisite	Electrical Machines, Electronics, Electric Circuit Analysis	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe the characteristics of measuring instruments and their errors.	**K2**
	CO2 Demonstrate the construction, working of analog meters and their proficient use.	**K3**
	CO3 Differentiate the various types of digital meters and its measurement.	**K2**
	CO4 Illustrate the construction and working principle of various types of display units and bridges for R, L and C measurement.	**K3**
	CO5 Apply the various types of transducers used for physical measurements.	**K3**

UNIT- I	**Introduction to Measurement and Error**	**Periods:09**
Functional elements of Generalized measurement system - Types of measurement - Classification of instruments - Static and Dynamic characteristics of instruments - Mean, Standard Deviation - Error - Accuracy, Precision, Sensitivity, Linearity, Resolution, Hysteresis, Threshold, Input impedance - loading effects - Probability of errors - Errors in Measurements.		**CO1**
UNIT- II	**Analog Instruments**	**Periods:09**
Essential requirements of an instrument - Ammeter and Voltmeter - Moving coil - Moving Iron - Extension of voltmeter and ammeter range - Electro dynamo meter type Wattmeter - Induction type Energy meter - Instrument Transformers: Construction, phasor diagrams - Magnetic measurements – Determination of B-H curve and measurements of iron loss.		**CO2**
UNIT- III	**Digital Instruments**	**Periods:09**
Digital Voltmeter and its design - Digital multimeter - Digital ohmmeter, Capacitance meter - Impedance meters (Polar and Cartesian types) - Digital Frequency Meter – Introduction to Phasor Measurement Units (PMU).		**CO3**
UNIT- IV	**Bridges and Display Units**	**Periods:09**
Bridges: Measurement of resistances – D.C potentiometer - Wheat stone, Kelvin and Kelvin's Double bridge - A.C bridges for measurement of L and C - Maxwell, Anderson, Hay, Wein and Schering bridges – Measurement of earth resistance. **Display Units:** CRO, DSO, LED, and LCD.		**CO4**
UNIT-V	**Transducers**	**Periods:09**
Transducers - Definition and classification - **Linear Displacement**: Resistive Potentiometers, Strain gauge, LVDT, Capacitive, Piezoelectric - **Position:** Synchro Transmitter and receiver – **Speed:** Magnetic and photo electric pickup transducer - **Temperature:** Thermistors, thermocouple – **Flow:** Electromagnetic, Ultrasonic – **Density:** Hydrometer - **Voltage, Current and Power:** Hall Effect transducer.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. A.K. Sawhney, "A Course in Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai and Co., New Delhi, 21st Edition, 2023.
2. J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 20th Edition, 2018.

Reference Books

1. David Bell, "Electronic Instrumentation and Measurements", Oxford University Press, 3rd Edition, 2013.
2. A. J. Bouwens, "Digital Instrumentation", Tata McGraw Hill Publications, 16th Reprint Edition, 2008.
3. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill Education, 4th Edition, 2019.
4. C.S. Rangan, G.R. Sharma and V. S. V. Mani, "Instrumentation Devices and Systems", Tata McGraw Hill Book Co., 3rd Edition, 2008.

Web References

1. https://www.omega.de/green/pdf/CAP_LEV_MEAS.PDF
2. https://nptel.ac.in/courses/108/105/108105153/
3. http://www.nptelvideos.in/2012/11/industrial-instrumentation.html
4. http://vlabs.iitkgp.ernet.in/asnm/
5. https://www.youtube.com/watch?v=xLjk5DrScEU
6. http://www.wisegeek.com/what-are-transducers.htm

2.A.1.38

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	1	-	-	-	-	-	-	1	2	3	3
2	3	2	2	2	1	-	-	-	-	-	-	1	2	3	3
3	3	2	2	2	1	-	-	-	-	-	-	1	2	3	3
4	3	2	2	2	1	-	-	-	-	-	-	1	2	3	3
5	3	2	2	2	1	-	-	-	-	-	-	1	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.39

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V	Course Category Code: **PC**			End Semester Exam Type :**TE**			
Course Code	U23EET510	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	MICROPROCESSOR AND MICROCONTROLLER	3	0	0	3	25	75	100
EEE								
Prerequisite	Electronics I, Programming in C							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Interpret the architecture of 8085 microprocessor and write assembly language programs.	K2
CO2	Examine the architecture and functionality of the PIC16F microcontroller.	K3
CO3	Apply embedded C programs for PIC16F microcontroller based applications.	K3
CO4	Demonstrate microcontroller based real-time applications.	K3
CO5	Differentiate ARM7 Processor with PIC 16F Microcontroller on various areas of applications.	K2

UNIT – I	Architecture and Programming of 8085 Microprocessor	Periods:09
8085 Microprocessor: Architecture, Addressing modes, Instruction set - Assembly language programs – Machine cycles and Timing diagrams. Application: Interfacing of stepper motor control with 8085 microprocessor.		CO1
UNIT – II	**PIC16F Microcontroller**	**Periods:09**
Introduction to Microcontroller – RISC and CISC programmer's model – Selection criteria for microcontroller – Overview of PIC family – **PIC16F877A:** Architecture – Pin configuration – Status register – Special function registers – Memory organization – On-Chip peripherals – Fuse bits of PIC.		CO2
UNIT – III	**PIC16F Programming**	**Periods:09**
Data types and assembler directives – Addressing modes – Instruction set – Bit addressability – MACROs – Intel HEX file – I/O Port – Timer – PWM – ADC Programming – **Serial Port Communication :** UART, I2C, SPI.		CO3
UNIT – IV	**PIC16F Peripherals**	**Periods:09**
Peripheral Interfacing: LCD and Keyboard – Relay – Stepper and DC Motor control – LM35 Temperature sensor – Ultrasonic sensor – IR sensor – PIR sensor.		CO4
UNIT – V	**ARM7 Microcontroller**	**Periods:09**
ARM Programmer's model - Registers – Processor modes – Pipeline – ARM processor families – Instruction sets – Thumb Instruction Set – Instruction Scheduling – GPIO port – Timer – PWM – DAC – Introduction to Raspberry Pi.		CO5

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

Text Books

1. Krishnakant, "Microprocessors and Microcontrollers: Architecture, Programming, and System Design 8085, 8086, and PIC Microcontrollers", PHI Learning Pvt. Ltd, 2nd Edition, 2022.
2. Muhammad Ali Mazidi, Rolin McKinlay, and Danny Causey, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Pearson Education, 2nd Edition, 2021.
3. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide: Designing and Optimizing System Software" Morgan Kaufmann Publishers, 2004

Reference Books

1. Han-Way Huang, "PIC Microcontroller: An Introduction to Software and Hardware Interfacing", Cengage Learning, 2nd Edition, 2021.
2. Muhammad Ali Mazidi, Shujen Chen, and Eshragh Ghaemi, "ARM Microprocessor Systems: Cortex-M Architecture, Programming, and Interfacing "Pearson Education, 1st Edition, 2018
3. Mark Fisher, "ARM Cortex-M Assembly Programming for Embedded Programmers", Newnes (an imprint of Elsevier), 1st Edition, 2022.
4. Eben Upton, Gareth Halfacree "Raspberry Pi User Guide "John Wiley & Sons, 4th Edition , 2016
5. K.U. Nithyananda Shetty, "The 8085 Microprocessor: Architecture, Programming, and Interfacing" , Cengage Learning, 1st Edition, 2023.

Web References

1. https://nptel.ac.in/courses/108105102
2. https://pic-microcontroller.com/chapter-1-pic16f887-microcontroller-device-overview/
3. https://deepbluembedded.com/pic-programming-tutorials/
4. https://www.udemy.com/course/programming-on-pic16f877a-microcontroller-from-scratch/
5. https://www.raspberrypi.org/courses/learn-python

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	2	-	-	-	-	-	-	1	3	3	3
2	3	3	2	2	2	-	-	-	-	-	-	1	3	3	3
3	3	2	3	2	3	-	-	-	-	-	-	1	3	3	3
4	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3
5	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.41

Department	Information Technology	Programme: **B.Tech.**					
Semester	V	Course Category Code: **ES**			*End Semester Exam Type: **LE**		
Course Code	U23ITPC02	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**PROGRAMMING IN JAVA LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**

Common to ALL Branches

Prerequisite	Basic concepts of Object-Oriented Programming Principles	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Apply and practice logical formulations to solve simple problems leading to specific applications.	**K3**
	CO2 Demonstrate the use of inheritance, interface and package in relevant applications	**K3**
	CO3 Implement robust application programs in Java using exception handling and multithreading	**K3**
	CO4 Build java distributed applications using Collections and IO streams.	**K3**
	CO5 Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java.	**K3**

List of Exercises:

1. Develop simple programs using java
2. Develop a java program that implements class and object.
3. Write a java program to find the frequency of a given character in a string
4. Write a java program to demonstrate inheritance and interfaces.
5. Develop a java program that implements the Packages.
6. Create java applications using Exception Handling for error handling.
7. Develop a simple real life application program to illustrate the use of Multi-Threads.
8. Implement simple applications using Collections.
9. Develop application using the concept of I/O Streams
10. Write a Java Program to demonstrate AWT and Swing Components
11. Develop a simple application and use JDBC to connect to a back-end database.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods:30**	**Total Periods:30**

Reference Books

1. Allen B. Downey and Chris May eld, "Think Java - How to Think Like a Computer Scientist", Green Tea Press, 2nd Edition, 2020
2. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Press Private Limited, 2018
3. Cay. S. Horstmann and Gary Cornell, "Core Java 2", Vol 2, Advanced Features, Pearson Education, 7th Edition, 2010.

Web References

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM's tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog.
5. https://www.geeksforgeeks.org.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
2	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
4	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
5	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	V	Course Category Code: **PC**			*End Semester Exam Type: **LE**			
Course Code	U23EEP507	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
	EEE							
Prerequisite	Electrical Machines Laboratory, Electronics Laboratory							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Apply concepts of electrical measurement for practical implementations in engineering applications	**K3**
	CO2 Analyze the magnetization characteristics and hysteresis loss of Iron specimen using BH curve.	**K4**
	CO3 Classify single phase and three phase energy meters used in domestic and commercial applications	**K4**
	CO4 Examine the range of extension of ammeter and voltmeter	**K3**
	CO5 Categorize the use of transducers for the measurements of physical quantities by choosing the right transducers, signal conditioning, and data acquisition methods	**K4**

List of Experiments:

1. (a) Measurement of an unknown resistance using Wheatstone bridge
   (b) Measurement of insulation resistance by Megger
2. (a) Measurement of unknown capacitance and loss angle of capacitor using Schering Bridge.
   (b) Measurement of unknown inductance and Q-factor using Maxwell Bridge.
3. Extension of the ranges of Ammeter and Voltmeter using Shunt / Series resistance
4. Calibration of single-phase Energy meter using direct loading method.
5. Calibration of three-phase Energy meter using direct loading method.
6. Determination of B-H Curve for the magnetic material specimen to obtain its hysteresis loss.
7. (a) Measurement of ratio error and phase error of a Current Transformer.
   (b) Measurement of ratio error and phase error of a potential transformer
8. Characteristics of Temperature Transducers using RTD, Thermistor and Thermocouple
9. Measurement of Displacement using transducers.
10. Measurement of Voltage, Current and Power using Hall Effect transducer.
11. Characteristics of Optical Transducers using LDR and Phototransistor
12. Measurement of Position using Synchro Transmitter and Receiver.

Lecture Periods: -	Tutorial Periods: -	Practical Periods:30	Total Periods:30

Reference Books

1. A.K. Sawhney, "A Course in Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai and Co., New Delhi, 21st Edition, 2023.
2. William D. Coopers and Albert D. Helfrick, "Modern Electronic instrumentation and Measurements Techniques", Pearson Education India, 1st Edition, January 2015.
3. E. W. Golding and F. C. Widdis, "Electrical Measurements and Measuring Instruments", Medtech Publication, 6th Edition, 2019.
4. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Education, 4th Edition, 2019.
5. C. D. Johnson, "Process Control Instrumentation Technology", Pearson Education India, 8th Edition, 2015.
6. Instrumentation and Measurement, IEEE Transactions.
7. Measurement: Journal of the International Measurement Confederation

Web References

1. https://www.omega.de/green/pdf/CAP_LEV_MEAS.PDF
2. https://archive.nptel.ac.in/courses/108/105/108105064/
3. http://www.nptelvideos.in/2012/11/industrial-instrumentation.html
4. http://vlabs.iitkgp.ernet.in/asnm/
5. http://www.wisegeek.com/what-are-transducers.html

2.A.1.43

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	-	-	-	3	-	-	1	3	2	2
2	3	2	2	2	2	-	-	-	3	-	-	1	3	2	2
3	3	2	2	2	2	-	-	-	3	-	-	1	3	2	2
4	3	2	2	2	2	-	-	-	3	-	-	1	3	2	2
5	3	2	2	2	2	-	-	-	3	-	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.A.1.44

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V	Course Category: **PC**			End Semester Exam Type : **LE**			
Course Code	U23EEP508	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**MICROPROCESSOR AND MICROCONTROLLER LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
EEE								
Prerequisite	**Electronics I, Programming in C**							

Course Outcomes		On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1	Develop assembly language program for microprocessor 8085.	K3
	CO2	Design and implement embedded system applications using PIC microcontroller	K4
	CO3	Analyze and interface different peripherals with microcontrollers for real-time applications	K3
	CO4	Demonstrate the use of on-chip peripherals for efficient data processing and control.	K4
	CO5	Interface ARM7 Processor and Raspberry Pi with external Peripheral devices	K4

List of Experiments:

Microprocessor Experiments using 8085:

1. 8 bit - Addition, Subtraction, Multiplication and Division
2. Assembly Language Programming: Subroutines, parameter passing to subroutines

Microcontroller Experiments using PIC:

3. a) Timer to generate accurate delay
   b) Timer to generate waveforms
4. Seven Segment LED Display interfacing
5. a) 16x2 LCD interfacing
   b) 4x4 matrix keyboard interfacing
6. DC Motor Interfacing with forward and reverse operation
7. Stepper motor interfacing
8. Relay interfacing
9. PIC on-chip ADC for interfacing analog sensors

Microcontroller Experiments using ARM7:

10. Interfacing with PC via UART interface
11. Interfacing of PWM based LED lighting board
12. ARM7 on-chip DAC interfacing

Microprocessor Experiments using Raspberry Pi:

13. Study on Raspberry Pi

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30

Reference Books

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with 8085" , Penram International Publishing, 7th Edition, 2022.
2. Muhammad Ali Mazidi, Rolin McKinlay, and Danny Causey, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18" , Pearson Education, 2nd Edition, 2021.
3. Tim Wilmshurst, "Designing Embedded Systems with PIC Microcontrollers: Principles and Applications" , Newnes, 3rd Edition, 2022
4. Lyla B. Das, "Embedded Systems: An Integrated Approach" Pearson Education, 2nd Edition, 2023
5. Han-Way Huang, "PIC Microcontroller: An Introduction to Software and Hardware Interfacing", Cengage Learning, 2nd Edition, 2021.

Web References

1. https://pic-microcontroller.com/
2. https://www.electronicwings.com/arm7/lpc2148-dac-digital-to-analog-converter
3. https://www.raspberrypi.org/courses
4. https://deepbluembedded.com/creating-new-project-with-mplab/
5. https://circuitdigest.com/microcontroller-projects/interfacing-stepper-motor-with-pic16f877a

2.A.1.45

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	3	-	-	1	3	3	3
2	3	3	3	2	3	-	-	-	3	-	-	1	3	3	3
3	3	3	3	2	3	-	-	-	3	-	-	1	3	3	3
4	3	3	3	2	3	-	-	-	3	-	-	1	3	3	3
5	3	3	3	2	3	-	-	-	3	-	-	1	3	3	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

Department	Electrical and Electronics Engineering		Programme: **B. Tech.**					
Semester	**V**		Course Category Code: **PA**			*End Semester Exam Type: **-**		
Course Code	**U23EEW501**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**MICRO PROJECT**		**0**	**0**	**2**	**1**	**100**	**-**	**100**
EEE									
Prerequisite	Electrical Engineering, Electronics								
Course Outcomes	**On completion of the course, the students will be able to**								BT Mapping (Highest Level)
	CO1	Identify the problem statement for the micro project work through the literature survey							**K2**
	CO2	Select the proper components as per the requirements of the design/ system.							**K4**
	CO3	Apply the acquainted skills to develop final model / system							**K3**

There shall be a Micro Project, which the student shall pursue as a team consists of maximum 4 students during the third year, fifth semester. The aim of the micro project is that the student has to understand the real time hardware / software applications. The student should gain a thorough knowledge in the problem he/she has selected and in the hardware / software he/she using in the Project. The Micro-project is an application that should be formally initiated and should be developed and also to be implemented by the respective team.

The Micro Project shall be submitted in a report form along with the hardware model / software developed, duly approved by the department internal evaluation committee. It shall be evaluated for 100 marks as Continuous Assessment. The department internal evaluation committee shall consist of faculty coordinator, supervisor of the project and a senior faculty member of the department. There shall be two reviews that will be considered for assessing a Micro Project work with weightage as indicated evaluation Methods.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	-	-	-	-	3	3	-	1	1	1	1
2	3	3	3	2	2	2	2	2	3	3	3	1	2	2	2
3	3	2	2	1	-	2	-	-	3	3	3	1	3	3	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Method

Assessment	Review 1			Review 2				Total Marks
	Novelty	Presentation	Viva	Presentation	Demonstration	Viva	Report	
Marks	10	20	10	20	20	10	10	100

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V	Course Category Code: **AEC**			End Semester Exam Type:-			
Course Code	U23EEC5XX	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**CERTIFICATION COURSE - V**	**0**	**0**	**4**	**-**	**100**	**-**	**100**
Prerequisite	-							

Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

(i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.

(ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.

(iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)		Total Marks
	Attendance	MCQ Test	
Marks	10	90	100

2.A.1.48

Department	Electrical and Electronics Engineering	Programme: B.Tech.					
Semester	V	Course Category Code: MC			*End Semester Exam Type: -		
Course Code	U23EEM505	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	-	100	-	100
Common to ALL Branches								
Prerequisite	-							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Familiarize with the philosophy of Indian culture	K2
CO2	Distinguish the Indian languages and literature	K2
CO3	Describe the philosophy of ancient, medieval and modern India	K2
CO4	Illustrate the information about the fine arts in India	K2
CO5	Describe the contribution of scientists of different eras	K2

UNIT- I	Introduction To Culture	Periods:06
Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India		CO1
UNIT- II	**Indian Languages, Culture and Literature**	**Periods:06**
Indian Languages and Literature - I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India Indian Languages and Literature-II: Northern Indian languages & literature		CO2
UNIT- III	**Religion and Philosophy**	**Periods:06**
Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)		CO3
UNIT- IV	**Fine Arts in India (Art, Technology and Engineering)**	**Periods:06**
Indian Painting, Indian handicrafts, Music, divisions of Indian classical music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India		CO4
UNIT-V	**Education System in India**	**Periods:06**
Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India		CO5

Lecture Periods:30	Tutorial Periods: -	Practical Periods: -	Total Periods:30

Reference Books

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200
4. S. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN 13: 978 - 8120810990, 2014

Web References

1. https://nptel.ac.in/courses/109/104/109104102/
2. https://nptel.ac.in/courses/101/104/101104065/
3. https://nptel.ac.in/courses/109/108/109108158/
4. https://nptel.ac.in/courses/109/106/109106059/
5. https://nptel.ac.in/noc/courses/noc17/SEM1/noc17-ae01/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
2	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
3	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
4	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
5	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)			Total Marks
	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

9.A.1.47

Department	Electrical and Electronics Engineering			Programme: **B.Tech.**			
Semester	VI			Course Category Code: **PC**		*End Semester Exam Type: **TE**	
Course Code	U23EET611	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**POWER SYSTEM ANALYSIS**	**2**	**1**	**0**	**3**	**25**	**75**	**100**
	EEE							

Prerequisite	Engineering Mathematics, Electrical Machines, Control Systems, Transmission and Distribution	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret the network matrices in the power systems and apply reduction techniques for network changes.	**K2**
	CO2 Apply the iterative techniques to solve the power flow analysis used in power system planning.	**K3**
	CO3 Explain the Sequence networks using positive, negative and zero sequence network	**K2**
	CO4 Predict appropriate circuit breakers based on short circuit capacity.	**K3**
	CO5 Examine stability problems in power system during pre-fault and post-fault conditions	**K3**

UNIT- I	**Modeling of Power System Components**	**Periods:09**
Need for system planning and operational studies - Power system components – Representation - Single line diagram - Per unit quantities - P.U. impedance / reactance diagram - Formulation of network matrices for the power systems - Bus impedance and bus admittance matrices - Reduction techniques on network matrices for network changes - Z bus Building algorithm.		**CO1**
UNIT- II	**Load Flow Studies**	**Periods:09**
Classification of buses - formulation of load flow problem - Load flow solution by Gauss - Seidal, Newton - Raphson and Fast Decoupled Load Flow (FDLF) Analysis - Comparison - Computation of slack bus power, transmission loss and line flow - Voltage Control Methods - Tap-changing and phase - shifting transformers.		**CO2**
UNIT- III	**Symmetrical Components and Sequence Networks**	**Periods:09**
Symmetrical components – Simple problems to calculate symmetrical voltages and currents - Sequence networks - positive, negative and zero sequence networks - Sequence networks of Series impedance, loads and Rotating machines – Advantages and Limitations.		**CO3**
UNIT- IV	**Fault Analysis**	**Periods:09**
Need for fault analysis - Types of faults - Symmetrical fault analysis through bus impedance matrix - Analysis of unsymmetrical faults- LG, LL and LLG - Analysis of simultaneous unbalanced short circuit and open conductor faults in power systems – short circuit capacity – circuit breaker selection - Representation of various types of faults in sequence networks.		**CO4**
UNIT-V	**Stability Studies**	**Periods:09**
Definition - Importance of stability analysis- classifications - Steady state and transient stability - Angle and voltage stability - Single Machine Infinite Bus (SMIB) system - swing equation – Swing Curve - Equal area criterion - Critical clearing angle and time - Factors affecting stability -Methods of improving transient stability. Introduction to automatic voltage regulator systems.		**CO5**

Lecture Periods:30	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 3rd Edition, 2010
2. D. P. Kothari and I. J. Nagrath, "Power System Engineering", Tata McGraw-Hill Education, 3rd Edition, 2019.
3. P. Kundur, "Power System Stability and Control", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th Reprint, 2013

Reference Books

1. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, "Power System Analysis and Design", Cengage Learning, 7th Edition, 2022.
2. John J. Grainger, Jr. William D. Stevenson, "Power System Analysis", McGraw Hill Education (India) Private Limited, 2nd Edition, 2021.
3. M. A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2014.

Web References

1. https://nptel.ac.in/courses/108/105/108105067/
2. https://nptel.ac.in/courses/108/107/108107127/
3. https://pserc.wisc.edu/webinars/systems_webinars.aspx
4. https://www.classcentral.com/course/swayam-power-system-analysis-14243
5. https://pypsa.readthedocs.io/en/latest/

2.A.1.48

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	3	1	-	-	-	-	-	1	3	2	2
2	3	3	2	2	3	1	-	-	-	-	-	1	3	2	2
3	3	3	2	2	3	1	-	-	-	-	-	1	3	2	2
4	3	3	2	2	3	1	-	-	-	-	-	1	3	2	2
5	3	3	2	2	3	1	-	-	-	-	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.49

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	VI	Course Category Code: **PC**			*End Semester Exam Type: **TE**			
Course Code	U23EET612	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	EMBEDDED SYSTEM	3	0	0	3	25	75	100
EEE								
Prerequisite	**Programming in C, Microprocessor and Microcontroller**							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Explain the basic building process of embedded system.	**K2**
	CO2 Describe any type of Microcontroller Architecture in detail.	**K2**
	CO3 Apply the instruction sets to program STM32 ARM Processor using Embedded C.	**K3**
	CO4 Experiment interfacing the hardware and software for any type of microcontroller-based product design.	**K3**
	CO5 Interpret the concepts of RTOS in accessing shared resources for optimized CPU performance, timing-based operations, video and audio streaming etc.	**K2**

UNIT – I	**Overview of Embedded Systems**	**Periods:09**
Basics of Embedded Systems – Classification – Characteristics and Requirements – Challenges and Design issues – I/O Devices: Types and Examples – Synchronous, ISO-Synchronous and Asynchronous Communication – Parallel Device Ports – Applications.		**CO1**
UNIT – II	**STM32 ARM Processor Architecture**	**Periods:09**
Architecture – Pin configuration - ARM Programmer's model - Processor modes - Core Registers - Memory map - Unaligned Memory Accesses - Bit-banding – Pipeline - ARM Memory Organization		**CO2**
UNIT – III	**STM32 ARM Processor Programming**	**Periods:09**
Thumb-2 Instruction Sets – Programming Tools: STM32 Cube Programmer - GPIO programming - Interrupts and Exceptions Handling - Timer programming –Pulse Width Modulation programming – Direct Memory Access programming		**CO3**
UNIT – IV	**STM32 ARM Processor Peripherals**	**Periods:09**
Introduction – UART, SPI and I2C – LCD and Keyboard Interfacing – Seven segment LED – Relay interfacing – ADC and DAC – Temperature sensor – Stepper and DC Motor control.		**CO4**
UNIT – V	**RTOS for Embedded Systems**	**Periods:09**
Introduction to RTOS – Characteristics – Tasks and Task Scheduler - Task states – Scheduling policies – FreeRTOS - Interrupt Service Routines – Semaphores and its types – Inter process communication mechanisms.		**CO5**

Lecture Periods:45	**Tutorial Periods:-**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Muhammad Ali Mazidi, Shujen Chen, Eshragh Ghaemi, "STM32 Arm Programming for Embedded Systems: Using C Language with STM32 Nucleo", MicroDigitalEd., 1st Edition, 2020.
2. Majid Pakdel, "Advanced Programming with STM32 Microcontrollers" Elektor International Media BV, United Kingdom, 1st Edition, 2020.
3. Brian Amos, "Hands-On RTOS with Microcontrollers: Building Real-time Embedded Systems Using Free RTOS, STM32 MCUs, and SEGGER Debug Tools", Thomas Learning, 1st Edition, 2020.

Reference Books

1. Yifeng Zhu, "Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language", E-Man Press LLC, 4th Edition, 2023.
2. Iresh A. Dhotre, "Embedded and Real time Systems", Technical Publications, Pune, 2nd Edition, 2023.
3. Raj Kamal, "Embedded system – Architecture, Programming, Design", Tata McGraw Hill, 3rd Edition, 2016.
4. Agus Kurniawan, "Getting Started With STM32 Nucleo Development", Agus Kurni, 1st Edition, 2016.
5. Carmine Noviello, "Mastering STM32", Lean Publishing, 2nd Edition, 2022.

Web References

1. https://developer.arm.com/architectures/learn-the-architecture/introducing-the-arm-architecture/single-page
2. https://nptel.ac.in/courses/108102045/
3. https://www.eeweb.com/app-notes/tags/arm
4. https://en.wikibooks.org/wiki/Embedded_Systems/Real-Time_Operating_Systems
5. https://www.dejazzer.com/coen4720/index.html
6. https://archive.nptel.ac.in/courses/106/105/106105193/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	3	2	-	-	-	-	-	2	3	3	3
2	3	2	3	3	3	2	-	-	-	-	-	2	3	3	3
3	3	2	3	3	3	2	-	-	-	-	-	2	3	3	3
4	3	2	3	3	3	2	-	-	-	-	-	2	3	3	3
5	3	2	3	3	3	2	-	-	-	-	-	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category Code: **PC**			*End Semester Exam Type: **TE**			
Course Code	U23EET613	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	POWER ELECTRONICS	3	0	0	3	25	75	100
EEE								
Prerequisite	Electronics and Electric Circuit Analysis							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Explain the switching characteristics of Power Devices used for Power Conversion.	K2
	CO2 Illustrate the performance of control Rectifiers in continuous and discontinuous modes.	K3
	CO3 Interpret the operation and analysis of DC to DC Converters	K2
	CO4 Outline the operating principles of various types of DC to AC Converters.	K4
	CO5 Apply the concept of AC to AC Converters for the various applications	K3

UNIT – I	Power Semi-conductor Devices	Periods: 09
Switching characteristics of MOSFET, IGBT, SCR, TRIAC and GTO. Turn on and Turn off methods of SCR – Protection circuits – Triggering circuits.		CO1
UNIT – II	**AC - DC Converters**	**Periods: 09**
Operation and analysis of single and three phase controlled rectifiers – half and fully controlled Converters with R, RL and RLE loads – Effect of source inductance on controlled rectifiers – Power factor and harmonic improvement methods - twelve pulse converter, Dual converter- circulating and non-circulating current mode.		CO2
UNIT – III	**DC – DC Converters**	**Periods: 09**
Principles of step down and step up chopper – Class A, B, C, D and E chopper, voltage commutated, current commutated chopper, multi-phase chopper, principle of operation of buck, boost and buck boost regulators – switching schemes.		CO3
UNIT – IV	**DC – AC Converters**	**Periods: 09**
Single phase and three phase voltage source inverters – Voltage control and harmonic reduction techniques – Capacitor commutated current source inverter and auto sequential current source inverter.		CO4
UNIT – V	**AC – AC Converters**	**Periods: 09**
AC Voltage Controllers: Single phase and Three-phase – Control strategy – **Cycloconverters:** Single phase step-up/step-down midpoint and bridge type cyclo-converters – Three phase cyclo-converters. **Applications:** Regulated Power Supply, UPS, Solid-State motor starter.		CO5

Lecture Periods: 45	Tutorial Periods:-	Practical Periods:-	Total Periods: 45

Text Books

1. M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, New Delhi, 4th Edition, 2023
2. P. S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 7th Edition, 2022.

Reference Books

1. Ned Mohan, M. Underland, William P. Robbins, "Power Electronics Converters, applications and design", John Wiley & sons, Singapore, 3rd Edition, 2003.
2. M. D. Singh, K. B. Khanchandani, "Power Electronics", Tata McGraw Hill, New Delhi, 2nd Edition, 2007.
3. Cyril W. Lander, "Power Electronics", McGraw Hill Book Company, 3rd Edition, 1993.
4. L. Umanand, "Power Electronics: Essentials and Applications", Willey Publisher, 2nd Edition, 2019.

Web References

1. https://www.tutorialspoint.com/power_electronics/index.htm
2. https://www.allaboutcircuits.com/technical-articles/a-review-on-power-semiconductor-devices/
3. https://www.electrical4u.com/concept-of-power-electronics/
4. https://nptel.ac.in/courses/108/101/108101038/
5. https://nptel.ac.in/courses/108/102/108102145/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3
2	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3
3	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3
4	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3
5	3	3	3	2	3	-	-	-	-	-	-	1	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

9.4.153

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category: **PC**			End Semester Exam Type: **TE**			
Course Code	U23EEB603	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL MACHINE DESIGN**	**2**	**0**	**2**	**3**	**50**	**50**	**100**

EEE

Prerequisite	Electromagnetic Theory, Electrical Machines	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret the transformer design by considering various factors for real time applications.	**K2**
	CO2 Examine and apply the optimal design for three phase induction motor.	**K3**
	CO3 Apply design principles to develop synchronous machines and turbo alternators for large-scale power generation.	**K3**
	CO4 Demonstrate the transformer design using software simulation.	**K3**
	CO5 Analyze the performance of Induction machine and synchronous machine using software simulation.	**K4**

UNIT – I	**Introduction and Design of Transformers**	**Periods:10**
Major considerations in Electrical Machine Design – Materials for Electrical apparatus – Calculation of Magnetic circuits. **Design of Transformers:** Construction – Output Equation (1-ϕ and 3-ϕ) – Expression for volts/ turn, estimation of no. of turns – choice of specific loadings – Overall dimensions – design of yoke, core, winding for core and shell type transformers – Estimation of No load current and Voltage regulation – Temperature rise in Transformers – Design of Tank and cooling tubes.		**CO1**
UNIT – II	**Design of Three Phase Induction Motors**	**Periods:10**
Construction - Output equation – Main dimensions – choice of specific loadings – **Design of stator:** Design of stator slots and Winding – Length of airgap – **Design of squirrel cage rotor:** Estimation of Number of rotor slots – Design of Rotor Bars and end Ring – wound rotor – **Operating characteristics:** Magnetizing current – Short circuit current.		**CO2**
UNIT – III	**Design of Synchronous Machines**	**Periods:10**
Construction – Output equations – choice of specific loadings – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of salient and non-salient pole rotors – Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators.		**CO3**
UNIT – IV	**Machine Design Practice I**	**Periods:15**
1. Simulation of Magnetic Circuits 2. Design of solenoid 3. Design of field system 4. Transformer Electrical and Thermal design 5. Complete design of Single phase transformer and performance evaluation 6. Complete design of Three phase transformer and performance evaluation		**CO4**
UNIT – V	**Machine Design Practice II**	**Periods:15**
1. Stator design of AC Machine 2. Rotor design of Induction Motor 3. Analysis of core loss in Induction Motors 4. Complete design of an Induction Motor and performance evaluation 5. Complete design of a Synchronous Machine and performance evaluation 6. Design of PMSM		**CO5**

Lecture Periods: 30	**Tutorial Periods:**	**Practical Periods: 30**	**Total Periods: 60**

Text Books

1. A.K. Sawhney "A Course in Electrical Machine Design", Dhanpat Rai & Sons, New Delhi, 6th Edition, 2016.
2. M. V. Deshpande, "Design and Testing of Electrical Machines", PHI learning Pvt. Ltd, 3rd Edition, 2010.
3. S. K. Sen, "Principles of Electrical Machine Designs with Computer Programmes", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2nd Edition, 2011.

Reference Books

1. Shanmugasundaram, G. Gangadharan, R. Palani, "Electrical Machine Design Data Book", New Age International Pvt. Ltd., 2nd Edition, 2015.
2. Marius Rosu, Ping Zhou, Dingsheng Lin, Dan Ionel, Mircea Popescu, Frede Blaabjerg, Vandana Rallabandi, and David Staton. "Multiphysics Simulation by Design for Electrical Machines, Power Electronics, and Drives" IEEE Press Series on Power and Energy Systems, Wiley, 1st Edition, 2018
3. A.Nagoor kani, "A Simplified text in Electrical Machine Design", RBA publications, 3rd Edition, 2022.
4. Thomas A. Lipo, "Introduction to AC Machine Design", John wiley & sons inc., 1st Edition, 2017.
5. K. M. Vishnumurthy, "Computer aided design of electrical machines", B S Publications, 1st Edition, 2015.

2.A.1.54

Web References
1. https://archive.nptel.ac.in/courses/108/105/108105155/ 2. https://nptel.ac.in/courses/108/106/108106023. 3. https://www.windings.com/technicalreference/basicmotordesigntutorial. 4. https://ndl.iitkgp.ac.in/homestudy/engineering. 5. http://electricalengineeringportal.com/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
1	3	3	3	2	3	-	-	-	2	-	-	2	3	3	3
2	3	3	3	2	3	-	-	-	2	-	-	2	3	3	3
3	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3
4	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3
5	3	3	3	2	3	-	-	-	2	-	-	2	3	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM) – Maximum 50 Marks										End Semester Examination (ESE) Marks (Theory)	Total Marks
	Continuous Assessment (Theory)					Continuous Assessment (Practical)						
	CAT 1	CAT 2	Model	Attendance	Total	Conduction of Practical	Report	Viva	Total	#End Semester Examination (ESE) Marks (Practical – Internal Evaluation)		
Marks	5	5	5	5	20	15	10	5	30	30	75	100
To be weighted for 10 Marks					10	*To be weighted for 10 Marks*			10		*To be weighted for* 50 Marks	

 # Final End semester practical exam to be conducted with internal and external examiner assigned by Head of the Institution and HoD.

2.A.1.55

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	VI	Course Category Code: **PC**			*End Semester Exam Type: **LE**			
Course Code	U23EEP609	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**POWER SYSTEM ANALYSIS LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
EEE								
Prerequisite	Electromagnetic Theory, Electric Circuit Analysis, Control Systems, Transmission and Distribution							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Determine the reactance values of power system components	K3
CO2	Examine Bus Admittance and Impedance matrices, used in power flow analysis	K3
CO3	Analyze the voltage and power flow condition of power system using Gauss Seidal and Newton Raphson methods.	K4
CO4	Classify Symmetrical and Unsymmetrical faults in power system to aid in the design relays and circuit breakers.	K4
CO5	Calculate the load and load duration curves for average load, unit generated load factor, etc.	K3

List of Experiments:

1. Computation of power system components in per units.
2. Modeling and Computation of Transmission Line Parameters
3. Formulation of a bus impedance matrix and admittance Matrix
4. Analysis of power-flow problem using Gauss-Seidel method.
5. Analysis of power-flow problem using Newton Raphson method.
6. Analysis of power-flow problem using Fast Decoupled Load Flow method.
7. Symmetrical components for different case studies
8. Symmetrical fault analysis
9. Unsymmetrical fault analysis
10. Load curve and load duration curve
11. Modeling and Analysis of Automatic Voltage Regulator system
12. Stability analysis of SMIB System.

Lecture Periods: -	Tutorial Periods: -	Practical Periods:30	Total Periods:30

Reference Books

1. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st Reprint, 2010.
2. M. A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 3rd Edition, 2014.
3. Prabha S. Kundur and Om P.Malik, "Power System Stability and Control", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2nd Edition, 2022.

Web References

1. https://nptel.ac.in/courses/108/105/108105067/
2. https://nptel.ac.in/courses/108/107/108107127/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	3	2	2	1	1	-	-	3	2	1	2	3	2	2
2	1	3	2	2	1	1	-	-	3	2	1	2	3	2	2
3	1	3	2	2	1	1	-	-	3	2	1	2	3	2	2
4	1	3	2	2	1	1	-	-	3	2	1	2	3	2	2
5	1	3	2	2	1	1	-	-	3	2	1	2	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.A.1.56

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category: **PC**			End Semester Exam Type: **LE**			
Course Code	U23EEP610	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**EMBEDDED SYSTEM LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**

EEE

Prerequisite	Programming in C Laboratory, Microprocessor and Microcontroller Laboratory	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Experiment with the STM32 ARM processor to explore its functionalities and capabilities.	**K3**
	CO2 Model the STM32 ARM processor with external peripheral devices.	**K3**
	CO3 Demonstrate the interrupts with real time control applications.	**K4**
	CO4 Analyze PWM signals for motor control applications.	**K4**
	CO5 Illustrate input / output peripheral devices with the STM32 ARM processor and implement advanced communication protocols.	**K4**

List of Experiments:

1. Study on STM32 ARM Processor starter kit

Conduction of following experiments using STM32 ARM Processor

2. GPIO programming and Interfacing
3. Timer programming
4. Interfacing of Relay
5. Interfacing of seven segment LED
6. Interfacing of LCD and Keyboard
7. Interfacing with PC via UART
8. ADC and DAC programming
9. Interfacing of Temperature Sensor
10. Interfacing of Stepper motor
11. Interfacing of DC motor and PWM control
12. Interfacing of Bluetooth and Wi-Fi module
13. Study of FPGA development board for PWM Generation

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

Reference Books

1. Muhammad Ali Mazidi, Shujen Chen, Eshragh Ghaemi, "STM32 Arm Programming for Embedded Systems: Using C Language with STM32 Nucleo", MicroDigitalEd., 1st Edition, 2020.
2. Majid Pakdel, "Advanced Programming with STM32 Microcontrollers" Elektor International Media BV, United Kingdom, 1st Edition, 2020.
3. Yifeng Zhu, "Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language", E-Man Press LLC, 4th Edition, 2023.
4. Iresh A. Dhotre, "Embedded and Real time Systems", Technical Publications, Pune, 2nd Edition, 2023.
5. Agus Kurniawan, "Getting Started With STM32 Nucleo Development", Agus Kurni, 1st Edition, 2016.
6. Carmine Noviello, "Mastering STM32", Lean Publishing, 2nd Edition, 2022.

Web References

1. https://developer.arm.com/architectures/learn-the-architecture/introducing-the-arm-architecture/single-page
2. https://nptel.ac.in/courses/108102045/
3. https://www.eeweb.com/app-notes/tags/arm
4. https://en.wikibooks.org/wiki/Embedded_Systems/Real-Time_Operating_Systems
5. https://www.dejazzer.com/coen4720/index.html
6. https://archive.nptel.ac.in/courses/106/105/106105193/

2.A.1.57

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	3	1	-	-	2	-	-	2	3	2	3
2	3	3	2	2	3	1	-	-	2	-	-	2	3	2	3
3	3	3	2	2	3	1	-	-	2	-	-	2	3	2	3
4	3	3	2	2	3	1	-	-	2	-	-	2	3	2	3
5	3	3	2	2	3	1	-	-	2	-	-	2	3	2	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.A.1.58

Department	Electrical and Electronics Engineering			Programme: **B. Tech.**				
Semester	VI			Course Category Code: **PC**		*End Semester Exam Type: **LE**		
Course Code	U23EEP611	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**POWER ELECTRONICS LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
EEE								
Prerequisite	Electronics I and II							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Experiment the I-V characteristics of SCR, MOSFET, IGBT and TRIAC	**K3**
	CO2 Illustrate the functioning of rectifiers and firing circuits.	**K3**
	CO3 Analyze the operation and performance of power converter circuits	**K4**
	CO4 Choose a power converter circuit for specific application	**K5**
	CO5 Distinguish the speed control of motor using converters	**K3**

List of Experiments:

1. Characteristics of SCR and TRIAC
2. Characteristics of MOSFET and IGBT
3. Single phase half and fully Controlled Converter
4. Three phase half and fully Controlled converter
5. Step Down and Step Up Chopper
6. Single phase AC Voltage Controller
7. Single phase Step Down Cycloconverter
8. Single phase and Three phase MOSFET/IGBT based PWM Inverter
9. Three Phase Inverters – 180° and 120° mode of operation.
10. Converter/ Chopper fed DC Motor
11. Speed Control of Inverter fed Induction Motor
12. Design for Voltage Regulation of DC Buck Converter

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

Reference Books

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, PHI, New Delhi, 4th Edition, 2023
2. P. S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 7th Edition, 2022.
3. Joseph Vithayathil, "Power Electronics: Principles and Applications", McGraw-Hill Education, 1st Edition, 1995.
4. Farzin Asadi, "Power Electronics Laboratory: Theory, Practice, and Organization", Springer, 1st Edition, 2020.
5. Ned Mohan, Tore M. Undeland, William P. Robbins, "Power Electronics: Converters, Applications, and Design", John Wiley & Sons, 3rd Edition, 2003.

Web References

1. http://vlabs.iitkgp.ernet.in/be/
2. https://be-iitkgp.vlabs.ac.in/
3. https://electricvlab.com/
4. https://www.circuitlab.com/editor/#?id=7pq5wm&from=homepage

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	3	2	-	-	-	2	-	-	1	3	3	3
2	3	3	2	3	2	-	-	-	2	-	-	1	3	3	3
3	3	3	2	3	2	-	-	-	2	-	-	1	3	3	3
4	3	3	2	3	2	-	-	-	2	-	-	1	3	3	3
5	3	3	2	3	2	-	-	-	2	-	-	1	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

9.A.1.59

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.A.1.60

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category Code: **PA**				*End Semester Exam Type: -		
Course Code	U23EEW602	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**MINI PROJECT**	**0**	**0**	**2**	**1**	**100**	**-**	**100**
EEE								
Prerequisite	Electrical Engineering, Electronics, C Programming							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Identify the problem statement for the mini project work through the literature survey	**K2**
	CO2 Choose the proper components as per the requirements of the design/ system.	**K2**
	CO3 Apply the acquainted skills to develop final model/system	**K3**

There shall be a Mini Project, which the student shall pursue as a team consists of maximum 4 students during the third year, fifth semester. The aim of the mini project is that the student has to understand the real time hardware / software applications. The student should gain a thorough knowledge in the problem he/she has selected and in the hardware / software he/she using in the Project. The Mini-project is an application that should be formally initiated and should be developed and also to be implemented by the respective team.

The Mini Project shall be submitted in a report form along with the hardware model / software developed, duly approved by the department internal evaluation committee. It shall be evaluated for 100 marks as Continuous Assessment. The department internal evaluation committee shall consist of faculty coordinator, supervisor of the project and a senior faculty member of the department. There shall be two reviews that will be considered for assessing a Mini Project work with weightage as indicated evaluation Methods.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	-	-	-	-	3	3	-	1	1	1	1
2	3	3	3	2	2	2	2	2	3	3	3	1	2	2	2
3	3	2	2	1	-	2	-	-	3	3	3	1	2	2	2

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Method

Assessment	Review 1			Review 2				Total Marks
	Novelty	Presentation	Viva	Presentation	Demonstration	Viva	Report	
Marks	10	20	10	20	20	10	10	100

2.A.1.61

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category: **AEC**			End Semester Exam Type: **-**			
Course Code	U23EEC6XX	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**CERTIFICATION COURSE - VI**	**0**	**0**	**4**	**-**	**100**	**-**	**100**
EEE								
Prerequisite	-							

Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

(i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.

(ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.

(iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)		Total Marks
	Attendance	MCQ Test	
Marks	10	90	100

2.A.1.62

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category: **MC**			End Semester Exam Type :-			
Course Code	U23EEM606	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENDER EQUALITY**	**2**	**0**	**0**	**-**	**100**	**-**	**100**

Common to ALL Branches

Prerequisite	-	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe the general identity, social construction of gender roles.	**K2**
	CO2 Illustrate the causes and issues of gender discrimination in Indian society.	**K2**
	CO3 Describe the workplace discrimination, media influences on gender and culture.	**K2**
	CO4 Familiarize with international and Indian frameworks on gender equality.	**K2**
	CO5 Illustrate the current challenges in gender equality, including the glass ceiling and the role of technology.	**K2**

UNIT – I	**Introduction to Gender Equality**	**Periods:06**
Gender equality – exploring gender identity and expression, Understanding the social construction of general roles and norms, historical perspectives on gender roles, Analyzing key milestones in the fight for gender equality.		**CO1**
UNIT – II	**Gender Inequality and Its Manifestations**	**Periods:06**
Gender discrimination in Indian society – causes of gender inequality – Illiteracy, patriarchal set up, lack of awareness, social beliefs, practice and custom – Issues of gender discrimination – Child marriage, child domestic work, poor education and health, violence and exploitation in workplace.		**CO2**
UNIT – III	**Gender and Culture**	**Periods:06**
Workplace discrimination, Media influences on gender and culture, Gender and power dynamics in society. Strategies for promoting gender equality and cultural understanding.		**CO3**
UNIT – IV	**Promoting Gender Equality**	**Periods:06**
Gender Equality and Human Rights – International frameworks and Conventions on Gender Equality – Equality under the Indian Constitution – Policies and initiatives for gender mainstreaming – Strategies for promoting Gender Equality in various contexts.		**CO4**
UNIT – V	**Contemporary Challenges and Future Directions**	**Periods:06**
Current challenges and emerging issues in gender equality – Glass ceiling – role of technology in continuing or challenging gender inequality – Exploring possibilities for transformative change and envisioning a gender-equal future.		**CO5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 30**

Text Books

1. Raewyn Connell, "Gender and Society", This book provides a comprehensive overview of gender roles, power dynamics, and the social construction of gender.
2. "The Second Sex" by Simone de Beauvoir – A historical and philosophical examination of women's oppression and gender inequality.
3. "Women and Gender in the Indian Society" by Neera Desai and Usha Thakkar – Focuses on the context of gender roles, inequality, and feminist movements in India.

Reference Books

1. Woman in early Indian societies, New Delhi: Manohar Publications. Sita A. Raman (2009).
2. A social and Cultural history, Volume1. Connecticut: Oxford: Praeger. Sita Raman (2009).
3. A social and Cultural history, Volume2. Connecticut: Oxford: Praeger.
4. Iftikhar R. (2016). Indian Feminism: Class, Gender and Identity in Medieval Ages. Chennai: Notion Press. Iftikhar, R. (2012).

Web References

1. https://www.unwomen.org
2. https://ncw.nic.in
3. https://en.unesco.org/themes/gender-equality
4. https://www.weforum.org/reports
5. https://wcd.nic.in

9.A.1.63

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
2	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
3	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
4	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1
5	1	-	-	-	-	-	-	-	-	3	-	1	1	-	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)			Total Marks
	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V	Course Category: **PE**			End Semester Exam Type: **TE**			
Course Code	U23EEE506	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**UTILIZATION OF ELECTRICAL ENERGY**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
EEE								

Prerequisite	Electrical Engineering, Electrical Machines	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe the various lighting schemes used in street, flood and factory.	**K2**
	CO2 Illustrate the principles of electrical heating methods and welding.	**K2**
	CO3 Apply the law of thermodynamics to troubleshoot, and optimize refrigeration and air conditioning systems	**K3**
	CO4 Examine the speed-time characteristics and performance parameters of electric traction systems	**K3**
	CO5 Summarize the principles and applications of electrolysis, electroplating, battery technology, and green building concepts	**K2**

UNIT – I	**Illumination**	**Periods:09**
Production of light – Laws of illumination – Lighting calculation – Determination of MHCP and MSCP – Polar curves of different types of sources – Rousseau's construction –Interior and exterior illumination systems – Design on lighting schemes – Factory lighting – Flood lighting – Gaseous discharge lamps – High pressure and Low pressure neon sign – High frequency , low pressure discharge tubes - Bureau of energy efficiency star rating for lamps.		**CO1**
UNIT – II	**Electric Heating and Welding**	**Periods:09**
Electrical heating - Methods, advantages and application, design of heating elements, efficiency and losses control. Induction heating: Core type furnaces, Core less furnaces and high frequency eddy current heating-Dielectric heating-Principle and special applications, Arc furnaces-Direct arc furnaces, Indirect arc furnaces, electrodes, power supply and control. Different methods of electrical welding. Arc furnaces transformer and welding transformer.		**CO2**
UNIT – III	**Refrigeration and Air Conditioning**	**Periods:09**
Laws of Thermodynamics-First Law of Thermodynamics (Conservation of Energy), Second Law of Thermodynamics (Entropy), Third Law of Thermodynamics (Absolute Zero). Electrical Circuit of Refrigerator – Trouble shooting of Refrigerator – Air conditioning types and their applications – smart air conditioning systems – Trouble shooting of air conditioning.		**CO3**
UNIT – IV	**Electric Traction**	**Periods:09**
Electric traction –Need, requirements and merits– Supply systems – Mechanics of train movement – Traction motors and control – Tractive effort calculations – Speed-time characteristics. Locomotives and train - Braking – recent trends in electric traction-Metro and Mono rail systems.		**CO4**
UNIT – V	**Electrolysis and Batteries**	**Periods:09**
Electrolysis- Laws of Electrolysis, power supply, Efficiency – Electro Plating. Batteries-Types – Lead Acid, Ni Cd, Lithium Ion-battery components and design, electrode, battery modules and packs, rating of batteries – Methods of charging and maintenance. Introduction to Green Building Concept and energy auditing.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. J. B. Gupta, "Utilization of Electrical Power and Traction", Kataria Publications, 4th Edition, 2022
2. E. Openshaw Taylor, "Utilisation of Electric Energy", Oriented Longmans Limited, 16th Edition, 2013
3. R. K. Rajput, "Utilization of Electrical Power", Lakshmi publications, 4th Edition, 2023

Reference Books

1. S.S. Uppal, "Utilization of Electrical Energy", Khanna Publishers, 4th Edition, 2022.
2. H. Partap, "Art and Science of Utilization of Electrical Energy", Dhanpat Rai and Sons, Delhi, 3rd Edition, 2020.
3. C. L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age International Publishers, 5th Edition, 2022.
4. Pradip Kumar Sadhu, Soumya Das, "Modern utilization of Electric Power", CBS Publisher, 2nd Edition, 2022.
5. Robert Spotnitz, "Modern Battery Technologies for Sustainable Energy Systems" Springer publications, 2nd Edition, 2020.

Web References

1. https://books.google.co.in/books?id=1LLVSAfXR8wC&lpg=PP1&pg=PR17#v=onepage&q&f=true
2. https://nptel.ac.in/courses/108/105/108105060/
3. https://nptel.ac.in/courses/112/107/112107090/
4. https://nptel.ac.in/courses/112/105/112105129/
5. https://nptel.ac.in/courses/103/108/103108162/

2.9.1.66

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2
2	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2
3	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2
4	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2
5	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.66

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V	Course Category: **PE**			End Semester Exam Type: **TE**			
Course Code	U23EEE507	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	SPECIAL ELECTRICAL MACHINES	3	0	0	3	25	75	100
EEE								
Prerequisite	Electrical Machines							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Describe the performance characteristics of stepper motors in various operating modes.	K2
CO2	Examine the performance characteristics of synchronous reluctance motors and to select the appropriate controllers for industrial applications.	K3
CO3	Illustrate the performance characteristics of different types of controllers used for switched reluctance motors.	K3
CO4	Demonstrate the various sensors used for brushless DC motor control in EV applications.	K3
CO5	Predict the performance characteristics of permanent magnet synchronous motors and to analyze the vector control schemes.	K3

UNIT – I	Stepper Motors	Periods:09
Constructional features and principle of operation: Variable reluctance, Permanent and Hybrid Stepper motor - Torque production in Variable Reluctance (VR) stepper motor– Static and Dynamic Characteristics – Microprocessor based control of stepper motors – Closed loop control – Applications.		CO1

UNIT – II	Synchronous Reluctance Motors	Periods:09
Constructional features of axial and radial air gap Motors - operating principle – Phasor diagram - Derivation of reluctance torque from phasor diagram- motor characteristics – Controller for Synchronous Reluctance motor - – Applications		CO2

UNIT – III	Switched Reluctance Motors	Periods:09
Constructional features - principle of operation - Torque equation - Torque Speed Characteristics – Converters for SRM – Current control schemes: Hysteresis and PWM – Microprocessor based controller and Sensorless Controller - Closed loop control of SRM – Applications.		CO3

UNIT – IV	Brushless DC Motors	Periods:09
Construction and Principle of operation - Torque and EMF equation - Torque-Speed characteristics - Permanent Magnet materials - electronic commutator - Difference between mechanical and electronic Commutator – Rotor Position sensors: Hall effect sensors – Optical sensor - Microprocessor based controller - Sensorless control – Applications.		CO4

UNIT – V	Permanent Magnet Synchronous Motors	Periods:09
Construction – Principle of operation – EMF and Torque equations - Phasor diagram – Torque-speed characteristics – Self-control – Vector control schemes - Microprocessor based control – Comparison of BLDC and PMSM – DFIG - Linear machines - Applications.		CO5

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

Text Books

1. E.G.Janardanan, "Special electrical machines", PHI learning Pvt. Ltd, 2nd Edition, 2014
2. T. J. E. Miller, "Brushless permanent magnet and reluctance motor drives", Clarendon Press, Oxford, 5th Edition, 2017.
3. K. Venkataratnam, "Special Electrical Machines", Universities Press Private Limited, 1st Edition, 2009.

Reference Books

1. R. Krishnan, "Switched Reluctance Motor Drives Modeling, Simulation, Analysis, Design, and Applications", CRC Press, 2017.
2. R. Srinivasan, "Special Electrical Machines", Lakshmi Publications, 2013.
3. Bilgin, Berker Emadi, Ali Jiang, James Weisheng, "Switched reluctance motor drives: fundamentals to applications", CRC, 2019.
4. J. Gnanavadivel, J. Karthikeyan and S. Albert Alexander, "Special Electrical Machines", Anuradha publications, 3rd Edition, 2009.

Web References

1. https://ndl.iitkgp.ac.in.
2. http://ess.inflibnet.ac.in.
3. https://nptel.ac.in/courses/108/102/108102156.
4. http://www.electrical4u.com.
5. https://vidwan.inflibnet.ac.in.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	2	-	-	-	-	-	-	-	1	3	2	2
2	3	3	2	3	-	-	-	-	-	-	-	1	2	2	2
3	3	2	2	3	-	-	-	-	-	-	-	1	3	3	3
4	2	3	3	2	-	-	-	-	-	-	-	1	3	2	3
5	3	2	3	2	-	-	-	-	-	-	-	1	2	3	2

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.28

Department	Electrical and Electronics Engineering	Programme: **B.Tech Degree**						
Semester	V	Course Category Code: **PE**			*End Semester Exam Type: **TE**			
Course Code	U23EEE508	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**HIGH VOLTAGE ENGINEERING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
EEE								
Prerequisite	Power systems, Electrical Engineering							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Describe the causes and types of over voltages.	**K2**
	CO2 Summarize various breakdown phenomena occurring in gaseous, liquid and solid dielectrics.	**K2**
	CO3 Discuss the different methods for generation of high voltages and currents for testing of high voltage apparatus.	**K2**
	CO4 Apply different methods used for measuring AC, DC and impulse voltages and impulse currents.	**K3**
	CO5 Examine appropriate testing method(s) for various high voltage apparatus.	**K3**

UNIT – I	**Over Voltages in Electrical Power Systems**	**Periods: 09**
Causes of over voltages and their effects on power system Lightning, switching and temporary over voltages - Protection against over voltages, surge diverters, surge modifiers- Bewley lattice diagram.		**CO1**
UNIT – II	**Insulation Material and Dielectric Breakdown**	**Periods: 09**
Introduction to Insulation materials: Classification, insulating materials used in various power equipment's. Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids– Breakdown mechanisms in solid and composite dielectrics.		**CO2**
UNIT – III	**Generation of High Voltages and High Currents**	**Periods: 09**
Generation of High DC, AC, impulse voltages and currents - Triggering and control of impulse generators.		**CO3**
UNIT – IV	**Measurement of High Voltages and Currents**	**Periods: 09**
HVDC measurement: Series resistance micro-ammeter, Resistance Potential divider, Generating Voltmeter. Power frequency A.C voltage measurement: Series Impedance Ammeter, Potential divider, Potential transformer, Electrostatic Voltmeters. Impulse voltage measurements: Sphere gaps, Digital techniques in high voltage measurement. Impulse current measurement: current transformer, Rogowski coil, pure resistive shunt method		**CO4**
UNIT – V	**High Voltage Testing and Insulation Coordination**	**Periods: 09**
High voltage testing of electrical power apparatus as per International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators, cables, surge arresters and transformers- design, planning and layout of high voltage laboratory - Insulation Co-ordination.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books:

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", Tata McGraw-Hill Publishing Co. Ltd., 6th Edition, 2020.
2. E.Kuffel and W.S. Zaengl, J.Kuffel, "High voltage Engineering fundamentals", Newnes, Elsevier, 2nd Edition, 2005.
3. C. L. Wadhwa, "High Voltage Engineering", New age international, 4th Edition, 2020.

Reference Books:

1. L.L.Alston, "High Voltage Technology", Oxford University Press, 1st Indian Edition, 2011.
2. Subir Ray, "An Introduction to High Voltage Engineering", PHI Learning Private Limited, New Delhi, 2nd Edition, 2011.
3. Rakosh Das Begamudre, "High Voltage Engineering, Problems and Solutions", New Age International Publishers, New Delhi, 2010

Web Reference:

1. https://www.springer.com/gp/book/9783642119927
2. https://www.elsevier.com/books/high-voltage-engineering/Hammond/978-0-08-024212-5
3. https://nptel.ac.in/courses/108/104/108104048/#

2.A.1.69

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	1	1	-	-	-	-	-	1	3	1	2
2	3	3	2	1	1	1	-	-	-	-	-	1	2	1	2
3	3	3	3	1	1	1	-	-	-	-	-	1	2	1	2
4	3	3	3	1	1	1	-	-	-	-	-	1	3	2	2
5	3	3	3	1	1	1	-	-	-	-	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.70

Department	Electrical and Electronics Engineering			Programme: **B.Tech.**			
Semester	V			Course Category Code: **PE**		*End Semester Exam Type: **TE**	
Course Code	U23EEE509	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**AUTOMOTIVE ELECTRONICS FOR ELECTRICAL ENGINEERING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
	EEE							
Prerequisite	Electronics							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Describe various control elements, emission norms and standards in automobiles	**K2**
	CO2 Classify the electronic fuel injection/ignition components and their functions.	**K4**
	CO3 Demonstrate automotive sensors and actuators with microcontrollers.	**K3**
	CO4 Predict electronic engine control system problems with appropriate diagnostic tools	**K3**
	CO5 Analyze the chassis management system and safety system provided in the vehicles.	**K4**

UNIT – I	**Introduction**	**Periods:09**
Evolution of electronics in automobiles – Emission laws – Emission norms and Standards, charging systems- Working - design – Types, D.C. and AC dynamo, flywheel magneto charging system and Alternators - controlling and regulator system: Relay/cut-out, voltage and current regulator, electronic regulator, characteristics. Drive for Charging system – Requirements of starting system - Starter motors and starter circuits.		**CO1**
UNIT – II	**Ignition and Injection Systems**	**Periods:09**
Ignition systems: Ignition fundamentals - Requirements. Types- Ballast Resistance, Ignition coil characteristics, Cam angle and contact angle gap, spark advance mechanism, spark plug, ignition timing, multi-cylinder distributor, Distributor (contact breaker ignition system), limitations - spark plug: characteristics, material, types, plug fouling - Electronic fuel Control: Basics of combustion – Engine fuelling and exhaust emissions – carburettor – Petrol and diesel fuel injection.		**CO2**
UNIT – III	**Sensor and Actuators**	**Periods:09**
Airflow rate, Engine crankshaft angular position, Throttle angle, exhaust gas oxygen sensors, Instrument Cluster panel, fuel gauges, oil temperature gauge, warning light sensors, coolant temperature gauge, speedometer, Odometer, tachometer, trip meter, oil level indicator, parking brake indicator, direction indicators – exhaust gas recirculation actuators, stepper motor actuator and vacuum operated actuator.		**CO3**
UNIT – IV	**Engine Control Systems**	**Periods:09**
Control modes for fuel control-engine control subsystems – ignition control methodologies – Engine management system – Block diagram - different engine control units (ECU's). Vehicle networks: Controller Area Network (CAN) standard – Diagnostics systems in modern automobiles. Digital Engine control system.		**CO4**
UNIT – V	**Chassis and Safety Systems**	**Periods:09**
Traction control system – Cruise control system – electronic control of automatic transmission – antilock braking system – electronic suspension system - Steering - power steering, collapsible and tiltable steering column – steer by wire – Airbag: working, role of Micro Electro-Mechanical Systems – centralized door locking system – climate control in Vehicle - Vision enhancement, road recognition system, Anti-theft technologies, smart key system.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Tom Denton, "Automobile Electrical and Electronics Systems", Edward Arnold Publishers, 5th Edition, 2018.
2. William B. Ribbens, "Understanding Automotive Electronics", Newnes Publishing, 8th Edition, 2017.
3. P. L. Kholi, "Automotive Electrical Equipment", Tata McGraw Hill Co., Ltd., New Delhi, 2001.

Reference Books

1. Barry Hollembeak, "Automotive Electricity, Electronics and Computer Controls", Delmar Publishers, 1st Edition, 2001.
2. Check-chart, Kalton C. Lahue and Alan Harold Ahlstrand, "Fuel System and Emission controls", Good Year Books, 3rd Edition, 2000.
3. Ronald. K. Jurgen, "Automotive Electronics Handbook", McGraw-Hill, 1st Edition, 1999.
4. Robert Bosch Gmbh, "Bosch Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive", John Wiley and Sons Inc., 5th Edition, 2007.

Web References

1. https://www.autotrainingcentre.com/blog/4-types-fuel-injection-systems-auto-parts-specialists/
2. https://www.bosch-mobility-solutions.com/en/products-and-services
3. https://www.oreilly.com/library/view/understanding-automotive-electronics/
4. https://clr.es/blog/en/sensors-and-actuators-for-safer-driving/
5. https://www.te.com/usa-en/industries/sensor-solutions/applications/automotive-sensors.html
6. https://www.renesas.com/us/en/solutions/automotive/chassis.html
7. https://www.st.com/en/applications/chassis-and-safety.html

2.A.1.71

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	2	2	-	-	-	-	-	1	2	3	3
2	3	3	3	2	2	2	-	-	-	-	-	1	2	3	3
3	3	3	3	2	2	2	-	-	-	-	-	1	2	3	3
4	3	3	3	2	2	2	-	-	-	-	-	1	2	3	3
5	3	3	3	2	2	2	-	-	-	-	-	1	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	V	Course Category Code: **PE**			*End Semester Exam Type: **TE**			
Course Code	U23EEE510	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**MODERN CONTROL SYSTEMS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
		EEE						
Prerequisite	Electronics							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Demonstrate pole placement and the state observer using state space and state feedback system in modern control systems	**K3**
	CO2 Analyze the nonlinear system behaviour by phase plane and describing function methods	**K4**
	CO3 Predict the stability by describing function method and Lyapounov's method for stability	**K3**
	CO4 Illustrate the Z transform analysis of sampled data control systems.	**K4**
	CO5 Examine discrete-time models using z domain to know the concept of sampling process that is used in digital control system.	**K3**

UNIT – I	**State Variable Design**	**Periods:09**
Introduction - concepts of state variables and state model - Effect of state feedback - Pole placement design - Necessary and sufficient condition for arbitrary pole placement-State regulator design - Design of state observers Separation principle - State feedback with integral control-State space controller for DC motor with feedback control.		**CO1**
UNIT – II	**Non-Linear Systems - I**	**Periods:09**
Introduction - nonlinearities - Phase plane method: concepts, singular points, stability of nonlinear systems - Construction of phase trajectories system analysis by phase plane method		**CO2**
UNIT – III	**Non-Linear Systems - II**	**Periods:09**
Stability analysis by describing function method - Jump resonance - Lyapounov's method for stability study, concept of Limit Cycle. Nonlinear modeling and identification of a DC motor		**CO3**
UNIT – IV	**Sampled Data Analysis - I**	**Periods:09**
Introduction - Spectrum analysis of sampling process signal reconstruction difference equations - Z transform function, Inverse Z transform function - Response of Linear discrete system		**CO4**
UNIT – V	**Sampled Data Analysis - II**	**Periods:09**
Response between sampling instants - Corelation between Z and S domain - Pulse transfer function-State equation - Stability analysis – Schur Cohn stability, Jury's Test and compensation techniques - Digital filter design techniques.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. M. Gopal, "Digital Control and State Variable Methods", Mc Graw Hill India, 4th Edition, 2012.
2. K. Ogata, "Modern Control Engineering", Pearson, 5th Edition, 2014.
3. K. P. Mohandas, "Modern Control Engineering", Sanguine Technical Publishers, 2nd Edition, 2016.

Reference Books

1. M. Gopal, Modern Control System Theory, New Age International Publishers, 3rd Edition, 2014.
2. William S Levine, "Control System Fundamentals," The Control Handbook, CRC Press, Taylor and Franci Group, 2nd Edition, 2017.
3. Ashish Tewari, "Modern Control Design with MATLAB and SIMULINK", John Wiley,1st Edition 2002.
4. T. Glad and L. Ljung, "Control Theory–Multivariable and Non-Linear Methods", Taylor and Francis, 1st Edition, 2009.
5. D. S. Naidu, "Optimal Control Systems", CRC Press, 1st Edition, 2002.

Web References

1. https://nptel.ac.in/courses/Adavanced Control systems
2. https://www.mathworks.com/products/control.html/Control system tool box
3. https://www.tutorialspoint.com/control_systems_state_space_analysis.html
4. http://web.mit.edu/www/Handouts/StateSpace.pdf
5. https://www.tutorialspoint.com/ control systems steady state errors.html
6. https://www.mathworks.com/ optimal-and-robust-control-.html
7. https://arc.aiaa.org/doi/pdf/10.2514/6.2002-4635

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	2	-	-	-	-	-	-	1	2	3	3
2	3	3	3	2	2	-	-	-	-	-	-	1	2	3	3
3	3	3	3	2	2	-	-	-	-	-	-	1	2	3	3
4	3	3	3	2	2	-	-	-	-	-	-	1	2	3	3
5	3	3	3	2	2	-	-	-	-	-	-	1	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	VI	Course Category: **PE**			End Semester Exam Type: **TE**			
Course Code	U23EEE611	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**FINITE ELEMENT ANALYSIS FOR ELECTRICAL ENGINEERING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

EEE

Prerequisite	Electromagnetic Theory, Electrical Machines – I and Electrical Machines – II	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Determine Maxwell's equations to model and analyze electromagnetic fields.	**K3**
	CO2 Explain various solution methods for solving field equations	**K2**
	CO3 Interpret finite element formulations to solve one and two-dimensional problems.	**K2**
	CO4 Apply basic quantities such as flux and torque using FEM packages.	**K3**
	CO5 Analyze the performance of electrical apparatus using the Finite Element Method	**K4**

UNIT – I	**Introduction**	**Periods:09**
History of FEM and FEA, difference between FEM and FEA, review of basic field theory – Maxwell's equations – Constitutive relationships and Continuity equations – Poisson and Helmholtz equation – Outline of Electromagnetic Fields: Vector Analysis - Electromagnetic Fields – Fundamental. Equations – Principle of energy conversion –Force/Torque calculation		**CO1**
UNIT – II	**Basic Solution Methods for Field Equations**	**Periods:09**
Limitations of the conventional design procedure – Field Problems with Boundary Conditions - Classical Method for the Field Problem Solution - Classical Residual Method - Classical Variational Method – Solution by analytical methods: Direct integration method – Variable separable method – Method of images – Solution by numerical methods – Solution for matrix equations – Finite difference method.		**CO2**
UNIT – III	**Formulation of Finite Element Method**	**Periods:09**
Variational formulation – Energy minimization – Discretization – Shape functions – Stiffness matrix –1D and 2D planar and axial symmetry problems – Mesh generation in 2D – Axis-symmetric applications.		**CO3**
UNIT – IV	**Computation of Basic Quantities Using Fem Packages**	**Periods:09**
Basic quantities – Energy stored in electric field – Capacitance – Magnetic field – Linked flux – Inductance – Force – Torque – Skin effect – Resistance – Computation of electric field, Magnetic field intensity. Air-gap Elements for Electrical machines: Introduction - Description of the air gap element method - Finite Element Discretization – Analytical Solution - Coupling Scheme – Applications		**CO4**
UNIT – V	**Design Applications**	**Periods:09**
Introduction to software packages of finite element analysis – Applications to magnetic circuit design – Modeling and design of insulators – Magnetic actuators – Transformers – Rotating machines. Computation of Losses: Computation of Eddy Current Loss - Losses in Winding.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. J. N. Reddy, "An Introduction to the Finite Element Method", Tata McGraw-Hill, 4th Edition, 2019.
2. P. Seshu, "Text Book of Finite Element Analysis", Prentice-Hall of India Pvt. Ltd., 10th Edition, 2012.

Reference Books

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", Oxford University Press, 7th Edition, 2024.
2. Charles W. Steels, "Numerical Computation of Electric and Magnetic fields", Van Nostrand Reinhold Company, 7th Edition, 2018.
3. Silvester and Ferrari, "Finite Elements for Electrical Engineers", Cambridge University press, 3rd Edition, 1996.
4. S. J. Salon, "Finite Element Analysis of Electrical Machines", Kluwer Academic Publishers, 1st Edition, 1995.
5. Nicola Biyanchi, "Electrical Machine analysis using Finite Elements", Taylor and Francis Group, CRC Publishers, 1st Edition, 2005.

Web References

1. https://nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/108/106/108106152
3. https://nptel.ac.in/courses/108/101/108101090
4. https://www.youtube.com/watch?v=4c-sPXolD0w
5. https://nptel.ac.in/courses/112/104/112104116/

2.A.1.75

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
2	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
3	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
4	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
5	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.36

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**					
Semester	VI	Course Category Code: **PE**			End Semester Exam Type: **TE**		
Course Code	U23EEE612	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRIC TRACTION**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
EEE								
Prerequisite	Electrical Machines, Transmission and Distribution							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Summarize the basics of Electric Traction System and its mechanics for train movements	K2
CO2	Interpret the different Traction Drives and controlling techniques	K2
CO3	Differentiate the best suited protection system for Electric Locomotive	K2
CO4	Discuss about the equipment present in Electric Traction Sub-Systems	K2
CO5	Apply the solid state interlocking principle in railway signalling system	K3

UNIT- I	**Introduction of Electric Traction**	**Periods:09**
Indian Scenario of Electric traction, Advantages of Electric Traction over other systems of traction, selection of traction system - Electric and Diesel-Electric. Mechanics of train movement- Speed - time curve for train movement - Requirement of tractive effort and T-N curve of a typical train load, Specific energy consumption and Coefficient of adhesion- Suspension and mechanism of torque transmission Concept of Weight Transfer & Effect of un-sprung mass and wheel diameter.		**CO1**

UNIT- II	**Traction Motor Drives**	**Periods:09**
Type of traction motor – characteristics - Optimization of design and construction features - Tractive Effort and Drive Ratings - Important Features of Traction Drives - conventional DC and AC Traction drives – Converter Controlled Drives - DC Traction using Chopper Controlled Drives - Poly phase AC /DC Traction Motors - Traction control of DC locomotives and EMU's - Traction control system of AC locomotives - Control gear.		**CO2**

UNIT- III	**Protection of Locomotive Equipment and Circuits**	**Periods:09**
Broad strategy for protection, Surge protection, Overload protection of main power circuits, Earth fault protection of power auxiliary circuits - Protection from over-voltage and under-voltage, Differential protection of traction circuits - Protection against high and low air pressure in the compressed air circuit – Temperature monitoring, Protection of transformer by buchholz relay - Protection against accidental contact with HT equipment Protection against fires.		**CO3**

UNIT- IV	**Electric Traction Sub-Systems (Overhead Equipment)**	**Periods:09**
Overhead Equipment (OHE), Sectionalizing, Bonding of Rails and Masts, Materials Employed in OHE Electric Traction Sub-Systems - Power Supply Installations - Layout design of Traction Substation/ Protection, Booster Transformers and Return Conductor- SCADA System.		**CO4**

UNIT-V	**Railway Signalling**	**Periods:09**
Block Section Concept - Track Circuits, Interlocking Principle - Train speed and signalling - Solid state Interlocking - Automatic Warning Systems.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Upadhayay J, Mahindra S.N, "Electric Traction", Allied Publishers Ltd., 1st Edition, 2000.
2. Andreas Steimel, "Electric Traction-Motive Power and Energy Supply", Deutscher Industrieverlag publishers, 2nd Edition, 2014.
3. A.T. Dover, "Electric Traction", Pitman Publishing, 4th Edition, 1965.

Reference Books

1. P.S. Rao, "Principle of 25 KV Overhead Equipments", Printpack Pvt. Ltd., 1st Edition, 2000.
2. Gopal K Dubey, "Fundamentals of Electric Drives", Narosa Publishing, 2nd Edition, 2010.
3. H. Partab, "Modern Electric Traction", Dhanpat Rai & Sons, 1st Edition, 2017.
4. C. L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age International, 3rd Edition, 2015.
5. J.B. Gupta, "Utilization of Electrical Power and Electric Traction", S. K. Kataria & Sons publications, 10th Edition, 2019.
6. R. B. Brooks, "Electric Traction Hand Book", Sir Isaac Pitman and sons Ltd, London, 1st Edition, 1954.

Web References

1. https://epd.wisc.edu/courses/fundamentals-of-traction-power-systems-and-overhead-contact-systems/
2. http://www.railsystem.net/electric-traction-systems/
3. https://archive.nptel.ac.in/courses/108/104/108104140/
4. http://www.vssut.ac.in/lecture_notes/lecture1424084684.pdf
5. https://onlinecourses.nptel.ac.in/noc23_ag06/preview

2.A.1.77

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
2	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
3	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
4	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3
5	3	2	3	3	1	-	-	-	-	-	-	1	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.78

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**					
Semester	VI	Course Category Code: **PE**			*End Semester Exam Type: **TE**		
Course Code	U23EEE613	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL ENERGY AUDIT AND CONSERVATION**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
EEE								
Prerequisite	Electrical Engineering, Electrical Machines, Renewable Energy							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Outline about the energy audit process and instruments	**K2**
	CO2 Apply the energy efficient methods for improving efficiency of electric motors	**K3**
	CO3 Demonstrate good illumination systems and analyze the power factor	**K3**
	CO4 Examine various meters used for energy management	**K3**
	CO5 Analyze and evaluate cost effective model in electrical equipment	**K4**

UNIT- I	**Introduction**	**Periods:09**
Basics of energy – need for energy management – energy accounting – energy monitoring – targeting and reporting – energy audit – definitions – types of energy audit – audit instruments – audit of process industry – Case studies.		**CO1**
UNIT- II	**Energy Management for Motors and Cogeneration**	**Periods:09**
Energy management for electric motors: energy efficient controls and starting efficiency – motor efficiency and load analysis – selection of motors – energy efficient motors. Energy management by cogeneration: forms of cogeneration – electrical interconnection.		**CO2**
UNIT- III	**Lighting Systems**	**Periods:09**
Energy management in lighting systems: task and the working space – light sources – ballasts – lighting controls – optimizing lighting energy – reactive power management – capacitor sizing – degree of compensation – capacitor losses –effect of harmonics – lighting and energy standards.		**CO3**
UNIT- IV	**Metering for Energy Management**	**Periods:09**
Metering for energy management: units of measure – utility meters – demand meters – paralleling of current transformers – instrument transformer burdens – multi tasking solid state meters – metering location vs requirements – power analyzer – metering techniques and practical examples.		**CO4**
UNIT- V	**Economic Analysis and Models**	**Periods:09**
Power system tariffs – Economic analysis: cash flow model – Time value of money – pay-back method – utility rate structures – cost of electricity – loss evaluation – load management – demand control techniques – utility monitoring and control system – economic analysis of HVAC systems.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Barney L. Capehart, Wayne C. Turner, and William J. Kennedy, "Guide to Energy Management", The Fairmont Press, Inc., 5th Edition, 2006.
2. Frank Kreith, D. Yogi Goswami, "Energy Management and Conservation Handbook", CRC Press, 2nd Edition, 2016.
3. Wayne C. Turner, "Energy Management Handbook", The Fairmont Press, 4th Edition, 2001.

Reference Books

1. P. Venkataseshaiah K.V. Sharma, "Energy Management and Conservation", Dreamtech Press, 1st Edition, 2020.
2. Amit K. Tyagi, "Handbook on Energy Audits and Management", TERI, 1st Edition, 2003.
3. ICAI, "Electricity in buildings good practice guide", McGraw-Hill Education, 1st Edition, 2017.

Web References

1. https://nptel.ac.in/courses/108/106/108106022/
2. https://www.youtube.com/watch?v=onIhwmbL8CA
3. https://www.youtube.com/watch?v=CTt4y8bokWs
4. https://ieeexplore.ieee.org/document/7977655
5. https://ieeexplore.ieee.org/document/993185
6. https://ieeexplore.ieee.org/document/6450335

2.A.1.79

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	3	-	-	-	-	-	-	-	-	1	1	1	1
2	3	2	3	-	-	-	-	-	-	-	-	1	3	2	3
3	3	2	3	-	-	-	-	-	-	-	-	1	3	2	3
4	3	2	2	-	-	-	-	-	-	-	-	1	2	1	2
5	2	2	3	-	-	-	-	-	-	-	-	1	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.80

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**						
Semester	VI	Course Category Code: **PE**			*End Semester Exam Type: **TE**			
Course Code	U23EEE614	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**INTELLIGENT CONTROL TECHNIQUES FOR ELECTRICAL APPLICATIONS**	**3**	**0**	**0**	**3**	25	75	100
EEE								
Prerequisite	Engineering Mathematics, Control Systems, Electric Drives							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Describe the principles of fuzzy set theory and apply them to solve engineering problems with inherent uncertainty.	**K2**
	CO2 Examine fuzzy logic controllers for non-linear systems for practical real-world applications.	**K3**
	CO3 Illustrate the core concepts and various types of neural networks, including their structure and function.	**K3**
	CO4 Interpret the back propagation network and associative memory algorithms	**K2**
	CO5 Apply neural network techniques to model and control non-linear electrical systems effectively.	**K3**

UNIT - I	**Fuzzy Sets and Relations**	**Periods:9**
Crisp sets, Fuzzy sets, Fuzzy Vs Crisp, Membership functions, features. Operations on fuzzy sets, properties of fuzzy sets, Fuzzy cartesian products, Crisp Relations, Fuzzy relations- Operations on fuzzy relations - Properties of fuzzy -lambda – cut set- fuzzy tolerance, and equivalence relations in fuzzy logic.		**CO1**
UNIT - II	**Fuzzy Inference System**	**Periods:9**
Fuzzification, membership value assignment, and rule base development - Defuzzification techniques with a focus on Mamdani and Sugeno fuzzy models. Design of fuzzy logic controllers for DC motors – Design and control of fuzzy based power converter - Applications in power systems for voltage regulation, stability and fault detection.		**CO2**
UNIT - III	**Artificial Neural Network**	**Periods:9**
Review of fundamentals – Biological neuron, Artificial neuron, Activation function - McCulloch-Pitt Model of Artificial Neuron - Neural Network Architectures – Learning Methods – Supervised - Unsupervised – Perceptron learning algorithm - limitations		**CO3**
UNIT - IV	**Backpropagation and Associative Networks**	**Periods:9**
Backpropagation algorithm-derivation of up-dation rules, drawbacks. Variants of Backpropagation algorithm-momentum, variable learning rate-simple problems. Bidirectional associative memories – Algorithm – Applications.		**CO4**
UNIT- V	**Neural Networks for Modeling and Control**	**Periods:9**
Modelling of non-linear systems using ANN – Generation of training data – Optimal architecture – Direct and indirect neuro control schemes – Adaptive neuro controller – Neural Network Controller Design for DC Motor Control and Power System Stabilization.		**CO5**

Lecture Periods:45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley, 2011
2. Laurene Fausett, "Fundamentals of Neural Networks", Pearson Education, 2008
3. M. Norgaard, O. Ravn, N.K. Poulsen, L.K. Hansen, "Neural Networks for Modelling and Control of Dynamic Systems", Springer 2003

Reference Books

1. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2019
2. Rajasekaran. S, Pai. G.A.V., "Neural Networks, Fuzzy Logic and Genetic Algorithms", Prentice-Hall of India, 2003
3. Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and soft computing", Pearson Education, 2007
4. W.T.Miller, R.S.Sutton and P.J.Webrose, "Neural Networks for Control", MIT Press, 2001.
5. S. N. Sivanandam, S. Sumathi, S. N. Deepa, "Introduction to Neural Networks using MATLAB 6.0", Tata McGraw Hill Education, 1st Edition, 2017.

Web References

1. https://lecturenotes.in/subject/922.
2. https://www.ifi.uzh.ch/dam/jcr:00000000-2826-155d-0000-00005e4763e3/fuzzylogicscript.pdf.
3. https://nptel.ac.in/courses/106/105/106105173/.

2.A.1.81

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	3	2	-	-	-	-	-	2	3	3	3
2	3	3	3	3	3	2	-	-	-	-	-	2	3	3	3
3	3	3	3	3	3	2	-	-	-	-	-	2	3	3	3
4	3	3	3	3	3	2	-	-	-	-	-	2	3	3	3
5	3	3	3	3	3	2	-	-	-	-	-	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Electrical and Electronics Engineering	Programme: **B.Tech.**					
Semester	VI	Course Category Code: **PE**			End Semester Exam Type: **TE**		
Course Code	U23EEE615	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**INTERNET OF THINGS FOR SMART SYSTEM**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

EEE

Prerequisite	Programming in Python, Microprocessor and Microcontroller, Measurements and Instrumentation	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret Internet of Things and its architecture	**K2**
	CO2 Explain the concepts of hardware and software elements	**K2**
	CO3 Apply IoT solutions for smart home and appliances	**K3**
	CO4 Examine strategies for leveraging IoT data to optimize industrial processes	**K3**
	CO5 Demonstrate IoT-based solutions for connected cities and transportation	**K3**

UNIT- I	**Fundamentals of IoT**	**Periods:09**
Evolution of Internet of Things, IoT Vision, IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Enabling Technologies, Functional blocks of an IoT ecosystem		**CO1**
UNIT- II	**Elements of IoT**	**Periods:09**
Hardware Components: I/O interfaces, Computing (Arduino, Raspberry Pi, ESP8266, ESP32), Communication, Sensing, Actuation. **Software Components:** Programming APIs (using Python/Node.js/Arduino) for Communication Protocols, MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.		**CO2**
UNIT- III	**IoT for Smart Home and Appliances**	**Periods:09**
Components for smart home, Home automation and its stages, Smart Furniture, Smart Lighting, Smart Security Systems, Smart Monitors, Smart refrigerator, Smart Oven, Smart Washer and Dryer		**CO3**
UNIT- IV	**IoT for Industries**	**Periods:09**
IoT architecture for industry, IoT based Gas Leakage Monitoring System, Temperature and Liquid Level Monitoring in Boilers, Fire Detection System, Wireless Video Surveillance Robot, Automatic Solar Tracker		**CO4**
UNIT-V	**IoT for Smart Cities and Transportation**	**Periods:09**
Smart city IoT and security architecture, IoT based Connected Street Lights, Smart Water Management System, Women Security System, Air Pollution Meter, IoT architecture for transportation, Smart Parking, Smart Traffic Control, Connected Cars, Connected Fleet.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:45**

Text Books

1. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill ISBN: 9789352605224, 9789352605224, 2nd Edition, 2017
2. Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World", QUE, 1st Edition, 2015.
3. David Hanes, Gonzalo Salgueiro, "IoT fundamentals: Networking technologies, Protocols, and use cases for the Internet of Things", Pearson, 1st Edition, 2018.

Reference Books

1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 1st Edition, 2017
2. Andrew Minteer: Analytics for the Internet of Things (IoT) Intelligent Analytics for Your Intelligent Devices, Packt Publishing, 1st Edition, 2017
3. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key Applications and Protocols", Wiley, 2nd Edition, 2012
4. Shriram K Vasudevan, Abhishek S Nagarajan and RMD Sundaram, "Internet of Things", Wiley, 1st Edition, 2019.
5. Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 1st Edition, 2011.

Web References

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://nptel.ac.in/courses/106105077
3. https://www.i-scoop.eu/internet-of-things-guide/
4. https://www.theinternetofthings.eu/
5. https://www.udemy.com/course/complete-guide-to-build-iot-things-from-scratch-to-market/

2.A.1.83

COs/POs/PSOs Mapping

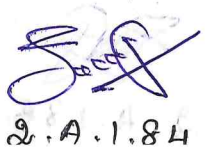
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	2	2	1	-	-	1	-	1	2	3	3
2	3	3	3	2	2	2	1	-	-	1	-	1	2	3	3
3	3	3	3	2	2	2	1	-	-	1	-	1	2	3	3
4	3	3	3	2	2	2	1	-	-	1	-	1	2	3	3
5	3	3	3	2	2	2	1	-	-	1	-	1	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus



Department	Electrical and Electronics Engineering			Programme: **B. Tech.**				
Semester	**V/VI**			Course Category: **OE**		End Semester Exam Type: **TE**		
Course Code	**U23EEDC01**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL SAFETY ENGINEERING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Common to ECE, ICE, MECH, CIVIL, CCE, BME, IT, CSE, AI&DS, MECHATRONICS, CSE&BS								
Prerequisite	**Basics of Electrical and Electronics Engineering**							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Describe the Indian Electricity (IE) acts and various rules for electrical safety.	**K2**
	CO2 Recognize the safety measures to prevent electrical shock in handling of domestic electrical appliances.	**K2**
	CO3 Illustrate the safety aspects during installation of plant and equipment.	**K2**
	CO4 Describe the various hazardous area and application of electrical safety in various places.	**K2**
	CO5 Explain the importance of electrical safety training to improve quality management in electrical systems	**K2**

UNIT – I	**Concepts and Statutory Requirements**	**Periods:09**
Objective and scope of electrical safety - National electrical Safety code - Statutory requirements – Indian Electricity acts related to electrical Safety - Safety electrical one line diagram - International standards on electrical safety safe limits of current and voltage -Grounding of electrical equipment of low voltage and high voltage systems - Safety policy - Electrical safety certificate requirement		**CO1**
UNIT – II	**Electrical Shocks and their Prevention**	**Periods:09**
Primary and secondary electrical shocks - Possibilities of getting electrical shock and its severity - Effect of electrical shock of human being - Shocks due to flash/ Spark over's - Firing shock - Multi storied building - Prevention of shocks - Safety precautions - Safe guards for operators - Do's and Don'ts for safety in the use of domestic electrical appliances - Case studies on electrical causes of fire and explosion		**CO2**
UNIT – III	**Safety During Installation, Testing and Commissioning, Operation and Maintenance**	**Periods:09**
Need for inspection and maintenance - Preliminary preparations - Field quality and safety - Personal protective equipment - Safe guards for operators - Safety equipment - Risks during installation of electrical plant and equipment - Effect of lightning current on installation and buildings - Safety aspects during installation -Safety during installation of electrical rotating machines - Importance of earthing in installation– Agricultural pump installation		**CO3**
UNIT – IV	**Hazardous Zones**	**Periods:09**
Primary and secondary hazards - Hazardous area classification and of electrical equipments (IS, NFPA, API and OSHA standards) - Explosive gas area classifications: Class I(Division 1) - Zone 0, Zone 1, zone 2 classified locations, Design Philosophy for Equipment and installations-Classification of equipment enclosure for various hazardous gases and vapors - flash hazard calculation and approach distances- calculating the required level of arc protection		**CO4**
UNIT – V	**Safety Management of Electrical Systems**	**Periods:09**
Principles of Safety Management - Occupational safety and health administration standards - Safety organization - Safety auditing - Employee electrical safety teams - Electrical safety training to improve Quality management - Total quality control and management – Importance of high load factor - Causes of low power factor - Disadvantages of low power factor - Power factor improvement - Importance of P.F. improvement - Case studies of electrical workplace safety practices.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. John Cadick, Mary Capelli Schellpfeffer, Dennis Neitzel, Al Winfield, "Electrical Safety Handbook", McGraw-Hill Education, 4th Edition, 2012.
2. Madden, M. John, "Electrical Safety and the Law: A Guide to Compliance", Wiley publications, 4th Edition, 2002.
3. Mohamed A. El-Sharkawi, "Electric Safety: Practice and Standards", CRC Press; 1st Edition, 2013.

Reference Books

1. Rob Zachariason, "Electrical Safety", Delmar Cengage Learning, 1st Edition, 2011.
2. Peter E. Sutherland, "Principles of Electrical Safety", Wiley-IEEE Press; 1st Edition, 2014.

2.A.1.8

Web References

1. https://www.apeasternpower.com/downloads/elecact2003.pdf
2. https://safetyculture.com/topics/electrical-hazards/
3. https://www.jove.com/science-education/10114/electrical-safety-precautions-and-basic-equipment
4. https://electrical-engineering-portal.com/21-safety-rules-for-working-with-electrical-equipment
5. https://www.electrical4u.com/safety-precautions-for-electrical-system/
6. https://www.constellation.com/energy-101/electrical-safety-tips.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
2	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
3	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
4	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
5	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.85

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V/VI	Course Category: **OE**			End Semester Exam Type: **TE**			
Course Code	U23EEOC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**SOLAR PHOTOVOLTAIC FUNDAMENTALS AND APPLICATIONS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Common to ECE, ICE, MECH, CIVIL, CCE, BME, IT, CSE, AI&DS, MECHATRONICS, CSE&BS								
Prerequisite	Physics, Basics of Electrical and Electronics Engineering							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Describe the basic concepts of solar cells and its properties.	**K2**
	CO2 Discuss about the selection of interfacing components in solar grid connected systems.	**K2**
	CO3 Classify various DC/AC equipment's used for stand-alone PV applications through requirements and design calculations	**K2**
	CO4 Locate the applications of hybrid systems and define the structure of micro grid system	**K2**
	CO5 Execute the cost analysis of solar PV systems	**K3**

UNIT – I	**Photovoltaic Basics and Developing Technologies**	**Periods:09**
Solar Cells: Structure and working - Types, Electrical properties - Cell properties and design - PV cell interconnection and Module fabrication - PV Modules and arrays. Commercial technologies: Mono crystalline and Multi crystalline, Silicon – Wafer based Solar cell, Thin film solar cells: A–Si, Cd–Te and CIGS, Concentrated PV cells, Developing technologies : Organic cells, Dye sensitized cells – Photovoltaic in global and Indian scenario		**CO1**

UNIT – II	**Solar PV for On-Grid Applications**	**Periods:09**
Solar cells to solar array – On–Grid PV system – With and Without storage – Balance of system – DC–DC converters – Inverters – Net Metering – Design and analysis – Performance evaluation and monitoring		**CO2**

UNIT – III	**Solar PV for Off-Grid Applications**	**Periods:09**
Off-Grid standalone PV system – System sizing – Module and Battery – Storage – Batteries for PV systems – Sun Tracking mechanism – Types of tracking – One–axis, Two–axis – Maximum power point tracking – Design and analysis – Performance evaluation and monitoring.		**CO3**

UNIT – IV	**Hybrid Systems**	**Periods:09**
Solar, Biomass, Wind and Diesel Hybrid systems - Comparison and selection criteria - simple hybrid systems – storage arrangements - Introduction to Micro grid – Comparison of micro grid with conventional power system – Architecture		**CO4**

UNIT – V	**Cost Benefit Analysis for Solar PV Installations**	**Periods:09**
Cost and manufacturability – Manufacturing economics – Scaling – Pricing – Trends in retail pricing – Energy economics – Gridtied power plant – Solar street lighting system - Simple payback calculation.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. C.S. Solanki, "Solar Photovotaics – Fundamentals, Technologies and Applications", PHI Learning Pvt. Ltd., 2nd Edition, 2011.
2. Martin A. Green, "Solar Cells Operating Principles, Technology, and System Applications", Prentice - Hall, 1st Edition, 2008

Reference Books

1. J. Nelson, "The Physics of Solar Cells", Imperial College Press, 1st Edition, 2003.
2. Thomas Markvart, "Solar Electricity", John Wiley and Sons, 2nd Edition, 2000.
3. Stuart R. Wenham, Martin A. Green, Muriel E. Watt, Richard Corkish, "Applied Photovoltaic", Earth scan, 3rd Edition, 2011.
4. Michael Boxwell, "The Solar Electricity Handbook", Green stream Publishing, 10th Edition, 2016.
5. RikDe Gunther, "Solar Power-Your Home for Dummies", Wiley Publishing Inc, 2nd Edition, 2010.

Web References

1. https://swayam.gov.in/nd1_noc20_ph21/preview
2. https://swayam.gov.in/nd2_nou20_ag13/preview
3. https://www.studentenergy.org/topics/solar-pv
4. https://www.eia.gov/energyexplained/solar/photovoltaics-and-electricity.php
5. https://www.energysage.com/solar/
6. https://www.bca.gov.sg/publications/others/handbook_for_solar_pv_systems.pdf
7. http://www.oas.org/dsd/publications/unit/oea79e/ch05.htm

2.A.1.67

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
2	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
3	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
4	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
5	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.68

Department	Management Studies	Programme: B. Tech.						
Semester	V / VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23HSOC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	INTELLECTUAL PROPERTY RIGHTS	3	0	0	3	25	75	100

Common to ALL Branches

Prerequisite	Nil	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe the Concept and Importance of Intellectual Property Rights (IPR).	K2
	CO2 Describe the procedures for patent registration, including recognizing legal remedies for infringement.	K3
	CO3 Apply copyright laws to hypothetical scenarios involving academic integrity and plagiarism.	K3
	CO4 Infer the different types of trademarks and understand the registration process and infringement issues.	K4
	CO5 Explain the legalities surrounding industrial designs, geographical indications, and their protection mechanisms.	K2

UNIT – I	**Overview of Intellectual Property**	**Periods:09**
Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Trade Secret – International protection of IPR- Major International conventions and agreements: WTO/TRIPS Agreement, Paris Convention, The Berne Convention, Universal Copyright Convention, WIPO Convention, Madrid Agreement, Nice Agreement and TRIPS Agreement		**CO1**

UNIT – II	**Law of Patents**	**Periods:09**
Meaning and Nature of Patent - Subject matter of Patent - Registration Procedure, Patentable and Non-patentable Inventions - Process and product Patent, Legal Requirements for Patents – Patent document: Specification and Claims - Granting of Patents - Transfer of Patent rights - Infringement of Patents and Remedies - Evergreening of Patents		**CO2**

UNIT – III	**Law of Copyrights**	**Periods:09**
Meaning and Nature of Copyright - Subject matter of copyright - Law of Copyrights - Authorship and Ownership of copyright, Registration Procedure, Assignment and Licensing of copyright - Infringement of Copyrights and Remedies - Emerging new trends in Copyrights - Related Rights: Celebrity Rights, Academic Integrity or Plagiarism: An Intellectual Theft - Copyrights with special reference to software.		**CO3**

UNIT – IV	**Law of Trademarks**	**Periods:09**
Meaning and Nature of Trademarks - Different kinds of Trademarks - Registrable and Non-Registrable Trademarks - Registration of Trademarks - Grounds for refusal of Registration: Absolute Ground and Relative Ground - Assignment and Licensing of trademarks - Infringement, Remedies and Penalties - Offenses relating to Trademarks - Passing off action – Deceptive similarity - Defences - Emerging New trends in trademarks		**CO4**

UNIT – V	**Other Forms of IPR**	**Periods:09**
Meaning and nature of Industrial Design - Subject Matter - Procedure for registration - Infringement of Copyrights in designs - Remedies for Infringement - Trade secret Law-Determination of Trade Secret Status - Liability for misappropriations of Trade Secrets- Protection for submission-Trade Secret litigation - Meaning and Nature of Geographical Indication (GI) - Procedure for registration - Infringement of Geographical indication - Remedies for Infringement.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. K.V. Nithyananda, "Intellectual Property Rights: Protection and Management", Cengage Learning India Pvt. Ltd., 2nd Edition 2019.
2. P. Neeraj and D. Khusdeep, "Intellectual Property Rights", PHI Learning Private Limited, 2nd Edition, 2018.

Reference Books

1. V. K. Ahuja, "Law Relating to Intellectual Property Rights", Lexis Nexis, 2nd Edition, 2017.
2. Bouchoux, E. Deborah, "Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets", Cengage Learning, 4th Edition, 2013.
3. P. Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata McGraw-Hill Publishing Company, 2022.
4. Jyoti Rattan, "Intellectual Property Rights", Bharat Law House, 2nd Edition, 2024.
5. Surendra Malik and Sudeep Malik, "Supreme Court on Intellectual Property", Eastern Book Company, 2022.

2.8.1.69

Web References

1. https://www.wipo.int/about-ip/en/
2. https://www.uspto.gov/patents/basics/general-information-patents
3. https://www.wto.org/english/tratop_e/trips_e/trips_e.htm
4. https://www.epo.org/about-us/annual-reports-statistics/annual-report.html
5. https://articles.manupatra.com/article-details/Patent-Types-Laws-related-to-them-in-India
6. https://www.inta.org/trademarks/trademark-basics/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	-	-	-	3	2	2	-	2	1	2	2	2	2
2	1	2	-	2	-	3	2	2	-	2	1	1	2	2	2
3	-	2	-	-	-	2	2	3	-	2	-	1	2	2	2
4	1	1	-	-	-	3	2	2	-	2	1	1	2	2	2
5	1	2	-	-	-	3	3	2	-	2	1	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.8.1.70

Department	Management Studies	Programme: B. Tech.						
Semester	V / VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23HSOC02	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	NEW PRODUCT DEVELOPMENT	3	0	0	3	25	75	100

Common to ALL Branches

Prerequisite	Nil	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain the stages and importance of new product development (NPD) in modern business contexts.	K2
	CO2 Apply market research to identify customer needs and translate them into product specifications.	K3
	CO3 Illustrate the product concepts using screening and scoring techniques to select the most viable option.	K3
	CO4 Examine product prototype that incorporates principles of product architecture and design for manufacturing.	K3
	CO5 Analyze a business plan and market strategy for the successful launch of a new product.	K4

UNIT – I	**Introduction to New Product Development**	**Periods:09**
Introduction to New Product Development (NPD) - Product Development vs New Product Development - Stages of NPD - Role of Innovation and Creativity in NPD - Reverse Engineering and its Application in NPD - Business Models for New Products - Risk Management in New Product Development - Sustainability and Ethical Considerations in NPD		**CO1**

UNIT – II	**Market Research and Customer Needs**	**Periods:09**
Identifying Market Opportunities for New Products - Conducting Market Research for NPD - Translating Customer Needs into Product Specifications - Establishing and Refining Product Specifications - Competitive Analysis and Benchmarking in NPD - Tools for Understanding Consumer Behaviour: Surveys, Focus Groups, and Ethnography		**CO2**

UNIT – III	**Concept Generation and Evaluation**	**Periods:09**
Concept Generation Process: Continuous and External Idea Sources - Clarifying the Problem and Brainstorming Solutions - Design Thinking for New Products - Techniques for Concept Generation - Systematic Exploration of Concepts - Screening and Scoring Product Concepts - Concept Evaluation and Selection Methods - Prototyping Techniques		**CO3**

UNIT – IV	**Product Design and Development**	**Periods:09**
Product Architecture and its role in NPD - Modular vs. Integral Product Architecture - Design for Sustainability - Environmental Considerations - Organizing Product Development Teams - Stages of team Development - Collaboration and Cross - Functional Teams in Product Development - Tools for Effective Product Design - Agile Product Development Methodologies		**CO4**

UNIT – V	**Launch, Strategy and Commercialization**	**Periods:09**
Developing a New Product Strategy - Building Market Demand and Entry Strategies for New Products - Developing a New Product Business Plan - Preparing for Market Launch - Post - Launch Evaluation - Product Life Cycle - Continuous Improvement and Future Product Enhancements		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. KT. Ulrich, SD. Eppinger, "Product Design and Development", McGraw-Hill Education, 7th Edition, 2020.
2. CM. Crawford, A. Di Benedetto, "New Products Management", 11th Edition, McGraw-Hill Education, 2014.
3. RG. Cooper, "Winning at new products: Creating value through innovation", Basic Books, 5th Edition, 2017.

Reference Books

1. P. Trott, "Innovation management and new product development", Pearson Education, 6th Edition, 2017.
2. S. Thomke, "Experimentation works: The surprising power of business experiments", Harvard Business Review Press, 2020
3. S.G. Blank, B. Dorf, "The start-up owner's manual: The step-by-step guide for building a great company", Wiley, 2020.
4. T. Brown, "Change by design: How design thinking transforms organizations and inspires innovation", Harper Business, 2009.
5. T. Kelley, J. Littman, "The ten faces of innovation: IDEO's strategies for beating the devil's advocate and driving creativity throughout your organization", Currency/Doubleday, 2006.

2.A.1.7)

Web References

1. https://conjointly.com/kb/
2. https://www.entrepreneur.com/article/281999
3. https://www.mindtools.com/pages/article/newSTR_66.htm
4. https://www.interaction-design.org/literature/article/design-thinking-getting-started-with-empathy
5. https://www.productplan.com/glossary/product-architecture/
6. https://hbr.org/2019/09/why-design-thinking-works
7. https://www.smartsheet.com/new-product-development.
8. https://www.ptc.com/en/blogs/cad/best-practices-for-developing-new-products

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	3	-	3	1	1	-	-	1	-	2	2	2	2
2	1	-	2	1	3	-	-	1	-	1	-	3	2	2	2
3	1	1	3	-	2	-	1	-	2	-	1	2	2	2	2
4	3	-	1	1	3	1	-	1	2	-	1	1	2	2	2
5	1	-	3	-	3	-	-	-	2	-	1	2	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.0.1.72

Department	Management Studies	Programme: B. Tech.						
Semester	V / VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23HSOC03	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	FINANCE FOR ENGINEERS	3	0	0	3	25	75	100

Common to ALL Branches

Prerequisite	Nil	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain the objectives, scope, and role of financial management in engineering, and differentiate between profit maximization and wealth maximization.	K2
	CO2 Apply the concepts of the time value of money to engineering projects and use investment appraisal techniques such as NPV, IRR, and Payback Period for decision-making.	K3
	CO3 Demonstrate the steps in the capital budgeting process and apply techniques like cost-benefit and sensitivity analysis for evaluating engineering projects.	K3
	CO4 Analyze financial statements, including balance sheets and income statements, from an engineering perspective, and evaluate financial ratios to assess the financial performance of engineering projects.	K4
	CO5 Analyze different types of costs, such as fixed, variable, and marginal costs, and evaluate cost-benefit analysis and break-even analysis for engineering decision-making.	K4

UNIT – I	**Introduction to Financial Management**	**Periods:09**
Overview of Financial Management: Objectives, Scope, and Role in Engineering - Financial Planning and Strategy: Short-Term and Long-Term Planning - Basic Concepts: Profit Maximization vs Wealth Maximization - Role of Engineering Managers in Financial Decision - Making, Relationship between Finance and Other Engineering Disciplines.		**CO1**

UNIT – II	**Time Value of Money and Investment Decisions**	**Periods:09**
Time Value of Money: Concept, Importance and Applications in Engineering Project, Present Value and Future Value Calculations - Investment Appraisal Techniques: Payback Period, Net Present Value (NPV), Internal Rate of Return (IRR) (Theory only) and Profitability Index (PI) - Risk Analysis in Investment Decision Making.		**CO2**

UNIT – III	**Capital Budgeting for Engineering Projects**	**Periods:09**
Capital Budgeting Process: Steps and Key considerations, Techniques for Evaluating Engineering Project, Cash-Flow Estimation for Project, Cost - Benefit Analysis in Engineering Project, Sensitivity Analysis, and Decision Trees for Project Evaluation.		**CO3**

UNIT – IV	**Financial Statements and Ratio Analysis**	**Periods:09**
Introduction to Financial Statements: Balance Sheet, Income Statement, and an Engineering Perspective on Financial Statement Interpretation - Financial Ratios: Liquidity, Profitability - Engineering Case Studies on Financial Performance Evaluation - Limitations of Ratio Analysis in Engineering Projects.		**CO4**

UNIT – V	**Cost Estimation and Engineering Economic Analysis**	**Periods:09**
Introduction to Cost Estimation in Engineering - Types of Costs: Fixed, Variable, Marginal, and Sunk Costs, Cost-Benefit Analysis in Engineering Projects, Break-Even Analysis and Its Application in Engineering Decision Making - Engineering Economic Analysis: Replacement Analysis.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. WG. Sullivan, EM. Wicks, CP. Koelling, "Engineering Economy", Pearson, 17th Edition, 2020.
2. RA. Brealey, SC. Myers, F. Allen, "Principles of Corporate Finance", 19th Edition, McGraw-Hill Education, 2022.
3. EF. Brigham, JF. Houston, "Fundamentals of Financial Management", 15th Edition, Cengage Learning, 2019.

Reference Books

1. BJ. Ranganath, KK. Sinha, "Financial Management for Engineers", Vikas Publishing House, 4th Edition, 2018.
2. F. Crundwell, "Finance for Engineers: Evaluation and Funding of Capital Projects", Springer, 2017.

2.A.1.73

Web References

1. https://www.netsuite.com/portal/resource/articles/financial-management/financial-management.shtml
2. https://www.investopedia.com/ask/answers/033015/why-time-value-money-tvm-important-concept-investors.asp
3. https://omnicard.in/blogs/capital-budgeting-24042024
4. https://www.linkedin.com/pulse/role-capital-budgeting-process-engineering-studies-ashraf
5. https://corporatefinanceinstitute.com/resources/accounting/financial-ratios/
6. https://www.dau.edu/acquipedia-article/engineering-cost-estimation-method

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	2	-	-	-	1	1	1	-	2	1	1	2	2	2
2	1	2	1	-	1	2	1	2	-	3	1	-	2	2	2
3	-	3	3	-	1	3	1	2	-	3	1	1	2	2	2
4	1	2	-	2	1	1	2	1	1	2	1	-	2	2	2
5	-	3	-	-	2	3	2	2	1	2	2	3	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1774

Department	Management Studies	Programme: B. Tech.						
Semester	V / VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23HSOC04	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	ECONOMICS FOR ENGINEERS	3	0	0	3	25	75	100
Common to ALL Branches								
Prerequisite	Nil							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Interpret principles of managerial economics to real-world scenarios, utilizing demand analysis and forecasting techniques.	K2
	CO2 Discuss production functions and cost structures to evaluate their impact on managerial decision-making and market strategies.	K2
	CO3 Examine various market structures and pricing strategies, synthesizing their effects on market behavior and competitive dynamics.	K3
	CO4 Apply macroeconomic policies and their implications on business cycles, investment decisions, and economic stability.	K3
	CO5 Analyze recent economic trends, such as technological advancements and income inequality.	K4

UNIT – I	Introduction to Managerial Economics	Periods:09
Managerial Economics: Meaning, Scope, and Importance - Functions of a Managerial Economist - Demand Analysis: Law of Demand, Elasticity of Demand, Law of Supply, Elasticity of supply and Market Equilibrium - Comparative statistics: Shift of a curve and movement along with the curve - Demand Forecasting: Criteria for Effective Forecasting - Qualitative Methods - Quantitative Methods.		CO1

UNIT – II	Production Function and Cost Concepts	Periods:09
Production Function: Meaning, Types, Applications in Managerial Decision Making - Law of variable proportion and law of returns to scale - ISO Quants - Producer Surplus: Price ceiling and price floor - Cost concept: Types of Costs - Total, average and marginal cost - Revenue Concepts: Total Revenue (TR) - Marginal Revenue (MR) and Average Revenue (AR).		CO2

UNIT – III	Market Structure	Periods:09
Market structure: Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly and Duopoly - Pricing policies: Cost-Based Pricing, Demand - Based Pricing, Competition - Based Pricing, Psychological Pricing, Geographical Pricing, Dynamic Pricing, Bundle Pricing, Price Discrimination, Premium Pricing and practices.		CO3

UNIT – IV	Macroeconomics	Periods:09
Globalization and Economic Policies - National Income Concepts: Methods of measuring national income - circular flow of income - Monetary policy and Fiscal Policy - Business Cycles concepts - Inflation, deflation and its types - Foreign Direct Investment (FDI) - Foreign Institutional Investment (FII).		CO4

UNIT – V	Recent Trends in Economics	Periods:09
Digital Economy : E-commerce, Fintech, and Online Services - Role of Technology : Big Data, Artificial Intelligence and Automation in Economic Decision-Making - Gig Economy : Growth of Freelance and Contract Work - Impact on Global Economies - Income In - equality : Causes, Effects and Socio - political Impact		CO5

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

Text Books

1. Samuelson, F. William, Marks, G. Stephen, "Managerial Economics: Theory, Applications, and Cases", Wiley, 10th Edition, 2020.
2. H. L. Ahuja, "Principles of Managerial Economics", Tata McGraw-Hill, 7th Edition, 2017.
3. D. M. Mithani, "Managerial Economics", Himalaya Publishing House, 3rd Edition, 2021.

Reference Books

1. Varian, Hal R., "Intermediate Microeconomics: A Modern Approach", W.W. Norton & Company, 9th Edition, 2014.
2. Brickley, A. James, Jr. Smith, W. Clifford, Zimmerman, L. Jerold, "Managerial Economics and Organizational Architecture", 7th Edition, McGraw-Hill Education, 2016.
3. Samuelson, Paul, Nordhaus, William, "Economics", McGraw-Hill Education, 20th Edition, 2019.
4. Schiff, Peter, and Schotter, J. Andrew, "Introduction to Microeconomics", Cengage Learning, 3rd Edition, 2012.
5. Moore, C. James, "Economic Theory and Operations Analysis", Academic Press, 2nd Edition, 1970.

2.8.1.75

Web References

1. https://www.jaroeducation.com/blog/nature-and-types-of-managerial-economics/
2. https://psu.pb.unizin.org/introductiontomicroeconomics/chapter/chapter-6-costs-and-production/
3. https://corporatefinanceinstitute.com/resources/economics/market-structure.
4. https://www.britannica.com/money/macroeconomics
5. https://www2.deloitte.com/us/en/insights/economy/global-economic-outlook/weekly-update.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	1	-	1	1	-	-	-	2	2	-	2	2	2
2	1	1	1	2	2	2	2	-	-	3	3	3	2	2	2
3	1	1	1	2	-	2	2	-	-	3	-	3	2	2	2
4	1	1	-	2	2	2	2	2	-	3	3	3	2	2	2
5	1	1	1	2	2	-	2	2	-	3	3	3	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.8.1.76

Department	Management Studies	Programme: B. Tech.						
Semester	V / VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23HSOC05	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	MARKETING MANAGEMENT	3	0	0	3	25	75	100

Common to ALL Branches

Prerequisite	Nil	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain the importance of marketing and differentiate between marketing and selling.	K2
	CO2 Apply the consumer decision-making process and differentiate between industrial and consumer buying behavior.	K3
	CO3 Examine product life cycle management strategies and demonstrate the steps involved in new product development.	K3
	CO4 Illustrate the role of distribution channels and design an effective channel distribution strategy for both consumer and industrial goods.	K3
	CO5 Analyze emerging trends in marketing, including Customer Relationship Management and experiential marketing strategies.	K4

UNIT – I	**Introduction to Marketing**	**Periods:09**
Marketing - Importance of Marketing - Difference between Marketing and Selling - Marketing Environment: The Macro and Micro Environment factors, Importance of environment analysis – Strategic Marketing planning: Introduction, Need, Framework of Strategic planning process and Steps in strategic planning - Ethical and Social Responsibility of Marketing - 4 Ps of Marketing		**CO1**

UNIT – II	**Consumer Behaviour and Marketing Strategy**	**Periods:09**
Role of buyer - Types of Buying behavior - Factors influencing buying decisions - Consumer decision making process: Meaning and Steps in Consumer decision making Process – Organizational buying behaviour: Classification of organizational markets, Characteristics, Difference between Industrial and Consumer buying - Market Segmentation - Needs, Classification and Significance – Targeting, Positioning and Competitive Strategies.		**CO2**

UNIT – III	**Product and Pricing Mix**	**Periods:09**
Product classifications - Product Life cycle - Strategies for managing Product Life cycle – Categories of New product, Importance and Steps in New Product Development – Packaging: Need for packaging, Essential qualities of packaging, kinds of packaging and advantages of packaging – Labelling: Functions, Types of labelling, advantages and disadvantages of labelling – Pricing objectives – Pricing strategies		**CO3**

UNIT – IV	**Place and Promotion Mix**	**Periods:09**
Distribution Channel and Physical distribution: Meaning and Importance of distribution channel - Channel design decisions – Channels of distribution for consumer and industrial goods – Physical Distribution: Meaning, Objectives and components of physical distribution - Promotion: Objectives, Types of sales promotion: Consumer, Salesperson and Dealer sales promotion – Introduction to Integrated Marketing Communication		**CO4**

UNIT – V	**Trends in Marketing**	**Periods:09**
Emerging trends in Marketing - Customer Relationship Management: Definition, features, Types and importance - Experiential Marketing: Meaning, strategies and benefits - Mobile Marketing: Definition and types of mobile marketing - Digital Marketing: Meaning, types of digital marketing – Inbound marketing: Meaning, fundamentals and difference between inbound and outbound marketing - Marketing Analytics: Meaning, importance, metrices of marketing analytics – An overview of Sustainable Marketing		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Keller, Philip, Kevin Lane Kotler, "Marketing Management", Pearson Education Limited, 16th Edition, 2022.
2. Ramaswamy V. S., Namakumari.S, "Marketing Management", Sage Publications India Pvt Ltd, 6th Edition, 2018.

Reference Books

1. Prachi Gupta, Ashita Aggarwal, et al., "Marketing Management: Indian Cases", Pearson Education Limited, 2024.
2. Arunkumar, N. Meenakshi, "Marketing Management", Vikas Publishing House, 3rd Edition, 2016.
3. Rajan Saxena, "Marketing Management", McGraw Hill Publications, 5th Edition, 2017.

Web References

1. https://www.ama.org/
2. https://www.marketingprofs.com/
3. https://indianjournalofmarketing.com/
4. http://www.publishingindia.com/ijamm/
5. https://onlinecourses.swayam2.ac.in/imb20_mg36/preview

2.A.1.77

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	2	-	-	-	2	1	1	-	2	1	1	2	2	2
2	1	2	1	-	1	2	1	2	-	2	1	1	2	2	2
3	1	2	3	-	1	2	1	2	-	2	1	1	2	2	2
4	1	1	3	-	2	1	2	1	1	2	2	1	2	2	2
5	1	3	2	2	2	3	2	2	1	2	2	3	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.78

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)

Puducherry

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.TECH. HONOUR / MINOR PROGRAMME
ELECTRIC VEHICLES

ACADEMIC REGULATIONS 2023
(R-2023)

CURRICULUM AND SYLLABI
Volume – I

2.8.1.79

B. Tech Honour / Minor Programme - ELECTRIC VEHICLES

CURRICULUM

COURSE DETAILS											
Sl. No.	Semester	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
					L	T	P		CAM	ESM	Total
Theory											
1	IV	U23MEX401	Electrical Vehicles: Design, Dynamics and Testing	PC / IC	3	1	0	4	25	75	100
2	V	U23MEX502	Energy Storage and Battery Management System	PC / IC	3	1	0	4	25	75	100
3	VI	U23EEX603	Electric Drives and Controls	PC / IC	3	1	0	4	25	75	100
4	VII	U23EEX704	Modelling and Simulation of EHV	PC / IC	3	1	0	4	25	75	100
5	VIII	U23EEX805	Autonomous and Connected Vehicles	PC / IC	3	1	0	4	25	75	100
Total								**20**	**125**	**375**	**500**
Equivalent NPTEL courses[##]											
1	**Course Code** U23XXXN01		Electric Vehicles and Renewable Energy					3	**12 WEEKS COURSE**		
2			Electrochemical Energy Storage					3			
3			Design of Photovoltaic Systems					3			
4			Design of Electric Motors					3			
5			Digital Control in Switched Mode Power Converters and FPGA -based Prototyping					3			

[##] The student shall be given an option to earn 3 credits through one 12-week NPTEL course (Equivalent) instead of any one course listed for honours degree programme and shall be completed before the commencement of eighth semester. The equivalent courses are subject to change based on its availability as per NPTEL course list.

2.A.1.80

Department	**EEE / MECHANICAL**	Programme: **B.Tech Honour/Minor**						
Semester	**IV**	Course Category Code: **PC**			*End Semester Exam Type: **TE**			
Course Code	**U23MEX401**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL VEHICLES: DESIGN, DYNAMICS AND TESTING**	**3**	**1**	**0**	**4**	**25**	**75**	**100**

Common to ALL Branches

Prerequisite	Engineering Mechanics, Automobile Engineering		
Course Outcomes	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Summarize the basic functions of both Electric and Hybrid vehicles and their performance.	**K2**
	CO2	Illustrate the automobile configurations, packaging, structural systems, aerodynamics and power demand, etc.,	**K3**
	CO3	Predict the vehicle resistance and proficiently optimize the powertrain performance for FWD, RWD, and multi-wheel drive systems.	**K3**
	CO4	Examine the vehicle testing, homologation, and standards compliance for safe automotive engineering.	**K3**
	CO5	Demonstrate the requirement of vehicular safety systems and road regulations	**K3**

UNIT – I	**Introduction**	**Periods:12**
History - Components of Electric Vehicle (EV)- General Layout of EV- EV classification- Comparison with Internal combustion Engine- Technology- Advantages and Disadvantages of EV. Hybrid vehicle – advantages- disadvantages- Architecture and energy flow– series, parallel, series-parallel- Drive train for hybrid and electric vehicles-Hybrid vehicle operating modes.		**CO1**
UNIT – II	**Vehicle Dynamics**	**Periods: 12**
General Configuration of Automobile- Body and Chassis Fundamentals- General Packaging- Types of Structural System- Backbone Construction- Body and Chassis Materials. Automotive Aero-dynamics- Vehicle Power Demand Analysis- Types of suspension and drive- Tyre Mechanics-Tyres and wheels- Tyre characteristics- Vehicle handling and stability- Automotive instrumentation		**CO2**
UNIT – III	**Vehicle Design**	**Periods: 12**
Vehicle resistance- **Types:** Rolling Resistance- grading resistance. Aerodynamic drag-vehicle performance- Calculation of Acceleration Force- maximum speed- Total Tractive Effort-Torque Required on drive Wheel- Transmission- Differential- clutch and gearbox- Braking performance. Front-Wheel Drive (FWD) Powertrains- Rear-Wheel Drive Powertrains (RWD)- Multi-Wheel Drive Powertrains (AWD and 4WD)		**CO3**
UNIT – IV	**Vehicle Testing and Homologation**	**Periods:12**
Need of vehicle testing and homologation- testing organizations- testing standards (AIS)- Hierarchy of testing- Individual component approval/testing- System level approval and Whole vehicle approval/testing- Conformity of production tests- Crash test- side impact test- rollover test- Impact test- Track testing		**CO4**
UNIT – V	**Vehicular Safety and Government norms**	**Periods:12**
Road and Automotive Safety Systems- Active and passive safety- Safety Regulations for vehicular application- occupant protection- Traffic signs- traffic rules- Government Norms- Regulations and Policies- penalties and procedures.		**CO5**

Lecture Periods:45	**Tutorial Periods:15**	**Practical Periods:-**	**Total Periods: 60**

Text Books:

1. Mehrdad Ehsani, Yimin Gao, Stefano Longo, Kambiz Ebrahimi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", CRC Press, 2018.
2. David C Barton, John D Fieldhouse, "Automotive Chassis Engineering", Springer International Publishing, 2018.

Reference Books:

1. Thomas Gillespie, "Fundamentals of Vehicle Dynamics", SAE International, April 2021.
2. Ulrich Seiffert, Lothar, Wech, "Automotive Safety Handbook, SAE International, 2007.

Web Reference:

1. https://www.nhtsa.gov/
2. https://www.ais.gov.in/
3. https://www.opal-rt.com/automotive-overview/

2.A.11.81

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	2	1	2	1	-	-	-	-	1	3	3	2
2	3	2	3	2	1	2	1	-	-	-	-	1	3	3	2
3	3	2	3	2	1	2	1	-	-	-	-	1	3	3	2
4	3	2	3	2	1	2	1	-	-	-	-	1	3	3	2
5	3	2	3	2	1	2	1	-	-	-	-	1	3	3	2

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.8.1.82

Department	EEE / MECHANICAL	Programme: **B.Tech Honour / Minor**						
Semester	V	Course Category Code: **PC**			End Semester Exam Type: **TE**			
Course Code	U23MEX502	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ENERGY STORAGE AND BATTERY MANAGEMENT SYSTEM**	**3**	**1**	**-**	**4**	**25**	**75**	**100**

Common to ALL Branches

Prerequisite	Physics , Automobile Engineering	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain about different classifications of battery.	**K2**
	CO2 Differentiate fuel cell and capacitor usage in EV.	**K2**
	CO3 Describe about various battery parameters.	**K3**
	CO4 Apply knowledge about BMS and state estimation	**K3**
	CO5 Demonstrate about different EV charging methods.	**K3**

UNIT – I	**EV and HEV Batteries**	**Periods:12**
Classification of Storage Technologies by Energy type- Thermal Energy- Heat Storage-Chemical Energy- Organic and Non-Organic; Mechanical Energy- Kinetic and Potential Energy- Electrical Energy- Electrical Potential- Lead-acid battery- Nickel-cadmium battery- Lithium-ion battery- Sodium-sulfur battery- Nickel metal hydride battery- Solid state Batteries- Differences amongst different ESS		**CO1**

UNIT – II	**Fuel Cells and Capacitors**	**Periods:12**
Operation principles of fuel cells – Electrode potential and current-voltage curves- Types – Proton exchange membrane fuel cells- alkaline fuel cells- phosphoric acid fuel cells- molten carbonate fuel cells- solid oxide fuel cells- direct methanol fuel cells. Fuel cell hybrid drive train- Fuel cell characteristic curves- Fundamentals of Electrochemical super-capacitors- Ultra-capacitor technologies- graphene based Ultra capacitors- Introduction to Flywheel.		**CO2**

UNIT – III	**Battery Parameters**	**Periods:12**
Cell and battery voltages- Charge (or Amphour) capacity-Energy stored- Energy density- Specific power- Amphour (or charge) efficiency- Energy efficiency-Self-discharge rates- Battery geometry- Battery temperature- heating and cooling needs- Battery life and number of deep cycle.		**CO3**

UNIT – IV	**Battery Management System and State Estimation**	**Periods:12**
Significance of Battery Management Systems - Functions of the Battery Management System – Topology of the BMS - Methods of Battery Management - Introduction to IoT based Battery Monitoring System, Single Cell – Series and Parallel combination of Batteries - Characteristic Parameters: State of Charge (SoC), Depth of Discharge (DoD) and State of Health (SoH).		**CO4**

UNIT – V	**EV Charging**	**Periods:12**
Battery Chargers- Charge equalization-Conductive -Basic charger circuits-Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers- Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging)- Battery indication methods		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. Ibrahim Dinçer, Halil S. Hamut and Nader Javani, "Thermal Management of Electric Vehicle Battery Systems", John Wiley& Sons Ltd., 2016.
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd, 2012

Reference Books

1. G. Pistoia, J.P. Wiaux, S.P. Wolsky, "Used Battery Collection and Recycling", Elsevier, 2001.
2. T R Crompton, "Battery", Newnes- Reed Educational and Professional Publishing Ltd. 3rd Edition, 2000.
3. James Larminie, John Lowry, "Electric Vehicles Technology", Wiley Publications, 2013.
4. F. Beguin and E. Frackowiak, "Super capacitors- materials, Systems and Applications", Wiley-VCH VerlagGmbH & Company, 2013.
5. V.Hacker, S. Mitsushima, "Fuel Cells and Hydrogens: From Fundamentals to applied Research", Elsevier, 2018.

9.9.1.83

Web References

1. https://archive.nptel.ac.in/courses/108/103/108103009/
2. https://www.nhtsa.gov/
3. https://www.ais.gov.in/
4. https://www.opal-rt.com/automotive-overview/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	2	2	2	1	-	-	-	-	1	3	3	2
2	3	2	3	2	2	2	1	-	-	-	-	1	3	3	2
3	3	2	3	2	2	2	1	-	-	-	-	1	3	3	2
4	3	2	3	2	2	2	1	-	-	-	-	1	3	3	2
5	3	2	3	2	2	2	1	-	-	-	-	1	3	3	2

Correlation Level: 1 – Low, 2 – Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.9.18.4

Department	EEE / MECHANICAL	Programme: **B.Tech Honour/Minor**						
Semester	VI	Course Category Code: **PC**			End Semester Exam Type: **TE**			
Course Code	U23EEX603	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRIC DRIVES AND CONTROLS**	**3**	**1**	**0**	**4**	**25**	**75**	**100**

Common to ALL Branches

Prerequisite	Electrical Machines, Power Electronics	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe about the motor characteristics and parameters.	**K2**
	CO2 Explain about various converter topologies for DC drives	**K2**
	CO3 Apply the knowledge for speed control of Induction motor in EV design	**K3**
	CO4 Implement the converters for SRM and PMSM for EV	**K3**
	CO5 Design Permanent Magnet Brushless DC motor drives for EV.	**K2**

UNIT – I	**EV motor and characteristics**	**Periods: 12**
Types of EV motors- Design and Sizing of Traction Motors- RPM and Torque calculation of different motors- torque speed characteristics- Constant-Torque Mode- Constant-Power Mode- Tractive effort in normal driving- Energy consumption-concept of Electric Drive Trains and its Architecture- Electric Propulsion unit- calibration of drive train based on vehicle parameters- Systems with Linear Motion and Rotating Motion- Comparison of EV motors - suitability in Electric vehicle domain for 2W, 3W, 4 wheelers and large size vehicles.		**CO1**

UNIT – II	**DC Drives and Control**	**Periods: 12**
DC Motor Drive- Principle of Operation and Performance- **Non-Isolated DC-DC Converter:** Boost Converter, Buck Converter, Buck-Boost Converter. **Isolated DC- DC Converters:** Flyback Converter, Forward Converter- Modes of Operation and Analysis, **Speed Control:** Regenerative Braking, Field Weakening Control, Combined Armature Voltage and Field Control, Chopper Control of DC Motors, Multi quadrant Control of Chopper-Fed DC Motor Drives, Single phase and three phases fully controlled and half controlled DC drives.		**CO2**

UNIT – III	**Induction motor Drives and Control**	**Periods: 12**
Rotating Magnetic Field- Induction motor- Construction and operation- Induction Motor Drives, Steady-State Performance- H - Bridge Inverter- PWM Switching Inverters- Soft-Switching Inverters- Variable-Voltage, Variable-Frequency Control, Field-Oriented Control- Direct Torque Control- Direct and Indirect Vector Control- Design Criteria of Induction Motor Drives for EVs.		**CO3**

UNIT – IV	**SRM and PMSM Drives and Control**	**Periods: 12**
SR Converter Topologies- Soft-Switching SR Converter Topologies- Comparison of SR Converters for EVs- Planetary-Geared SR Motor Drive- Outer-Rotor In-Wheel SR Motor Drive- Speed control- Current chopping control- Torque-Ripple Minimization Control- Position Sensorless Control-Design Criteria of SR Motor Drives for EVs PMSM Motor – Construction and types of PMSM - EMF and torque developed, Planetary-Geared PM Synchronous Motor Drive, Braking methods, Field-Oriented Control, Flux-Weakening Control, Position Sensorless Control of PMSM.		**CO4**

UNIT – V	**BLDC Motor Drives and Control**	**Periods: 12**
Properties of Permanent magnet materials- BLDC Motor -construction and working-Principle of BLDC drives, Inverter Requirements- Switching Schemes for Brushless AC Operation and DC Operation- Outer-Rotor PM Brushless DC Motor Drive- Design Criteria of PM Brushless Motor Drives for EVs- Trapezoidal back EMF BLDC motor control.		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. K.T. Chau, "Electric Vehicle Machines and Drives: Design, Analysis and Application", Wiley-IEEE Press, 1st Edition, 2015.
2. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", Wiley-Blackwell, 1st Edition, 2018.

Reference Books

1. C.G. Hochgraf, M.J. Ryan, and H.L. Wiegman, "Engine control strategy for a series hybrid electric vehicle incorporating load leveling and computer controlled energy management", Warrendale, PA, 2nd Edition, 2002.
2. Seth Leitman Bob Brant, "Build your own electric vehicle", Mc Graw hill, 3rd Edition, 2013.
3. C. C. Chan, K.T. Chau, "Modern Electric Vehicle Technology", Oxford University Press, 1st Edition, 2001.

Web References

1. https://archive.nptel.ac.in/courses/108/104/108104140/
2. https://onlinecourses.nptel.ac.in/noc24_ee30/preview
3. https://www.slideshare.net/slideshow/electric-drives-and-controls-unit-1-introduction/250009052
4. https://www.mygreatlearning.com/academy/learn-for-free/courses/introduction-to-inverters-and-electric-drive
5. https://onlinecourses.swayam2.ac.in/ntr24_ed16/preview

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	2	2	-	-	-	-	2	3	3	3
2	3	3	3	3	2	2	2	-	-	-	-	2	3	3	3
3	3	3	3	3	2	2	2	-	-	-	-	2	3	3	3
4	3	3	3	3	2	2	2	-	-	-	-	2	3	3	3
5	3	3	3	3	2	2	2	-	-	-	-	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

20.1.26

Department	EEE / MECHANICAL			Programme: **B.Tech Honour/Minor**			
Semester	VII			Course Category Code: **PC**		End Semester Exam Type: **TE**	
Course Code	U23EEX704	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**MODELLING AND SIMULATION OF EHV**	3	1	0	4	25	75	100

Common to ALL Branches

Prerequisite	Electrical Machines, Control Systems	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Apply the concept of modelling for electric vehicle and predict the performance.	**K3**
	CO2 Illustrate the modelling for battery electric vehicles.	**K3**
	CO3 Describe the drive train characteristics of electric vehicles	**K2**
	CO4 Apply energy management system in electric vehicles	**K3**
	CO5 Execute and explain the electric vehicle dynamic control systems	**K3**

UNIT - I	**Modelling in Performance Parameters**	**Periods: 12**
Modelling Vehicle Acceleration - Acceleration performance parameters, modelling the acceleration of an electric scooter, modelling the acceleration of a small car.		**CO1**

UNIT - II	**Modelling of Battery Electric Vehicles**	**Periods: 12**
Electric Vehicle Modelling - Tractive Effort- Rolling resistance force- Aerodynamic drag- Hill climbing force- Acceleration force- Total tractive effort- Modelling Electric Vehicle Range - Driving cycles- Constant velocity range modeling- Range modelling of battery electric vehicles- fuel cell vehicles- hybrid electric vehicles		**CO2**

UNIT - III	**EV Drive Train Characteristics**	**Periods: 12**
Modelling and Characteristics of EV/HEV Powertrains Components- ICE Performance Characteristics, Electric Motor Performance Characteristics - Battery Performance Characteristics-Transmission and Drive train Characteristics-Regenerative Braking Characteristics-Driving Cycles Modelling and Analysis of Electric and Hybrid Electric Vehicles Propulsion and Braking - Longitudinal Dynamics Equation of Motion - Vehicle Propulsion Modelling and Analysis - Vehicle Braking Modelling and Analysis.		**CO3**

UNIT - IV	**Energy Management**	**Periods: 12**
Handling Analysis of Electric and Hybrid Electric Vehicles - Simplified Handling Models Energy/Power Allocation and Management - Power/Energy Management Controllers – Rule Based Control Strategies - Optimization-Based Control Strategies.		**CO4**

UNIT - V	**Vehicle Dynamic Control**	**Periods: 12**
Control of Electric and Hybrid Electric Vehicle Dynamics - Fundamentals of Vehicle Dynamic Control (VDC) Systems, VDC Implementation on Electric and Hybrid Vehicles – Case Studies, Rechargeable Battery Vehicles, Hybrid Vehicles, Fuel Cell Powered Vehicles. **Simulation Tools:** Matlab / Simulink, ADVISOR and AVL Cruise		**CO5**

Lecture Periods: 45	**Tutorial Periods:15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd., 2nd Edition, 2012.
2. Amir Khajepour, Saber Fallah and AvestaGoodarzi, "Electric and Hybrid Vehicles -Technologies, Modelling and Control: A Mechatronic Approach", John Wiley & Sons Ltd, 1st Edition, 2014.

Reference Books

1. Antoni Szumanowski, "Hybrid Electric Power Train Engineering and Technology: Modelling, Control, and Simulation", Idea Group, 1st Edition, 2013.
2. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles_ Fundamentals, Theory, and Design, CRC Press, 2nd Edition", 2017.

Web References

1. https://archive.nptel.ac.in/content/syllabus_pdf/108103009.pdf
2. https://www.researchgate.net/publication/309548969_MODELING_AND_SIMULATION_OF_HYBRID_ELECTRIC_VEHICLES
3. https://www.sciencedirect.com/science/article/pii/S2405896322014446
4. https://www.academia.edu/1003352/A_Matlab_Based_Modeling_and_Simulation_Package_for_Electric_and_Hybrid_Electric_Vehicle_Design
5. https://www.academia.edu/90442341/Modeling_and_Simulation_of_Hybrid_Electric_Vehicle_Power_Systems?uc-sb-sw=17290990

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	3	2	2	-	-	-	-	2	3	3	3
2	3	3	3	3	3	2	2	-	-	-	-	2	3	3	3
3	3	3	3	3	3	2	2	-	-	-	-	2	3	3	3
4	3	3	3	3	3	2	2	-	-	-	-	2	3	3	3
5	3	3	3	3	3	2	2	-	-	-	-	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.9.1.88

Department	EEE / MECHANICAL	Programme: **B.Tech Honour/Minor**						
Semester	VIII	Course Category: **PC**			End Semester Exam Type :**TE**			
Course Code	U23EEX805	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**AUTONOMOUS AND CONNECTED VEHICLES**	**3**	**1**	**0**	**4**	**25**	**75**	**100**
(Common to All Branches)								
Prerequisite	Electric and Hybrid Vehicle, Internet of Things							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Summarize the advanced driver assistance systems for connected vehicle	**K2**
	CO2 Interpret the recent global navigation and Lidar technology for vehicle integration	**K2**
	CO3 Apply the Perception path, Deep Learning, planning for autonomous and connected vehicles	**K3**
	CO4 Demonstrate the hardware used in E-vehicle an computer architecture for Autonomous Driving	**K3**
	CO5 Illustrate the ECU evolution in architecture by software defined vehicles	**K3**

UNIT – I	**Autonomous System Architecture**	**Periods:12**
Overview-Autonomous Driving Algorithms-Sensing- Perception- Object Recognition and Tracking- Action- Autonomous Driving Client System-Robot Operating System- Hardware Platform- Autonomous Driving Cloud Platform-HD Map Production, Deep Learning Model Training.		**CO1**
UNIT – II	**Autonomous Vehicle Integration**	**Periods:12**
Localization with GNSS- GNSS Overview- GNSS Error Analysis- Satellite-based Augmentation Systems- Real-Time Kinematic and Differential GPS- Precise Point Positioning- GNSS INS Integration. Localization with LiDAR and High-Definition Maps- LiDAR Overview-High-Definition Maps Overview- Localization with LiDAR and HD Map- Visual Odometry- Stereo Visual Odometry- Monocular Visual Odometry- Visual Inertial Odometry- Dead Reckoning and Wheel Odometry- Wheel Encoders- Wheel Odometry Errors- Reduction of Wheel Odometry Errors		**CO2**
UNIT – III	**Perception and Deep Learning in Autonomous Driving Perception**	**Periods:12**
Introduction- Datasets- Detection- Segmentation- Stereo- Optical Flow- Scene Flow- Tracking- Deep Learning in Autonomous Driving- Convolutional Neural Networks- Detection- Semantic Segmentation- Stereo and Optical Flow- Planning and Control Overview- Architecture-Traffic Prediction -Lane Level Routing		**CO3**
UNIT – IV	**Client Systems for Autonomous Driving**	**Periods:12**
Hardware platform for autonomous driving- Operating system-ROS overview- system reliability- performance improvement- Resource Management And Security- Computing Platform- existing computing solution- computer architecture design exploration- Autonomous Driving on Mobile Processor- V2V-System Architecture-Safet application- V2I overview- BIM-V2P- System Architecture- Vehicle Warning Strategy		**CO4**
UNIT – V	**Cloud Platform for Autonomous Driving**	**Periods:12**
Infrastructure-distributed computing framework-distributed storage-heterogeneous computing- Simulation-BINPIPERDD-connecting spark and ROS-performance- Model training-need of SPARK-Training platform architecture-HD map generation. Autonomous driving-Vehicle Onboard Architecture- ECU software architecture –AUTOSAR- COVESA		**CO5**

Lecture Periods: 45	**Tutorial Periods:15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. Shaoshan Liu, Liyun Li, Jie Tang, Shuang Wu, Jean-Luc Gaudiot, "Creating Autonomous Vehicle Systems", Morgan & Claypool Publishers, 1st Edition, 2018
2. Radovan Miucic, "Connected Vehicles: Intelligent Transportation Systems", Springer, 2018

Reference Books

1. Domokos Esztergár-Kiss, Pierluigi Coppola, "Autonomous Vehicles and Future Mobility", Elsevier, 2019.
2. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles Fundamentals, Theory and Design", CRC Press, 2nd Edition, 2017.

Web References

1. https://www.ibm.com/blogs/digitale-perspektive/2023/06/the-software-defined-vehicle/
2. https://www.sciencedirect.com/science/article/pii/S2405896322014446
3. https://www.ais.gov.in/
4. https://www.opal-rt.com/automotive-overview/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
2	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
3	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
4	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3
5	3	3	3	2	3	-	-	-	-	-	-	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.8.1.90

ANNEXURE – III

Academic Calendar – I Year / I Sem

Use of Cell Phones

It has been decided not to permit cell phones inside the college campus. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pined. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working Hours

I hour	08.45 a.m	to	09.35 a.m
II hour	09.35 a.m	to	10.25 a.m
III hour	10.25 a.m	to	11.15 a.m
Break	11.15 a.m	to	11.30 a.m
IV hour	11.30 a.m	to	12.20 p.m
V hour	12.20 p.m	to	01.10 p.m
Lunch	01.10 p.m	to	01.50 p.m
VI hour	01.50 p.m	to	02.40 p.m
VII hour	02.40 p.m	to	03.30 p.m
VIII hour	03.30 p.m	to	04.20 p.m

Lunch break 01.10 p.m. to 01.50 p.m.

Table 1 Assessment method for Theory Courses

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESM) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Table 2 Question Paper pattern for CAT 1 and CAT 2 - Theory Courses

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
5	4	2 (out of 3 question)	50

Table 3 Mid and End Semester Examination Question Paper pattern for 5 unit courses

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
10 (two questions from each unit)	5 (one questions from each unit)	3 (out of 5 questions one from each unit)	75

Table 4 Mid and End Semester Examination Question Paper pattern for 6 unit courses

Course	2 Mark Questions	5 Mark Questions	8/9 Mark Questions	Total Marks
Part A	5	2 (out of 3 questions, one from each unit)	2 9 mark questions (out of 3 questions, one from each unit)	38
Part B	5	2 (out of 3 questions, one from each unit)	2 8 mark questions (out of 3 questions, one from unit IV & unit VI) 1 9 mark questions (compulsory question from unit III)	37

Table 5 Assessment Method for Practical Courses

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESM) Marks	Total Marks
	Performance in practical classes: Conduction of practical	Record work	Model Practical Examination	Attendance			
Marks	15	5	5	15	10	50	100

Table 6 Assessment Method for Theory cum Practical Courses

Assessment	Continuous Assessment Marks (CAM) + Maximum 50 Marks								End Semester Examination (ESM) Marks (Theory)	Total Marks
	Continuous Assessment (Theory): CAT 1	CAT 2	Model	Attendance	Total	Continuous Assessment (Practical): Conduction of Practical	Report	Viva	Total	End Semester Examination (ESE) (Practical-Internal Evaluation)		
Marks	5	5	5	5	20*	15	10	5	30**	30	75**	100
*To be weighted for 10 Marks					10	**To be weighted for 10 Marks			10		**To be weighted for 50 Marks	

Table 7 Question Paper pattern for CAT 1 and CAT 2 (Theory cum Practical course)

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
5	4	2 (out of 3 question)	50

Table 8 Question paper pattern for Model and End Semester Examination (Theory cum Practical course)

2 Mark Questions	5 Mark Questions	14 Mark Questions	Total Marks
9 (3 questions from each unit)	3 (one question from each unit)	1 Compulsory question (with sub-section questions in any of the unit) 2 (out of 3 questions, one from each unit with sub-section)	75

Requirements for Appearing End Semester Examination

A student is expected to maintain 100% attendance in all courses as attendance also carries internal marks. A student will be qualified to appear for end semester examinations of a semester only if he/she satisfies the below mentioned requirements.

The student is permitted to appear for End Semester Examinations, only if he/she maintains minimum 75% of attendance. If he/she secured attendance greater than or equal to 69 % and less than 75 % has to pay the necessary condonation prescribed by the college authority with necessary supporting documents for his/her absence.

Redo Category

A student who secures overall attendance less than 60% has to repeat the course with the approval, when it is next offered. A student secures attendance greater than or equal to 60% and less than 75% will be promoted to next higher semester only if less of attendance is due to medical reasons(hospitalization/ accident/illness) or participation in sports event or any competitions or NCC or NSS activities with prior permission from the Head of Institution through the Head of the department with necessary supporting documents and payment of necessary condonation fee as prescribed by the college authority. However, student secures more than 75 % of attendance in the current semester will be moved to next higher semester.

Women Empowerment Cell

For the Welfare of the girl students, a Women Cell has been constituted in the college. The girl students may approach the member secretary for assistance.
Mail id : wec@smvec.ac.in

Grievance Redressal Committee

There is a Grievance Redressal committee in our college and the details are available in the website. Students can approach the member of the committee to redress their grievances if any. Mail id: grievance@smvec.ac.in

Internal Complaints Committee

The objective of this committee is to avoid sexual harassment of students and women employees in the college by preventing it, recording complaints, and taking appropriate action in response. It also aims to eliminate gender-based discrimination by creating a safe physical and social environment that deters sexual harassment and enforcing the necessary disciplinary actions.
For complaints:
Mail id: icc@smvec.ac.in

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)
Accredited by NAAC with "A" Grade
Madagadipet, Puducherry – 605 107

Academic Calendar

September 2024 to January 2025

Programme/Regulations: B.Tech/R-2023
Year/Sem : I year/I Sem

About Autonomous

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020.

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M1: **Quality Education:** To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices.

M2: **Research and Innovation:** To foster value- based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: **Employability and Entrepreneurship:** To inculcate the employability and entrepreneurial skills through value and skill-based training.

M4: **Ethical Values:** To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

I year / I Sem

September 2024

Date	Day	Schedule	Working Day
1	Sun		Holiday
2	Mon		
3	Tue		
4	Wed		
5	Thu	Teachers Day	
6	Fri		
7	Sat		Holiday
8	Sun		Holiday
9	Mon	Commencement of Classes for I semester / Induction Programme Starts	1
10	Tue		2
11	Wed		3
12	Thu		4
13	Fri		5
14	Sat		6
15	Sun		Holiday
16	Mon	World Senior Citizens' Day	Holiday
17	Tue		7
18	Wed		8
19	Thu		9
20	Fri	Induction Programme Ends	10
21	Sat		Holiday
22	Sun		Holiday
23	Mon		11
24	Tue		12
25	Wed		13
26	Thu		14
27	Fri		15
28	Sat		16
29	Sun		Holiday
30	Mon		17

Total number of working days : 17
Total number of holidays : 5

October 2024

Date	Day	Schedule	Working Day
1	Tue		18
2	Wed	Gandhi Jayanthi	Holiday
3	Thu		19
4	Fri		20
5	Sat		Holiday
6	Sun		Holiday
7	Mon		21
8	Tue		22
9	Wed		23
10	Thu		24
11	Fri	Saraswathy Pooja	Holiday
12	Sat	Vijayadasami	Holiday
13	Sun		Holiday
14	Mon		25
15	Tue		26
16	Wed		27
17	Thu	Online Feedback – I	28
18	Fri	Assignment – I	29
19	Sat		Holiday
20	Sun		Holiday
21	Mon	Submission of OCM – I / Syllabus Coverage – I	30
22	Tue	Submission of Attendance and Assessment Record	31
23	Wed	CAT – I (I & II Hour)	32
24	Thu	CAT – I (I & II Hour)	33
25	Fri	CAT – I (I & II Hour)	34
26	Sat	CAT – I (I & II Hour)	35
27	Sun		Holiday
28	Mon	CAT – I (I & II Hour)	36
29	Tue	CAT – I (I & II Hour)	37
30	Wed		38
31	Thu	Deepavali	Holiday

Total number of working days : 21
Total number of holidays : 10

November 2024

Date	Day	Schedule	Working Day
1	Fri	Puducherry Liberation Day	Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon		39
5	Tue		40
6	Wed	Submission of CAT – I Result Analysis	41
7	Thu		42
8	Fri		43
9	Sat		44
10	Sun		Holiday
11	Mon		45
12	Tue		46
13	Wed		47
14	Thu		48
15	Fri		49
16	Sat		Holiday
17	Sun		Holiday
18	Mon		50
19	Tue		51
20	Wed	Online Feedback – II	52
21	Thu	Assignment – II	53
22	Fri	Submission of OCM – II/ Syllabus Coverage – II	54
23	Sat	Submission of Attendance and Assessment Record	55
24	Sun		Holiday
25	Mon	CAT – II (I & II Hour)	56
26	Tue	CAT – II (I & II Hour)	57
27	Wed	CAT – II (I & II Hour)	58
28	Thu	CAT – II (I & II Hour)	59
29	Fri	CAT – II (I & II Hour)	60
30	Sat	CAT – II (I & II Hour)	61

Total number of working days : 23
Total number of holidays : 7

December 2024

Date	Day	Schedule	Working Day
1	Sun		Holiday
2	Mon		62
3	Tue		63
4	Wed	Online Feedback – III	64
5	Thu	Submission of CAT – II Result Analysis, Assignment – III	65
6	Fri	Submission of OCM – III Syllabus Coverage – III	66
7	Sat		Holiday
8	Sun		Holiday
9	Mon	Model Exam starts	67
10	Tue		68
11	Wed		69
12	Thu		70
13	Fri		71
14	Sat	Model Exam Ends	72
15	Sun		Holiday
16	Mon	Tentative Model Practical Examination	73
17	Tue		74
18	Wed		75
19	Thu	Submission of Model Exam Result Analysis	76
20	Fri	Submission of Attendance and Assessment Record / Last working Day	77
21	Sat		Holiday
22	Sun		Holiday
23	Mon	Tentative – End Semester Practical Examination	
24	Tue		
25	Wed	Christmas	Holiday
26	Thu		
27	Fri		
28	Sat		
29	Sun		Holiday
30	Mon		
31	Tue		

Total number of working days: 16
Total number of holidays : 4

January 2025

Date	Day	Schedule	Working Day
1	Wed	New year	Holiday
2	Thu	Tentative – End Semester Theory Examination	
3	Fri		
4	Sat		Holiday
5	Sun		Holiday
6	Mon		
7	Tue		
8	Wed		
9	Thu		
10	Fri		
11	Sat		
12	Sun		
13	Mon		
14	Tue		
15	Wed		
16	Thu		
17	Fri		
18	Sat		
19	Sun		
20	Mon		
21	Tue		
22	Wed		
23	Thu		
24	Fri		
25	Sat		
26	Sun	Republic Day	Holiday
27	Mon		
28	Tue		
29	Wed		
30	Thu		
31	Fri		

Total number of working days : -
Total number of holidays : -

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR: 2023-2024

R-2023 (Regulation)

BATCH: 2023-2027
YEAR/SEM: I /I

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

Mission

M1: Quality Education:
To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal Needs:
To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation:
To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship:
To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:
Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics:
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and teamwork:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning:
Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge:
To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility.

PEO2: Innovative Skills:
To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment.

PEO3: Ethics:
To actively embrace leadership qualities for achieving professional goals with ethical values

PEO4: Adaptability:
To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency:
Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of Power Electronics, Electrical Machines and Power Systems.

PSO2: Cutting Edge Technologies:
Explore the new cutting-edge technologies in the field of Electric Vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market.

PSO3: Design and Evolution:
Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

U23MATC01-ENGINEERING MATHEMATICS – I

Course Outcomes
CO1 - Understand the concept of Eigen values and Eigen vectors, Diagonalization of a Matrix K3
CO2 - Solve higher order differential equations K3
CO3 - Understand the different types of partial differential equations K3
CO4 - Know about the Applications of double and triple integrals K3
CO5 - Gain the knowledge about Vector Calculus and its Applications K3

U23BSTC01 - PHYSICAL SCIENCE FOR ENGINEERS

Course Outcomes
CO1 - Understand the basic of properties of magnetic, dielectric and superconductors. K2
CO2 - Identify the wave nature of the particles, physical significance of wave functions K3
CO3 - Understand the basic principles of laser and fiber optics communication K2
CO4 - Understand and familiar with the water treatment. K2
CO5 - Understand the electrode potential for its feasibility in electrochemical reaction and uses of various batteries. K2
CO6 - Understand the specific operating condition under which corrosion occurs and suggest a method to control corrosion. K2

U23ESTC02 - ENGINEERING MECHANICS

Course Outcomes
CO1 - Recognize the basics of equilibrium of particles in 2D and 3D K2
CO2 - Review the requirements of equilibrium of rigid bodies in 2D and 3D. K2
CO3 - Solve problem related to friction force. K3
CO4 - Compute the center of mass and moment of inertia of surfaces and solids. K3
CO5 - Predict displacement, velocity and acceleration of dynamic particles. K3

U23EET101-ELECTRICAL ENGINEERING

Course Outcomes
CO1 - Evaluate the current, voltage and power using different laws in DC circuits. K3
CO2 - Familarlize different terms, laws and parameters governing the magnetic circuits. K3
CO3 - Analyze the different AC circuits and impart the concepts of poly phase system. K3
CO4 - Develop the various domestic wiring with the preventive safety measures. K4
CO5 - Acquire skills about the factory wiring, estimation and protection methods for industries. K4

U23EET102-ELECTRONICS – I

Course Outcomes
CO1 - Acquire knowledge about semiconductor devices and their characteristics for applications like rectifiers, clippers, clampers and regulator circuits. K3
CO2 - Gain knowledge of transistor biasing techniques and stability considerations for applications like amplifier and switching circuits. K3
CO3 - Comprehend the physical structure, types and characteristics of FET. K2
CO4 - Describe the behavior of special and optoelectronic devices. K2
CO5 - Apply Boolean Algebra and Karnaugh map for designing combinational logic circuits. K3

U23ENBC01-COMMUNICATIVE ENGLISH – I

Course Outcomes
CO1 - Understand the communication flow in organization and its objectives K2
CO2 - Write the technical contents with grammatically precise sentences K2
CO3 - Articulate with correct pronunciation and overcome vernacular impact in speaking K3
CO4 - Express opinions confidently in formal and informal communicative contexts K2
CO5 - Attend interview with assertiveness K3

U23ESPC02 -DESIGN THINKING AND IDEA LAB

Course Outcomes
CO1 - Demonstrate a comprehensive understanding of the tools and inventory associated with the IDEA Lab. K2
CO2 - Develop proficiency in ideation techniques to generate creative and innovative solutions for various design challenges and problems K3
CO3 - Acquire practical knowledge of mechanical and electronic fabrication processes, including hands-on experience with machinery, tools, and techniques used in the manufacturing and assembly of physical components. K3
CO4 - Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends, and technological advancements into the design process. K4
CO5 - Apply iterative design methodologies to refine and improve solutions based on feedback, user testing, and evaluation of functional, aesthetic, and usability aspects K4

U23EEP101-ELECTRICAL ENGINEERING LABORATORY

Course Outcomes
CO1 - Acquire knowledge on safety protocols and procedures for working with electricity. K2
CO2 - Gain hands on experience in using various electrical tools and equipments K3
CO3 - Develop skills in designing line diagram and construct wiring for domestic and industrial applications. K4
CO4 - Use protection circuits for electrical networks and measure insulation resistance using megger. K3
CO5 - Analyze and troubleshoot the electrical circuits of various domestic appliances. K4

U23EEP102-ELECTRONICS – I LABORATORY

Course Outcomes
CO1 - Analyze the characteristics of diodes, current controlled and voltage controlled power switches. K4
CO2 - Design and implement clippers, clampers, rectifiers and regulator circuits using diodes. K3
CO3 - Analyze the characteristics of photodiodes, LEDs and able to investigate their behavior under different operating conditions. K3
CO4 - Gain knowledge in design and implementation of digital logic circuits in order to validate their functionality. K3
CO5 - Develop skills to simplify the hardware requirements of digital circuits for real time applications. K4

U23EEM101- INDUCTION PROGRAMME (UHV - I)

Course Outcomes
CO1 - Develop holistic attitude and harmony in the individual, family, and Society K2
CO2 - Acquire grammar skills and capable to write and speak English confidently K2
CO3 - Understand the basic concepts in Mathematics and Programming K2
CO4 - Know about the art and culture, language and literature of this vast secular nation K2
CO5 - Identify the inherent talent and develop it professionally K3

U23EEC1XX-CERTIFICATION COURSE-I

Students shall choose an international certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO etc. the duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence. Pass/Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for award of degree.

2.A.1.92

Academic Calendar – II Year / III Sem

Use of Cell Phones

It has been decided not to permit cell phones inside the college campus. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pined. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working Hours

I hour	09.00 a.m	to	09.50 a.m
II hour	09.50 a.m	to	10.40 a.m
Break	10.40 a.m	to	10.55 a.m
III hour	10.55 a.m	to	11.45 a.m
IV hour	11.45 a.m	to	12.35 p.m
V hour	01.15 p.m	to	02.05 p.m
VI hour	02.05 p.m	to	02.55 p.m
Break	02.55 p.m	to	03.10 p.m
VII hour	03.10 p.m	to	04.00 p.m
VIII hour	04.00 p.m	to	04.50 p.m

Lunch break 12.35 p.m. to 1.15 p.m.

Table 1 Assessment method for Theory Courses

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESM) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Table 2 Question Paper pattern for CAT 1 and CAT 2 - Theory Courses

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
5	4	2 (out of 3 question)	50

Table 3Model and End Semester Examination Question Paperpattern for Sunit courses

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
10 (two questions from each unit)	5 (one questions from each unit)	3 (out of 5 questions one from each unit)	75

Table 4 Model and End Semester Examination Question Paper pattern for Gunit cuses

Course	2 Mark Questions	5 Mark Questions	8/9 Mark Questions	Total Marks
Part A	5	2 (out of 3 questions, one from each unit)	2 9 mark questions (out of 3 questions, one from each unit)	38
Part B	5	2 (out of 3 questions, one from each unit)	1 8 mark questions (out of 2 questions, one from Unit IV & unit V) 1 9 mark questions (compulsory question from unit VI)	37

Table 5 Assessment Method for Practical Courses

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESM) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	Model Exam				
Marks	15	5	5	15	10	50	100

Table 6 Assessment Method for Theory cum Practical Courses

Assessment	Continuous Assessment Marks (CAM) - Maximum 50 Marks								End Semester Examination (ESM) Marks (Thmy)	Total Marks
	Continuous Assessment (Theory)				Continuous Assessment (Practical)					
	CAT 1	CAT 2	Model	Attendance	Total	Conduction of Practical	Record	Viva	Total	End Semester Examination (ESE) (Practical-Internal Evaluation)	
Marks	5	5	5	5	20*	15	10	5	30**	30	75**
	*To be weighted for 30 Marks					*To be weighted for 30 Marks					**To be weighted for 50 Marks

Table 7 Question Paper pattern for CAT 1 and CAT 2 (Theory cum Practical course)

2 Mark Questions	5 Mark Questions	10 Mark Questions	Total Marks
5	4	2 (out of 3 question)	50

Table 8 Question paper pattern for Model and End Semester Examination (Theory cum Practical course)

2 Mark Questions	5 Mark Questions	14 Mark Questions	Total Marks
9 (3 questions from each unit)	3 (one question from each unit)	1 Compulsory question (with sub-section questions in any of the unit) 2 (out of 3 questions, one from each unit with sub-section)	75

Requirements for Appearing End Semester Examination

A student is expected to maintain 100% attendance in all courses as attendance also carries internal marks. A student will be qualified to appear for end semester examinations of a semester only if he/she satisfies the below mentioned requirements.

The student is permitted to appear for End Semester Examinations, only if he/she maintains minimum 75% of attendance. If he/she secured attendance greater than or equal to 60 % and less than 75 % has to pay the necessary condonation prescribed by the college authority with necessary supporting documents for his/her absence.

Redo Category

A student who secures overall attendance less than 60% has to repeat the course with the approval, when it is next offered. A student secures attendance greater than or equal to 60% and less than 75% will be promoted to next higher semester only if lack of attendance is due to medical reasons(hospitalization/ accident/illness)or participation in sports event or any competitions or NCC or NSS activities with prior permission from the Head of Institution through the Head of the department with necessary supporting documents and payment of necessary condonation fee as prescribed by the college authority. However, student secures more than 75% of attendance in the current semester will be moved to next higher semester.

Women Empowerment Cell

For the Welfare of the girl students, a Women Cell has been constituted in the college. The girl students may approach the member secretary for assistance.
Mail id : wec@smvec.ac.in

Grievance Redressal Committee

There is a Grievance Redressal committee in our college and the details are available in the website. Students can approach the member of the committee to redress their grievances if any. Mail id : grievance@smvec.ac.in

Internal Complaints Committee

The objective of this committee is to avoid sexual harassment of students and women employees in the college by preventing it, recording complaints, and taking appropriate action in response. It also aims to eliminate gender-based discrimination by creating a safe physical and social environment that deters sexual harassment and enforcing the necessary disciplinary actions. For complaints:
Mail id : icc@smvec.ac.in

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry -605 107

Academic Calendar

July 2024 to November 2024

Dept.: **Electrical and Electronics Engg.**
Programme/Regulations: **B.Tech/R-2023**
Year/Sem : II year / III Sem

About Autonomous:

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020.

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M1: **Quality Education:** To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices.

M2: **Research and Innovation:** To foster value- based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: **Employability and Entrepreneurship:** To inculcate the employability and entrepreneurial skills through value and skill-based training.

M4: **Ethical Values:** To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

II year / III Sem

July 2024

Date	Day	Schedule	Working Day
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		Holiday
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
11	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	Commencement of Classes for II year	1
16	Tue		2
17	Wed	Muharram	Holiday
18	Thu		3
19	Fri		4
20	Sat		Holiday
21	Sun		Holiday
22	Mon		5
23	Tue		6
24	Wed	National Thermal Engineer Day	7
25	Thu		8
26	Fri		9
27	Sat		10
28	Sun		Holiday
29	Mon	World Nature Conservation Day	11
30	Tue		12
31	Wed		13

Total number of working days : 13
Total number of holiday : 04

August 2024

Date	Day	Schedule	Working Day
1	Thu		14
2	Fri		15
3	Sat		Holiday
4	Sun		Holiday
5	Mon		16
6	Tue		17
7	Wed		18
8	Thu		19
9	Fri		20
10	Sat		21
11	Sun		Holiday
12	Mon	International Youth day	22
13	Tue		23
14	Wed		24
15	Thu	Independence Day	Holiday
16	Fri	Independence Day (Puducherry)	Holiday
17	Sat		Holiday
18	Sun		Holiday
19	Mon		25
20	Tue	Online Feedback-1	26
21	Wed	Assignment-1	27
22	Thu	Submission of QCM-1 / Syllabus Coverage	28
23	Fri		29
24	Sat	Submission of Attendance and Assessment Record	30
25	Sun		Holiday
26	Mon	CAT – 1 (I and II Hour)	31
27	Tue	CAT – 1 (I and II Hour)	32
28	Wed	CAT – 1 (I and II Hour)	33
29	Thu	CAT – 1 (I and II Hour)	34
30	Fri	CAT – 1 (I and II Hour)	35
31	Sat	CAT – 1 (I and II Hour)	36

Total number of working days : 23
Total number of holiday : 08

September 2024

Date	Day	Schedule	Working Day
1	Sun		Holiday
2	Mon		37
3	Tue		38
4	Wed	Submission of CAT-1 Result Analysis	39
5	Thu	Teachers Day	40
6	Fri		41
7	Sat	Vinayagar Chaturthi	Holiday
8	Sun	World Literacy Day	Holiday
9	Mon		42
10	Tue		43
11	Wed		44
12	Thu		45
13	Fri		46
14	Sat		47
15	Sun	Engineer's Day in India	Holiday
16	Mon	Milad Habi/ World Ozone Day	Holiday
17	Tue	World Ozone Day	48
18	Wed		49
19	Thu		50
20	Fri		51
21	Sat		Holiday
22	Sun		Holiday
23	Mon	Online Feedback-2	52
24	Tue	Assignment - 2	53
25	Wed	Submission of QCM-2/ Syllabus coverage	54
26	Thu	Submission of Attendance and Assessment Record	55
27	Fri	CAT – 2 (I and II Hour)	56
28	Sat	CAT – 2 (I and II Hour) Investor Day	57
29	Sun		Holiday
30	Mon	CAT – 2 (I and II Hour)	58

Total number of working days : 22
Total number of holiday : 08

October 2024

Date	Day	Schedule	Working Day
1	Tue	CAT – 2 (I and II Hour)	59
2	Wed	Gandhi Jayanthy - Holiday	Holiday
3	Thu	CAT – 2 (I and II Hour)	60
4	Fri	CAT – 2 (I and II Hour)	61
5	Sat		Holiday
6	Sun		Holiday
7	Mon		62
8	Tue		63
9	Wed		64
10	Thu	Submission of CAT2 Result Analysis	65
11	Fri	Ramaswamy Pooja	Holiday
12	Sat	Vijayadasmi	Holiday
13	Sun		Holiday
14	Mon	World Standards Day	66
15	Tue	World Students Day	67
16	Wed	Online Feedback-3	68
17	Thu	Assignment-3	69
18	Fri	Submission of QCM-3 / Syllabus coverage	70
19	Sat		Holiday
20	Sun		Holiday
21	Mon	MODEL EXAM Starts	71
22	Tue		72
23	Wed		73
24	Thu		74
25	Fri		75
26	Sat	MODEL EXAM- Ends (Last Working day)	76
27	Sun		Holiday
28	Mon	Tentative Model Practical Examination	77
29	Tue		78
30	Wed		79
31	Thu	Deepavali	Holiday

Total number of working days :21
Total number of holiday : 10

November 2024

Date	Day	Schedule	Working Day
1	Fri	Puducherry Liberation Day	Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon	Tentative ESE Practical	80
5	Tue	Submission of Model Exam Result Analysis	81
6	Wed	Submission of Attendance and Assessment Record	82
7	Thu		83
8	Fri		84
9	Sat		85
10	Sun		Holiday
11	Mon	Tentative – End Semester Theory Examination	
12	Tue		
13	Wed		
14	Thu	Children's Day	
15	Fri		
16	Sat		Holiday
17	Sun		Holiday
18	Mon		
19	Tue		
20	Wed		
21	Thu		
22	Fri		
23	Sat		
24	Sun		Holiday
25	Mon	International Day for the Elimination of Violence against Women	
26	Tue	Constitution Day of India	
27	Wed		
28	Thu		
29	Fri		
30	Sat		

Total number of working days : 06
Total number of holiday : 03

2.A.1.93

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR: 2024-2025
BATCH: 2023-2027
R-2023
YEAR / SEM: II / III

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

Mission

M1: Quality Education:
To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal Needs:
To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation:
To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship:
To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:
Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics:
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and teamwork:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning:
Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge:
To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility.

PEO2: Innovative Skills:
To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment.

PEO3: Ethics:
To actively embrace leadership qualities for achieving professional goals with ethical values

PEO4: Adaptability:
To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency:
Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of Power Electronics, Electrical Machines and Power Systems.

PSO2: Cutting Edge Technologies:
Explore the new cutting-edge technologies in the field of Electric Vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market

PSO3: Design and Evolution:
Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

U23MATC03 - PROBABILITY AND STATISTICS

Course Outcomes:
CO1-Apply the concept of probability (K3)
CO2-Solve the problem on Random variables (K3)
CO3-Evaluate the correlation and Regression (K3)
CO4-Find Correlation between variables (K3)
CO5 -Analyze the problems in small samples (K3)

U23ADTC01- PROGRAMMING IN PYTHON

Course Outcomes:
CO1-Interpret the basic concepts of Python programs. (K2)
CO2-Articulate the concepts of Sets, Dictionaries and Object-Oriented concepts. (K2)
CO3- Experiment with Numpy package. (K3)
CO4-Apply and analyze Data Manipulation with Pandas. (K3)
CO5-Illustrate programming concept for Visualization with Matplotlib. (K3)

U23EET304-ELECTROMAGNETIC THEORY

Course Outcomes:
CO1-Interpret the basic mathematical concepts related to electrostatic and electromagnetic fields. (K2)
CO2-Explain the basic concepts of electrical potential, electric dipole, energy density and their applications. (K2)
CO3- Predict the magnetic field for the analysis of electrical machines. (K3)
CO4-Illustrate the behaviour of magnetic fields at the interface of two different materials and their applications to electrical engineering (K3)
CO5-Gain knowledge about the relation between electric and magnetic fields with help of Maxwell's Equation and analyze Electromagnetic Wave propagation, Poynting Vector and Poynting Theorem. (K2)

U23EET305-ELECTRICAL MACHINES – I

Course Outcomes:
CO1-Describe the magnetic circuit calculations and principles of Electromechanical energy conversion (K2)
CO2-Predict the performance of DC machines under various operating conditions using their characteristics. (K3)
CO3-Interpret the efficiency of DC machines by conducting Suitable tests. (K2)
CO4-Illustrate the performance of transformers by equivalent circuits. (K3)
CO5- Summarize the efficiency of Transformers by conducting Suitable tests and analyze the characteristics of special transformers. (K2)

U23EET306-ELECTRONICS - III

Course Outcomes:
CO1-Describe the IC fabrication process of devices and various logic families. (K2)
CO2-Apply OP AMP based circuits for applications like ADC, DAC etc. (K3)
CO3-Analyze filters and waveform generator circuits using OP AMP. (K4)
CO4-Categorize the regulators for various power supply circuits. (K4)
CO5-Illustrate multivibrator circuits using 555 timer and classify memory devices. (K3)

U23EEB301-ELECTRIC CIRCUIT ANALYSIS

Course Outcomes:
CO1-Solve DC and AC networks using various network theorems. (K3)
CO2-Predict the behavior of three phase circuits for different types of load under balanced and unbalanced conditions (K3)
CO3-Categorize the steady state and transient response of various circuits with DC and AC excitations. (K4)
CO4-Examine various electrical circuits using simulation software (K3)
CO5-Demonstrate the behaviour of magnetically coupled circuits for series and parallel connections using simulation software (K3)

U23ENPC01-GENERAL PROFICIENCY – I

Course Outcomes:
CO1-Interpret meaning and apply reading strategies in technical and non-technical context (K3)
CO2-Develop interpersonal communication skills professionally (K4)
CO3-Demonstrate various forms of formal writing (K3)
CO4-Decode graphical data coherently (K2)
CO5-Apply the techniques of verbal aptitude in competitive exams (K3)

U23MAPC01-ENGINEERING MATHEMATICS LABORATORY

Course Outcomes:
CO1-Perform and evaluate Matrix Operations (K3)
CO2-Solve Differential and Integral Equations (K3)
CO3-Construct Fourier series and Fourier Transforms of the given function (K3)
CO4-Find the Measures of Central tendency (K3)
CO5-Analyze Correlation and Regression lines (K3)

U23ADPC01-PROGRAMMING IN PYTHON LABORATORY

Course Outcomes:
CO1-Describe common Python functionality and features used for data science. (K3)
CO2-Query Data Frame structures for cleaning and processing. (K3)
CO3-Configure your programming environment (K3)
CO4-Experiment the concept using data visualization. (K3)
CO5-Analyze real time datasets. (K3)

U23EEP304-ELECTRICAL MACHINES – I LABORATORY

Course Outcomes:
CO1-Test the performance of DC machines and transformers by conducting suitable experiments (K3)
CO2-Predetermine the different performance characteristics of DC machines and transformers. (K3)
CO3-Analyze the various speed control techniques and electrical braking of DC shunt motor. (K3)
CO4-Infer the load sharing of single-phase transformers by parallel operation. (K3)
CO5-Experiment the performance of DC machine for various applications. (K3)

ABILITY ENHANCEMENT COURSE

U23EEC3XX-CERTIFICATION COURSE - III

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence. Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23EES301-SKILL ENHANCEMENT COURSE I

1. TESTING OF ELECTRONICS DEVICES AND PCB BOARD DESIGNING

Course Content:

Testing of Electronic Devices:

1. Identification of components and its symbols
2. Testing of semiconductor devices (Diodes, BJT, SCR, DIAC, TRIAC, MOSFET and IGBT)
3. Testing of multimeter, function generator and regulated power supply
4. Identification and testing of resistors, capacitors and inductors

PCB -Through Hole Technology Mounting (THT):

5. Schematic capture of Electronic Circuits and PCB Design
6. Fabrication of PCB for Clapping and IR switching circuits
7. Fabrication of PCB for cell, battery and mobile charger

PCB - Surface Mount Technology:

8. Calculation of Surface mount device (SMD) resistor values.
9. Identification and testing of SMD Components (Capacitor, Fuse, Coil, Diode, Transistor and Crystals)
10. Practice of SMT Integrated Circuits-package types (SOIC, SOP, QFP, PLCC and BGA)
11. Practice of different SMT solder joints and soldering methods
12. Assembling Process of SMT
13. Design and implementation of Microcontroller Development board using SMT.

2. DESIGN OF SOLAR POWER PLANT AND INSTALLATION

Course Content:

1. Familiarization of Subsidy scheme for Solar Photovoltaic in Urban sector, water pumping system and house rooftop.
2. Selection of PV module technology
3. Design of solar PV system for fan and LED lamps.
4. Connection of PV Module (Series and Parallel Circuit)
5. Preparation of single line diagram and plant array layout diagram.
6. Calculation of battery capacity for household appliance
7. Selection and sizing of Inverter and controller
8. Selection and sizing of AC and DC Cables
9. Net Metering and Introduction to Smart grid
10. Cost estimation and payback period calculation for solar power plant

3. DEMONSTRATION / TROUBLESHOOTING OF ELECTRICAL AND ELECTRONICS EQUIPMENTS

Course Content:

1. Demonstration of electrical safety and electricity tariff calculation for household appliances.
2. Single phase house wiring, Fuse calculation and Extension box fitting
3. Demonstration of electrical measuring instruments (Ammeter, Voltmeter, CRO, DSO and Multimeter)
4. a) Electrical wiring for fan and tube light
   b) Demonstration of coil rewinding of ceiling fan
5. Troubleshooting of electrical and electronic home appliances - (Electric water heater, Iron box)
6. Troubleshooting of electrical and electronic home appliances - (Rice cooker, Vacuum cleaner)
7. Troubleshooting of electrical and electronic home appliances -(Washing machine, Mixer)
8. Troubleshooting of electrical and electronic home appliances-(Air conditioner, Grinder)
9. Troubleshooting of electrical and electronic home appliances- Induction stove
11. Demonstration of water level indicator for domestic purpose.
12. Troubleshooting Steps for Common TV Problems
13. Construction of series and parallel connection of LED for decoration purpose.
14. Demonstration and design of inductive coil for required specification.

MANDATORY COURSE

U23EEM303-CLIMATE CHANGE

CO1-Inspect the characteristics and Temperature profile of the atmosphere (K2)
CO2-Analyze past climate, human influence on global warming, and predict future climates (K3)
CO3-Analyze the impact of climate change and the risk of Irreversible Changes (K3)
CO4-Outline the carbon credits and evidences of changes in Environment (K2)
CO5-Acquire knowledge on clean development mechanism and mitigation technologies (K2)

2.A.1.94

Academic calendar – III Year / V Sem

Use of Cell Phones

It has been decided not to permit cell phones inside the college campus. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pined. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working Hours

I hour	09.00 a.m	to	09.50 a.m
II hour	09.50 a.m	to	10.40 a.m
Break	10.40 a.m	to	10.55 a.m
III hour	10.55 a.m	to	11.45 a.m
IV hour	11.45 a.m	to	12.35 p.m
V hour	01.15 p.m	to	02.05 p.m
VIhour	02.05 p.m	to	02.55 p.m
Break	02.55 p.m	to	03.10 p.m
VII hour	03.10 p.m	to	04.00 p.m
VIII hour	04.00 p.m	to	04.50 p.m

Lunch break 12.35 p.m. to 1.15 p.m.

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM) Scheme for Continuous Assessment Test (CAT)

S. No	Course Type	Continuous Assessment components									
		Test Marks	Average of pre/post lab/ viva for each experiment	Average of marks for experiment report for each experiment	Model Exam / Report	Assignment	Review - 1	Review - 2	Review - 3	Attendance	Total
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project Phase-I	-	-	-	-	-	15	15	20	-	50
4.	Project Phase-II	-	-	-	-	-	10	10	20	-	40

The internal marks will be provided fully based on the continuous assessment tests

Weightage of Assessment for Theory Course

S.No.	Test	Portion for Test	Test Marks	Duration of Test	Weightage for Internal
1	CAT 1	1½ Units	50	1 ½ hours	10
2	CAT 2	1½ Units	50	1 ½ hours	
3	Model	5 Units	75	3 hours	05
Continuous Assessment for Theory Course					15

Question Paper Pattern

Question paper for CAT and ESE will be based on the pattern shown in Table (a) and (b)

Table (a) Question Paper pattern for CAT/Model Exam

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 / CAT 2	5(questions) (10 Marks)	4(questions) (20 Marks)	2 (questions) (30 Marks)	50
Model	End Semester Examination Question Pattern			75

Table (b) Question paper pattern for End semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10(20 Marks)	5 (25 Marks) (one question from each unit)	3 (30 Marks) (out of 5 questions, one question from each unit)	75

End Semester Examination Question Paper Pattern for Six Units Courses

Course	2 Mark	5 Mark	8 / 9 Mark	Total Marks
Part A	5	2 (out of 3 questions, one from each unit)	one 8 mark question (out of 2 questions from Unit I and Unit II)	37
			One 9 mark question (compulsory question from unit III)	
Part B	5	2 (out of 3 questions, one from each unit)	Two 8 mark questions (out of 3 questions from IV, V & VI)	38

Requirements for Appearing End Semester Examination

A student is expected to maintain 100% attendance in all courses as attendance also carries internal marks. A student will be qualified to appear for end semester examinations of a semester only if he/she satisfies the below mentioned requirements.

The student is permitted to appear for End Semester Examinations, only if he/she maintains minimum 75% of attendance. If he/she secured attendance greater than or equal to 60 % and less than 75 % has to pay the necessary condonation prescribed by the college authority with necessary supporting documents for his/her absence.

Redo Category

A student who secures overall attendance less than 60% has to repeat the course with the approval, when it is next offered. A student secures attendance greater than or equal to 60% and less than 75% will be promoted to next higher semester only if loss of attendance is due to medical reasons(hospitalization/ accident/illness) or participation in sports event or any competitions or NCC or NSS activities with prior permission from the Head of Institution through the Head of the department with necessary supporting documents and payment of necessary condonation fee as prescribed by the college authority. However student secures more than 75 % of attendance in the current semester will be moved to next higher semester.

Women Empowerment Cell

For the Welfare of the girl students, a Women Cell has been constituted in the college. The girl students may approach the member secretary for assistance.
Mail id : wec@smvec.ac.in

Grievance Redressal Committee

There is a Grievance Redressal committee in our college and the details are available in the website. Students can approach the member of the committee to redress their grievances if any. Mail id : grievance@smvec.ac.in

Internal Complaints Committee

The objective of this committee is to avoid sexual harassment of students and women employees in the college by preventing it, recording complaints, and taking appropriate action in response. It also aims to eliminate gender-based discrimination by creating a safe physical and social environment that deters sexual harassment and enforcing the necessary disciplinary actions. For complaints :
Mail id : ice@smvec.ac.in

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry -605 107

Academic Calendar

July 2024 to November 2024

Programme / Regulations : B.Tech / R-2020
Year / Sem : III year / V Sem & IV year / VII Sem

About Autonomous:

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Bondicherry University on 19th June 2020.

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M 1: **Quality Education:** To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: **Research and Innovation:** To foster value- based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: **Employability and Entrepreneurship:** To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: **Ethical Values:** To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

III Year / V Sem & IV Year/ VII Sem

July 2024

Date	Day	Schedule	Working Day
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		Holiday
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
11	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	Commencement of Classes for III & IV years	1
16	Tue		2
17	Wed	Muharram	Holiday
18	Thu		3
19	Fri		4
20	Sat		Holiday
21	Sun		Holiday
22	Mon		5
23	Tue		6
24	Wed		7
25	Thu		8
26	Fri	Phase- I /Project Review - I	9
27	Sat		10
28	Sun		Holiday
29	Mon	World Nature Conservation Day	11
30	Tue		12
31	Wed		13

Total number of working days : 13
Total number of holiday : 04

August 2024

Date	Day	Schedule	Working Day
1	Thu		14
2	Fri		15
3	Sat		Holiday
4	Sun		Holiday
5	Mon		16
6	Tue		17
7	Wed		18
8	Thu		19
9	Fri		20
10	Sat		21
11	Sun		Holiday
12	Mon		22
13	Tue		23
14	Wed		24
15	Thu	Independence Day	Holiday
16	Fri	Independence Day (Puducherry)	Holiday
17	Sat		Holiday
18	Sun		Holiday
19	Mon		25
20	Tue	Online Feedback-1	26
21	Wed	Assignment-1	27
22	Thu	Submission of QCM-1 / Syllabus Coverage	28
23	Fri		29
24	Sat	Submission of Attendance and Assessment Record	30
25	Sun		Holiday
26	Mon	CAT – 1 (I and II Hour)	31
27	Tue	CAT – 1 (I and II Hour)	32
28	Wed	CAT – 1 (I and II Hour)	33
29	Thu	CAT – 1 (I and II Hour)	34
30	Fri	CAT – 1 (I and II Hour)	35
31	Sat	CAT – 1 (I and II Hour)	36

Total number of working days : 23
Total number of holiday : 08

September 2024

Date	Day	Schedule	Working Day
1	Sun		Holiday
2	Mon		37
3	Tue		38
4	Wed	Submission of CAT-1 Result Analysis	39
5	Thu	Teachers Day	40
6	Fri	Phase II Project Review - II	41
7	Sat	Vinayagar Chaturthi	Holiday
8	Sun		Holiday
9	Mon		42
10	Tue		43
11	Wed		44
12	Thu		45
13	Fri		46
14	Sat		47
15	Sun		Holiday
16	Mon	Milad Nabi/ World Ozone Day	Holiday
17	Tue		48
18	Wed		49
19	Thu		50
20	Fri		51
21	Sat		Holiday
22	Sun		Holiday
23	Mon	Online Feedback-2	52
24	Tue	Assignment - 2	53
25	Wed	Submission of QCM-2/ Syllabus coverage	54
26	Thu	Submission of Attendance and Assessment Record	55
27	Fri	CAT – 2 (I and II Hour)	56
28	Sat	CAT – 2 (I and II Hour) Inventor Day	57
29	Sun		Holiday
30	Mon	CAT – 2 (I and II Hour)	58

Total number of working days : 22
Total number of holiday : 08

October 2024

Date	Day	Schedule	Working Day
1	Tue	CAT – 2 (I and II Hour)	59
2	Wed	Gandhi Jayanthi - Holiday	Holiday
3	Thu	CAT – 2 (I and II Hour)	60
4	Fri	CAT – 2 (I and II Hour)	61
5	Sat		Holiday
6	Sun		Holiday
7	Mon		62
8	Tue	Phase II Project Review - III	63
9	Wed		64
10	Thu	Submission of CAT2 Result Analysis	65
11	Fri	Saraswathy Pooja	Holiday
12	Sat	Vijayadasmi	Holiday
13	Sun		Holiday
14	Mon		66
15	Tue		67
16	Wed	Online Feedback-3	68
17	Thu	Assignment-3	69
18	Fri	Submission of QCM-3 / Syllabus coverage	70
19	Sat		Holiday
20	Sun		Holiday
21	Mon	MODEL EXAM-Starts	71
22	Tue		72
23	Wed		73
24	Thu		74
25	Fri		75
26	Sat	MODEL EXAM- Ends	76
27	Sun		Holiday
28	Mon	Tentative Model Practical Examination/ Phase I / Final Project Review	77
29	Tue		78
30	Wed		79
31	Thu	Deepavali	Holiday

Total number of working days :21
Total number of holiday : 10

November 2024

Date	Day	Schedule	Working Day
1	Fri	Puducherry Liberation Day	Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon	Tentative IES Practical	80
5	Tue	Submission of Model Exam Result Analysis	81
6	Wed	Submission of Attendance and Assessment Record	82
7	Thu		83
8	Fri		84
9	Sat		85
10	Sun		Holiday
11	Mon	Tentative – End Semester Theory Examination	
12	Tue		
13	Wed		
14	Thu		
15	Fri		
16	Sat		Holiday
17	Sun		Holiday
18	Mon		
19	Tue		
20	Wed		
21	Thu		
22	Fri		
23	Sat		
24	Sun		Holiday
25	Mon		
26	Tue		
27	Wed		
28	Thu		
29	Fri		
30	Sat		

Total number of working days : 06
Total number of holiday : 03

2.A.1.95

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

BATCH: 2022-2026
YEAR/SEM: III /V
ACADEMIC YEAR: 2024-2025

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

Mission

M1: Quality Education:
To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.
M2: Industrial and Societal Needs:
To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.
M3: Research and Innovation:
To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.
M4: Placement and Entrepreneurship:
To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis:
Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO8: Ethics:
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and teamwork:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication:
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance:
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-long learning:
Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge:
To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility.
PEO2: Innovative Skills:
To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment.
PEO3: Ethics:
To actively embrace leadership qualities for achieving professional goals with ethical values
PEO4: Adaptability:
To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency:
Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of Power Electronics, Electrical Machines and Power Systems.
PSO2: Cutting Edge Technologies:
Explore the new cutting-edge technologies in the field of Electric Vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market
PSO3: Design and Evolution:
Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

U20BST542-NUMERICAL METHODS AND OPTIMIZATION

Course Outcomes
CO1 - Understand the basic concepts and numerical techniques of solving algebraic and transcendental equations. (K3)
CO2 - Understand the knowledge of various numerical techniques of solving linear simultaneous equations. (K3)
CO3 - Appreciate the numerical techniques of interpolation and error approximations in various intervals. (K3)
CO4-Apply optimization techniques for various types of partial differential equations. (K3)
CO5 - Analyze the optimization technique and use the simplex method to solve linear programming problems. (K3)

U20EET513-POWER ELECTRONICS

Course Outcomes
CO1 - Discriminate the switching characteristics of power devices and to use for power conversion. (K2)
CO2 - Inspect the performance of control rectifiers in continuous and discontinuous modes. (K2)
CO3 - Acquire knowledge on operation and analysis of DC-to-DC converters (K2)
CO4 - Outline the operating principles of various types of inverters. (K2)
CO5 - Gain knowledge on the operation of AC to AC converters and its applications (K2)

U20EET514-CONTROL SYSTEMS

Course Outcomes
CO1 - Develop the transfer function for the block diagram / signal flow graph model of electrical / mechanical / electro-mechanical systems. (K3)
CO2 - Analyze the performance of control system using time-domain approach. (K4)
CO3 - Analyze performance characteristics of system using Frequency response methods. (K3)
CO4 -Design P/I/D controllers for the System in order to meet design specifications. (K4)
CO5 - Express the control systems into state space models and analyze the performance of the system. (K2).

U20EET515-TRANSMISSION AND DISTRIBUTION

Course Outcomes:
CO1 - Summarize the structure of Generation, Transmission and Distribution with real time connection schemes. (K2)
CO2 - Calculate the line parameters in the transmission system and their effects in the overhead lines. (K3)
CO3 - Analyze on different types of transmission lines (short, medium, long) and its performance. (K2)
CO4 - Choose the adaptable types of insulators and cables for transmission and distribution systems. (K3)
CO5 - Compare various schemes of electrification and gain knowledge on High Voltage AC / DC system (K2)

PROFESSIONAL ELECTIVE-II

U20EEES08-ELECTRICAL ENERGY AUDIT AND CONSERVATION

Course Outcomes:
CO1 - Outline about the energy audit process and instruments. (K2)
CO2 - Apply the energy efficient methods for improving efficiency of electric motors. (K2)
CO3 - Develop good illumination systems and analyze the power factor. (K3)
CO4 - Acquire knowledge on various meters used for energy management. (K2)
CO5 - Analyze and evaluate cost effective model in electrical equipment (K5)

U20EEE506- UTILIZATION OF ELECTRICAL ENERGY

Course Outcomes:
CO1 - Develop a clear idea on lighting requirement for domestic and industrial needs in an efficient way. (K3)
CO2 - Analysis the different types of heating and welding schemes used in the industries. (K4)
CO3 - Repair the minor faults that occurs in refrigerator and in air conditioning system. (K4)
CO4 - Analyze the speed-time characteristics and performance of the electric traction. (K4)
CO5 - Calculate the power requirement and efficiency of domestic appliances. (K4)

OPEN ELECTIVE-II
U20HSO501-PRODUCT DEVELOPMENT AND DESIGN

Course Outcomes:
CO1 - Apply the concept for new product development. (K3)
CO2 - Validate knowledge on the concepts of product specification. (K3)
CO3 - Describe the principles of industrial design and prototyping. (K2)
CO4 - Apply knowledge on product architecture. (K3)
CO5 - Review the concept of product development and customer needs. (K5)

U20BSPS43-NUMERICAL METHODS AND OPTIMIZATION LAB

Course Outcomes:
CO1 - Solve polynomial equation. (K3)
CO2 - Find out the root of the Algebraic and Transcendental equations. (K3)
CO3 - Know the applications of interpolation (K3)
CO4 - Apply the Trapezoidal formula. (K3)
CO5 - Evaluate the integrals using simpson's formula. (K5)

U20EEPS10-POWER ELECTRONICS AND DRIVES LAB

Course Outcomes:
CO1 - Analyze the fundamental operations of power semiconductor devices and its characteristics. (K3)
CO2 - Demonstrate the operation of various power converters circuits. (K4)
CO3 - Illustrate the operating characteristics of AC and DC Drives. (K4)
CO4 - Acquire knowledge on design and implementation of Microcontroller based control schemes for electrical drives. (K5)
CO5 - Design and implement the closed loop controllers for converters. (K5)

U20EEPS11-CONTROL SYSTEMS LAB

Course Outcomes:
CO1 - Interpret different electrical and mechanical systems with its modelling. (K2)
CO2 - Use the time domain analysis, to predict stability of a system performance of the system (K3)
CO3 - Demonstrate frequency domain analysis of a system. (K3)
CO4 - Familiarize with the tuning procedure of P/I/D controllers for converter/motor applications. (K4)
CO5 - Design a controller for any system to meet the desired performance. (K4)

EMPLOYABILITY ENHANCEMENT COURSE

U20EECSXX CERTIFICATION COURSE – V

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence. Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U20EES504 SKILL DEVELOPMENT COURSE 4

Student should choose the Foreign Language/IELTS course like Japanese/French/ Germany/IELTS, etc. approved by the Department committee comprising of HoD, Programme Academic Coordinator, Class advisor and language Experts. The courses are to be approved by Academic Council on the recommendation of HoD at the beginning of the semester if necessary, subject to ratification in the next Academic council meeting. Students have to complete the courses successfully. The Committee will monitor the progress of the student and recommend the grade (100% Continuous Assessment pattern) based on the completion of course. The marks attained for this course is not considered for CGPA calculation

U20EES505 SKILL DEVELOPMENT COURSE 5

The methodology used is "learning by doing", a hands-on approach, enabling the students to follow their own pace. The teacher, after explaining the project, became a tutor, answering questions and helping students on their learning experience.

Communication Technology (CT) skill:

a. Understand ICT workflow in cloud computing.
b. Manage multitasking.
c. Deal with main issues using technology in class.
d. Record, edit and deliver audio and video.
e. Automate assessments and results.

Teaching tools:

f. Different ways to create audio-visual activities.
g. Handle audio-visual editors.
h. Collaborative working.
i. Individualize learning experience.
j. Get instant feedback from students.

Each one of the students will be assigned an ICT Topic and the student has to conduct a detailed study and have to prepare a report, running to 15 or 20 pages for which a demo to be performed followed by a brief question and answer session. The demo will be evaluated by the internal assessment committee for a total of 100 marks. The marks attained for this course is not considered for CGPA calculation

MANDATORY COURSE

U20EEM505-INDIAN CONSTITUTION

Course Outcomes:
CO1 - Identify and explore the basic features and modalities about Indian constitution.
CO2 - Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
CO3 - Differentiate different aspects of Indian Legal System and its related bodies.
CO4 - Discover and apply different laws and regulations related to engineering practices.
CO5 - Correlate the role of engineers with different organizations and governance models

2.A.1.96

Academic calendar – IV Year / VII Sem

Use of Cell Phones

It has been decided not to permit cell phones inside the college campus. If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pinned. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working Hours

I hour	09.00 a.m	to	09.50 a.m
II hour	09.50 a.m	to	10.40 a.m
Break	10.40 a.m	to	10.55 a.m
III hour	10.55 a.m	to	11.45 a.m
IV hour	11.45 a.m	to	12.35 p.m
V hour	01.15 p.m	to	02.05 p.m
VIhour	02.05 p.m	to	02.55 p.m
Break	02.55 p.m	to	03.10 p.m
VII hour	03.10 p.m	to	04.00 p.m
VIII hour	04.00 p.m	to	04.50 p.m

Lunch break 12.35 p.m. to 1.15 p.m.

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)
Scheme for Continuous Assessment Test (CAT)

S. No	Course Type	Continuous Assessment components									
		Test Marks	Average of prepartory/ viva for each experiment	Average of marks for experiment report for each experiment	Model Exam / Report	Assignment	Review - 1	Review - 2	Review - 3	Attendance	Total
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project Phase-I	-	-	-	-	-	15	15	20	-	50
4.	Project Phase-II	-	-	-	-	-	10	10	20	-	40

The internal marks will be provided fully based on the continuous assessment tests

Weightage of Assessment for Theory Course

S.No.	Test	Portion for Test	Test Marks	Duration of Test	Weightage for External
1	CAT 1	1½ Units	50	1 ½ hours	10
2	CAT 2	1½ Units	50	1 ½ hours	
3	Model	5 Units	75	3 hours	05
		Continuous Assessment for Theory Course			15

Question Paper Pattern

Question paper for CAT and ESE will be based on the pattern shown in Table (a) and (b)

Table (a) Question Paper pattern for CAT/Model Exam

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 / CAT 2	5(questions) (10 Marks)	4(questions) (20 Marks)	2 (questions) (30 Marks)	50
Model	End Semester Examination Question Pattern			75

Table (b) Question paper pattern for End semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10(20 Marks)	5 (25 Marks) (one question from each unit)	3 (30 Marks) (out of 5 questions, one question from each unit)	75

End Semester Examination Question Paper Pattern for Six Units Courses

Course	2 Mark	5 Mark	8 / 9 Mark	Total Marks
Part A	5	2 (out of 3 questions, one from each unit)	one 8 mark question (out of 2 questions from Unit I and Unit II) One 9 mark question (compulsory question from unit III)	37
Part B	5	2 (out of 3 questions, one from each unit)	Two 9 mark questions (out of 3 questions from IV, V & VI)	38

Requirements for Appearing End Semester Examination

A student is expected to maintain 100% attendance in all courses as attendance also carries internal marks. A student will be qualified to appear for end semester examinations of a semester only if he/she satisfies the below mentioned requirements.

The student is permitted to appear for End Semester Examinations, only if he/she maintains minimum 75% of attendance. If he/she secured attendance greater than or equal to 60 % and less than 75 % has to pay the necessary condonation prescribed by the college authority with necessary supporting documents for his/her absence.

Redo Category

A student who secures overall attendance less than 60% has to repeat the course with the approval, when it is next offered. A student secures attendance greater than or equal to 60% and less than 75% will be promoted to next higher semester only if loss of attendance is due to medical reasons(hospitalization/ accident/illness) or participation in sports event or any competitions or NCC or NSS activities with prior permission from the Head of Institution through the Head of the department with necessary supporting documents and payment of necessary condonation fee as prescribed by the college authority. However student secures more than 75 % of attendance in the current semester will be moved to next higher semester.

Women Empowerment Cell

For the Welfare of the girl students, a Women Cell has been constituted in the college. The girl students may approach the member secretary for assistance.
Mail id : wec@snsvec.ac.in

Grievance Redressal Committee

There is a Grievance Redressal committee in our college and the details are available in the website. Students can approach the member of the committee to redress their grievances if any. Mail id : **grievance@snsvec.ac.in**

Internal Complaints Committee

The objective of this committee is to avoid sexual harassment of students and women employees in the college by preventing it, recording complaints, and taking appropriate action in response. It also aims to eliminate gender-based discrimination by creating a safe physical and social environment that deters sexual harassment and enforcing the necessary disciplinary actions. For complaints :
Mail id : ice@snsvec.ac.in

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

Academic Calendar

July 2024 to November 2024

Programme / Regulations : B.Tech / R-2020
Year / Sem : III year / V Sem & IV year / VII Sem

About Autonomous

Sri Manakula Vinayagar Engineering College has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020.

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M 1: Quality Education: To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation: To foster value- based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship: To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values: To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

III Year / V Sem & IV Year/ VII sem

July 2024

Date	Day	Schedule	Working Day
1	Mon		
2	Tue		
3	Wed		
4	Thu		
5	Fri		
6	Sat		Holiday
7	Sun		Holiday
8	Mon		
9	Tue		
10	Wed		
11	Thu		
12	Fri		
13	Sat		
14	Sun		Holiday
15	Mon	Commencement of Classes for III & IV years	1
16	Tue		2
17	Wed	Muharram	Holiday
18	Thu		3
19	Fri		4
20	Sat		Holiday
21	Sun		Holiday
22	Mon		5
23	Tue		6
24	Wed		7
25	Thu		8
26	Fri	Phase-1 /Project Review - I	9
27	Sat		10
28	Sun		Holiday
29	Mon	World Nature Conservation Day	11
30	Tue		12
31	Wed		13

Total number of working days : 13
Total number of holiday : 04

August 2024

Date	Day	Schedule	Working Day
1	Thu		14
2	Fri		15
3	Sat		Holiday
4	Sun		Holiday
5	Mon		16
6	Tue		17
7	Wed		18
8	Thu		19
9	Fri		20
10	Sat		21
11	Sun		Holiday
12	Mon		22
13	Tue		23
14	Wed		24
15	Thu	Independence Day	Holiday
16	Fri	Independence Day (Puducherry)	Holiday
17	Sat		Holiday
18	Sun		Holiday
19	Mon		25
20	Tue	Online Feedback-1	26
21	Wed	Assignment-1	27
22	Thu	Submission of QCM-1 / Syllabus Coverage	28
23	Fri		29
24	Sat	Submission of Attendance and Assessment Record	30
25	Sun		Holiday
26	Mon	CAT – 1 (I and II Hour)	31
27	Tue	CAT – 1 (I and II Hour)	32
28	Wed	CAT – 1 (I and II Hour)	33
29	Thu	CAT – 1 (I and II Hour)	34
30	Fri	CAT – 1 (I and II Hour)	35
31	Sat	CAT – 1 (I and II Hour)	36

Total number of working days : 23
Total number of holiday : 08

September 2024

Date	Day	Schedule	Working Day
1	Sun		Holiday
2	Mon		37
3	Tue		38
4	Wed	Submission of CAT-1 Result Analysis	39
5	Thu	Teachers Day	40
6	Fri	Phase I/ Project Review - II	41
7	Sat	Vinayagar Chaturthi	Holiday
8	Sun		Holiday
9	Mon		42
10	Tue		43
11	Wed		44
12	Thu		45
13	Fri		46
14	Sat		47
15	Sun		Holiday
16	Mon	Milad Nabi/ World Ozone Day	Holiday
17	Tue		48
18	Wed		49
19	Thu		50
20	Fri		51
21	Sat		Holiday
22	Sun		Holiday
23	Mon	Online Feedback-2	52
24	Tue	Assignment - 2	53
25	Wed	Submission of QCM-2/ Syllabus coverage	54
26	Thu	Submission of Attendance and Assessment Record	55
27	Fri	CAT – 2 (I and II Hour)	56
28	Sat	CAT – 2 (I and II Hour) Invasion Day	57
29	Sun		Holiday
30	Mon	CAT – 2 (I and II Hour)	58

Total number of working days : 22
Total number of holiday : 08

October 2024

Date	Day	Schedule	Working Day
1	Tue	CAT – 2 (I and II Hour)	59
2	Wed	Gandhi Jayanthy - Holiday	Holiday
3	Thu	CAT – 2 (I and II Hour)	60
4	Fri	CAT – 2 (I and II Hour)	61
5	Sat		Holiday
6	Sun		Holiday
7	Mon		62
8	Tue	Phase II Project Review - III	63
9	Wed		64
10	Thu	Submission of CAT2 Result Analysis	65
11	Fri	Saraswathy Pooja	Holiday
12	Sat	Vijayadasmi	Holiday
13	Sun		Holiday
14	Mon		66
15	Tue		67
16	Wed	Online Feedback-3	68
17	Thu	Assignment-3	69
18	Fri	Submission of QCM-3 / Syllabus coverage	70
19	Sat		Holiday
20	Sun		Holiday
21	Mon	MODEL EXAM- Starts	71
22	Tue		72
23	Wed		73
24	Thu		74
25	Fri		75
26	Sat	MODEL EXAM- Ends	76
27	Sun		Holiday
28	Mon	Tentative Model Practical Examinations/ Phase I / Final Project Review	77
29	Tue		78
30	Wed		79
31	Thu	Deepavali	Holiday

Total number of working days :21
Total number of holiday : 10

November 2024

Date	Day	Schedule	Working Day
1	Fri	Puducherry Liberation Day	Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon	Tentative ES Practical	80
5	Tue	Submission of Model Exam Result Analysis	81
6	Wed	Submission of Attendance and Assessment Record	82
7	Thu		83
8	Fri		84
9	Sat		85
10	Sun		Holiday
11	Mon	Tentative – End Semester Theory Examinations	
12	Tue		
13	Wed		
14	Thu		
15	Fri		
16	Sat		Holiday
17	Sun		Holiday
18	Mon		
19	Tue		
20	Wed		
21	Thu		
22	Fri		
23	Sat		
24	Sun		Holiday
25	Mon		
26	Tue		
27	Wed		
28	Thu		
29	Fri		
30	Sat		

Total number of working days : 08
Total number of holiday : 03

2.A.1.97

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR: 2024-2025

BATCH: 2021-2025
YEAR/SEM: IV /VII

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

Mission

M1: Quality Education:
To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal Needs:
To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation:
To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship:
To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:
Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics:
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and teamwork:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning:
Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Professional Knowledge:
To possess strong educational foundation in Electrical and Electronics Engineering to attain successful career with professional responsibility.

PEO2: Innovative Skills:
To enrich the skills to design and develop innovative solutions for engineering problems in a multidisciplinary environment.

PEO3: Ethics:
To actively embrace leadership qualities for achieving professional goals with ethical values

PEO4: Adaptability:
To enhance intellectual competency along with technical skills by adapting to the current trends through eternal learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Core Proficiency:
Utilize the engineering core knowledge to identify, formulate, design, and investigate the complex engineering problems of Power Electronics, Electrical Machines and Power Systems.

PSO2: Cutting Edge Technologies:
Explore the new cutting-edge technologies in the field of Electric Vehicle, Automation, Artificial Intelligence, Robotics and Renewable Energy to compete in global market

PSO3: Design and Evolution:
Capability to comprehend the technological advancements with the usage of modern design tools for analysing and designing systems to confront the rapid pace of industrial innovations.

U20EET720- INDUSTRIAL AUTOMATION AND CONTROL

Course Outcomes:
CO1 - Analyze the type of Automation system and its architecture in detail. (K3)
CO2 - Discuss the history of PLC, main parts and its functions. (K3)
CO3 - Illustrate the operation of Relays, contactors, Motor Starters, Switched, Sensors, Output Control Devices, etc., (K3)
CO4 - Acquire knowledge about the operation of SCADA and its sub-systems. (K3)
CO5 - Demonstrate the fundamentals of Human-Machine Interface. (K3)

U20EECM02 - ELECTRIC VEHICLE TECHNOLOGY

Course Outcomes:
CO1 - Summarize the basics of electric vehicle and its working principle. (K2)

CO2 - Review the working of different configurations of electric drives and its concepts (K2)
CO3 - Analyze the different sensor and sensorless control in electric vehicle (K4)
CO4 - Describe the working of different configurations of hybrid vehicles. (K2)
CO5 - Combine the different energy storage technologies and its implementation in hybrid vehicle. (K2)

PROFESSIONAL ELECTIVE – IV

U20ICCM01-FUZZY LOGIC AND NEURAL NETWORKS

Course Outcomes:
CO1 - Illustrate the fuzzy sets and the properties of fuzzy logic (K2)
CO2 - Comprehend fuzzy logic controllers and its applications. (K2)
CO3 - Familiarize in the neural network architecture. (K2)
CO4 - Impart knowledge on various training algorithm of neural network and its application. (K3)
CO5 - Recognize the hybrid Neuro-fuzzy logic controllers. (K2)

OPEN ELECTIVE – IV

U20ECCM04-INTERNET OF THINGS

Course Outcomes:
CO1 - Infer internet of Things and its components. (K2)
CO2 - Describe about Reference modules and Architecture. (K2)
CO3 - Explain the concepts of Hardware and Software Elements. (K2)
CO4 - Build and deploy various Functions with IoT elements. (K3)

CO5 -Develop real-time IoT based Applications. (K3)

U20HSP703-BUSINESS BASICS FOR ENTREPRENEUR

Course Outcomes:
CO1 - Impact comprehensive knowledge of an entrepreneurial ecosystem. (K6)
CO2 - Understand the need and significance of Business Plan in the success of an Enterprise. (K2)
CO3 - Understand the ways to judge the economic and business viability of proposed venture. (K2)
CO4 - Utilize the elements of success of entrepreneurial ventures. (K3)
CO5 - Evaluate the effectiveness of different entrepreneurial strategies. (K5)

U20EEP715-INDUSTRIAL AUTOMATION AND CONTROL LAB

Course Outcomes:
CO1 - Analyze the ladder logic programs and components used for process control. (K2)
CO2 - Design PLC-relay logic for the real time applications (K3)
CO3 - Implement Industrial processing system. (K3)
CO4 - Design a SCADA monitoring system for real time applications. (K3)
CO5 - Diagnose the fault in Power generation and distribution networks, etc. (K3)

U20EEP716-ELECTRIC AND HYBRID VEHICLE LAB

Course Outcomes:
CO1 - Estimate electrical motor power requirement for hybrid electrical vehicle. (K4)
CO2 - Design and analyze the performance electric and hybrid vehicle. (K4)
CO3 - Analyze the performance of Battery in charging and discharging intervals. (K4)
CO4 - Troubleshoot and test the control circuits, sensors, actuators used in an E-Vehicle (K4)
CO5 - Evaluate the electric vehicle performance by mathematical modeling using software. (K4)

U20EEP717- ELECTRICAL SOFTWARE SIMULATION LAB

Course Outcomes:
CO1 - Draft the interior and exterior machine models / components in 2D and 3D using simulation software. (K3)

CO2 - Design, analyze and optimize the electromagnetic parameters of all the Electrical machines using software. (K4)
CO3 - Model and integrate the micro grid system. (K4)

CO4 - Determine the transmission line parameters by simulation software. (K4)
CO5 - Simulate and analyze the electrical, electronic circuits using appropriate simulation software. (K3)

PROJECT WORK

U20EEW701 -PROJECT PHASE – I

Course Outcomes:
CO1 - Identify the problem statement for the proposed work through the literature survey. (K3)
CO2 - Choose the proper components as per the requirements of the design/system. (K2)
CO3 - Apply the acquainted skills to develop final model/system. (K2)
CO4 - Estimate, plan and execute the project as a team. (K3)
CO5 - Defend the finding and conclude with oral/written reports. (K2)

U20EEW702-INTERNSHIP/ INPLANT TRAINING

Students may undergo training or internship during summer / winter vacation at Industry/ Research organization / University (after due approval from the Mentor, Class advisor and Departmental Consultative Committee (DCC)). In such cases, the internship/training should be undergone continuously (without break) in one organization. Normally no extension of time is allowed. However, DCC may provide relaxation based on the exceptional case. The students are allowed to undergo three to four weeks internship in established industry / Esteemed institution during vacation period. An Evaluation committee formed by the Head of the Department will review and recommend the grade 100% Continuous Assessment pattern as follows: Internship / Inplant training Report (50 %), Presentation (25 %) and oral Examination (25 %).

MANDATORY COURSE

U20EEM707- PROFESSIONAL ETHICS

Course Outcomes:
CO1 - Apply ethics in society. (K3)
CO2 - Discuss the ethical issues related to engineering. (K2)
CO3 - Act as a responsible Experimenter and to follow the codes of Ethics. (K3)
CO4 - Realize the responsibilities and rights in the society. (K2)
CO5 - Familiarize with the Multinational Corporations and its Social Responsibility. (K3)

2.A.198

ANNEXURE – IV

Details of Professional and Open Elective list offered under R-2020

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF PROFESSIONAL ELECTIVE COURSE

ODD SEMESTER – JULY 2024 TO NOV 2024

Batch: 2022 - 2026 **Year/Sem/Sec: III / V / A & B**

S. No	Name of the Professional Elective Course	Course Code	No. of Students opted
1.	Utilization of Electrical Energy	U20EEE506	56
2.	Electrical Energy Audit and Conservation	U20EEE508	52
		Total No. of Students	**108**

Class Advisors
(Mr. A. Janagiraman)
(Dr. D. Sivaraj)

HoD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.9

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF PROFESSIONAL ELECTIVE COURSE

Batch: 2022 - 2026 **Year/Sem/Sec: III / V / A & B**

Name of the Professional Elective: **UTILIZATION OF ELECTRICAL ENERGY**
Course Code: **U20EEE506**

S. No	Enroll Number	Register Number	Name of the Students	Section
1	220408	22UEE002	AFRENA A	A
2	220650	22UEE004	AKASH N	B
3	221666	22UEE007	AROKIA ANANDU PRASANTHU A	A
4	220608	22UEE008	ARUNAISH R	B
5	221712	22UEE009	ARUNPRADAAP S	A
6	220546	22UEE010	ASHWIN KUMAR S	A
7	221257	22UEE014	BARANI DHARAN A	B
8	221476	22UEE021	GOKULARAMANANE S	A
9	220416	22UEE022	GOKULRAJ R	A
10	220873	22UEE023	GOPIKA J	B
11	220470	22UEE024	GOPIKRISHNAN P	A
12	222079	22UEE025	GOPINATH B	B
13	220630	22UEE027	HARINI L	B
14	222010	22UEE033	JEEVITHAA D	A
15	220879	22UEE034	JENI K	A
16	220369	22UEE035	KARMUKILAN A	B
17	221414	22UEE037	KAVIMANJARI L	A
18	222130	22UEE038	KEERTHANA G M	B
19	221785	22UEE039	KUSHAAN ANAND	A
20	220967	22UEE040	LALITH KUMAR S	A
21	220576	22UEE041	LATHIKAA V	A
22	222136	22UEE043	MADHAN A	B
23	221002	22UEE045	MADHAV V	B
24	220820	22UEE046	MAHESH R	B
25	220620	22UEE047	MATHAN M	A
26	221740	22UEE048	MOHAMAD KASEEM M	B
27	220962	22UEE052	MUKESHKUMAR R	A
28	220680	22UEE055	NAVEENKUMAR D	A
29	221070	22UEE060	POOJA R	B
30	220681	22UEE061	POOJITHA A	A
31	220440	22UEE062	PRASANAA K	A

2 . A . 1. 100

32	220526	22UEE064	PUGAZH SELVAN P	A
33	220495	22UEE065	RAAKESH K	A
34	221048	22UEE066	RAGUL A	A
35	220679	22UEE067	RAGUL V	A
36	220931	22UEE069	RAJESH M	A
37	220456	22UEE072	RAMYA S	B
38	222084	22UEE073	RANDHIGA L	B
39	221736	22UEE074	REBEKKAL R	A
40	221424	22UEE077	SAKTHISHWARI S	B
41	220936	22UEE078	SANCHI VENKATESH	A
42	221217	22UEE079	SANJAY U	B
43	222025	22UEE080	SARULATHA T	B
44	222069	22UEE082	SHARANKUMAR M	A
45	221643	22UEE084	SRILOGESHWARAN S	A
46	220540	22UEE085	SURYA PRAKASH B	B
47	220528	22UEE088	THILIPAN SIVA HARI S	B
48	222064	22UEE089	THIRISHA N	A
49	221023	22UEE090	THIRUVENGADAM P	A
50	222093	22UEE093	VARSINEE S	B
51	220545	22UEE095	VIDHYADHARSHINI S	A
52	220724	22UEE096	VIDHYASRI S	A
53	220360	22UEE099	VISHVA P	A
54	231378	22EEL003	GIRIDHARAN R	B
55	230329	22EEL004	JAYAKUMAR S	A
56	230145	22EEL005	KARTHIKEYAN M	A

Class Advisors
(Mr. A. Janagiraman)
(Dr. D. Sivaraj)

HoD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.101

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF PROFESSIONAL ELECTIVE COURSE

Batch: 2022 - 2026 **Year/Sem/Sec: III / V / A & B**

Name of the Professional Elective: **ELECTRICAL ENERGY AUDIT AND CONSERVATION**
Course Code: **U20EEE508**

S. No	Enroll Number	Register Number	Name of the Students	Section
1	220556	22UEE001	ABHINAYAA M	A
2	221212	22UEE003	AKASH KUMAR N	B
3	221578	22UEE005	ANANDHARAMAN V	A
4	220839	22UEE011	ASWINKUMAR A	A
5	220618	22UEE012	ASWITHA R	A
6	220883	22UEE013	BALAKUMARAN A	A
7	220790	22UEE015	CALLIS JOSEPH E	A
8	222096	22UEE016	CHANDRU A	B
9	220881	22UEE017	DHANAVEERANESH J	B
10	220897	22UEE018	DHINISH N	B
11	222026	22UEE019	DHIVIYA S	B
12	221134	22UEE020	GANESH C	B
13	220523	22UEE026	HARINEE P	A
14	221592	22UEE028	HEMACHANDASANAM S	B
15	221455	22UEE029	HERWIN W	A
16	220832	22UEE030	ISHWARYA LAKSHMI S	A
17	220752	22UEE031	IYYAPPAN R	B
18	220641	22UEE032	JAYALAKSHMI L	B
19	220901	22UEE036	KARTHIKRAJA S	B
20	222124	22UEE042	LAVANYA M	B
21	220515	22UEE044	MADHAN S	B
22	221677	22UEE049	MOHAMED ABDULKALAM K	B
23	220742	22UEE050	MOHAMED HARUN RASHEED S	B
24	221636	22UEE051	MONIKA D	B
25	220411	22UEE053	MURUGAN T	B
26	220558	22UEE054	NATHESH N B	B
27	220921	22UEE056	NIVETHITHA B	A
28	220795	22UEE057	PAMPANA KARUNA PRABHAS	B

2.A.1.102

29	222062	22UEE058	PARAMESH S	A
30	221627	22UEE059	PAVINTHRAN U	A
31	220771	22UEE063	PRAVEEN G	B
32	221402	22UEE068	RAJANAGESHVARAN M	B
33	220923	22UEE070	RAMESHKUMAR P	B
34	220541	22UEE071	RAMKUMAR S	A
35	221001	22UEE075	REESHMA R	B
36	220793	22UEE076	SAILESHWAR T	B
37	220431	22UEE081	SELVAM S	B
38	220599	22UEE083	SIVAPOTHIS ALIAS KALICHARAN M	A
39	220928	22UEE086	THARANI S	A
40	220723	22UEE087	THARANITHARAN M	B
41	220429	22UEE091	THOGESH M	B
42	220627	22UEE092	UNILKUMAR D	A
43	220992	22UEE094	VARUNESH S	A
44	221005	22UEE097	VIGNESH V	A
45	220789	22UEE098	VIJAY A	B
46	220792	22UEE100	VISHVA S	B
47	220979	22UEE101	YUGANDIRAN R	A
48	220621	22UEE102	YUGANIGAN J	B
49	230055	22EEL001	BALAJI L	A
50	230209	22EEL002	BHARATHKUMAR S	B
51	231143	22EEL006	PADMASEELAN K	B
52	230752	22EEL007	RAMPRASATH M	B

Class Advisors
(Mr. A. Janagiraman)
(Dr. D. Sivaraj)

HoD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.103

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF OPEN ELECTIVE COURSE

ODD SEMESTER – JULY 2024 TO NOV 2024

Batch: 2022 - 2026 **Year/Sem: III / V**

S. No	Name of the Open Elective Course	Sec	Course Code	No. of Students opted
1.	Product Development and Design	A	U20HSO501	54
2.	Product Development and Design	B	U20HSO501	54
			Total No. of Students	**108**

Class Advisors
(Mr. A. Janagiraman)
(Dr. D. Sivaraj)

HoD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.104

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF OPEN ELECTIVE COURSE

Batch: 2022 - 2026 **Year/Sem/Sec: III / V / A**

Name of the Professional Elective: **PRODUCT DEVELOPMENT AND DESIGN**
Course Code: **U20HSO501**

S. No	Enroll Number	Register Number	Name of the Students	Section
1	220556	22UEE001	ABHINAYAA M	A
2	220408	22UEE002	AFRENA A	A
3	221578	22UEE005	ANANDHARAMAN V	A
4	221666	22UEE007	AROKIA ANANDU PRASANTHU A	A
5	221712	22UEE009	ARUNPRADAAP S	A
6	220546	22UEE010	ASHWIN KUMAR S	A
7	220839	22UEE011	ASWINKUMAR A	A
8	220618	22UEE012	ASWITHA R	A
9	220883	22UEE013	BALAKUMARAN A	A
10	220790	22UEE015	CALLIS JOSEPH E	A
11	221476	22UEE021	GOKULARAMANANE S	A
12	220416	22UEE022	GOKULRAJ R	A
13	220470	22UEE024	GOPIKRISHNAN P	A
14	220523	22UEE026	HARINEE P	A
15	221455	22UEE029	HERWIN W	A
16	220832	22UEE030	ISHWARYA LAKSHMI S	A
17	222010	22UEE033	JEEVITHAA D	A
18	220879	22UEE034	JENI K	A
19	221414	22UEE037	KAVIMANJARI L	A
20	221785	22UEE039	KUSHAAN ANAND	A
21	220967	22UEE040	LALITH KUMAR S	A
22	220576	22UEE041	LATHIKAA V	A
23	220620	22UEE047	MATHAN M	A
24	220962	22UEE052	MUKESHKUMAR R	A
25	220680	22UEE055	NAVEENKUMAR D	A
26	220921	22UEE056	NIVETHITHA B	A
27	222062	22UEE058	PARAMESH S	A
28	221627	22UEE059	PAVINTHRAN U	A
29	220681	22UEE061	POOJITHA A	A
30	220440	22UEE062	PRASANAA K	A
31	220526	22UEE064	PUGAZH SELVAN P	A

2.A.1.105

32	220495	22UEE065	RAAKESH K	A
33	221048	22UEE066	RAGUL A	A
34	220679	22UEE067	RAGUL V	A
35	220931	22UEE069	RAJESH M	A
36	220541	22UEE071	RAMKUMAR S	A
37	221736	22UEE074	REBEKKAL R	A
38	220936	22UEE078	SANCHI VENKATESH	A
39	222069	22UEE082	SHARANKUMAR M	A
40	220599	22UEE083	SIVAPOTHIS ALIAS KALICHARAN M	A
41	221643	22UEE084	SRILOGESHWARAN S	A
42	220928	22UEE086	THARANI S	A
43	222064	22UEE089	THIRISHA N	A
44	221023	22UEE090	THIRUVENGADAM P	A
45	220627	22UEE092	UNILKUMAR D	A
46	220992	22UEE094	VARUNESH S	A
47	220545	22UEE095	VIDHYADHARSHINI S	A
48	220724	22UEE096	VIDHYASRI S	A
49	221005	22UEE097	VIGNESH V	A
50	220360	22UEE099	VISHVA P	A
51	220979	22UEE101	YUGANDIRAN R	A
52	230055	22EEL001	BALAJI L	A
53	230329	22EEL004	JAYAKUMAR S	A
54	230145	22EEL005	KARTHIKEYAN M	A

Class Advisor	HoD	Dean Academics	Director cum Principal
(Mr. A. Janagiraman)	(Dr.P.Jamuna)	(Dr.S.Anbumalar)	(Dr.V.S.K.Venkatachalapathy)

2.A.1.106

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF OPEN ELECTIVE COURSE

Batch: 2022 - 2026 **Year/Sem/Sec: III / V / B**

Name of the Professional Elective: **PRODUCT DEVELOPMENT AND DESIGN**
Course Code: **U20HSO501**

S. No	Enroll Number	Register Number	Name of the Students	Section
1	221212	22UEE003	AKASH KUMAR N	B
2	220650	22UEE004	AKASH N	B
3	220608	22UEE008	ARUNAISH R	B
4	221257	22UEE014	BARANI DHARAN A	B
5	222096	22UEE016	CHANDRU A	B
6	220881	22UEE017	DHANAVEERANESH J	B
7	220897	22UEE018	DHINISH N	B
8	222026	22UEE019	DHIVIYA S	B
9	221134	22UEE020	GANESH C	B
10	220873	22UEE023	GOPIKA J	B
11	222079	22UEE025	GOPINATH B	B
12	220630	22UEE027	HARINI L	B
13	221592	22UEE028	HEMACHANDASANAM S	B
14	220752	22UEE031	IYYAPPAN R	B
15	220641	22UEE032	JAYALAKSHMI L	B
16	220369	22UEE035	KARMUKILAN A	B
17	220901	22UEE036	KARTHIKRAJA S	B
18	222130	22UEE038	KEERTHANA G M	B
19	222124	22UEE042	LAVANYA M	B
20	222136	22UEE043	MADHAN A	B
21	220515	22UEE044	MADHAN S	B
22	221002	22UEE045	MADHAV V	B
23	220820	22UEE046	MAHESH R	B
24	221740	22UEE048	MOHAMAD KASEEM M	B
25	221677	22UEE049	MOHAMED ABDULKALAM K	B
26	220742	22UEE050	MOHAMED HARUN RASHEED S	B
27	221636	22UEE051	MONIKA D	B
28	220411	22UEE053	MURUGAN T	B

2.A.1.107

29	220558	22UEE054	NATHESH N B	B
30	220795	22UEE057	PAMPANA KARUNA PRABHAS	B
31	221070	22UEE060	POOJA R	B
32	220771	22UEE063	PRAVEEN G	B
33	221402	22UEE068	RAJANAGESHVARAN M	B
34	220923	22UEE070	RAMESHKUMAR P	B
35	220456	22UEE072	RAMYA S	B
36	222084	22UEE073	RANDHIGA L	B
37	221001	22UEE075	REESHMA R	B
38	220793	22UEE076	SAILESHWAR T	B
39	221424	22UEE077	SAKTHISHWARI S	B
40	221217	22UEE079	SANJAY U	B
41	222025	22UEE080	SARULATHA T	B
42	220431	22UEE081	SELVAM S	B
43	220540	22UEE085	SURYA PRAKASH B	B
44	220723	22UEE087	THARANITHARAN M	B
45	220528	22UEE088	THILIPAN SIVA HARI S	B
46	220429	22UEE091	THOGESH M	B
47	222093	22UEE093	VARSINEE S	B
48	220789	22UEE098	VIJAY A	B
49	220792	22UEE100	VISHVA S	B
50	220621	22UEE102	YUGANIGAN J	B
51	230209	22EEL002	BHARATHKUMAR S	B
52	231378	22EEL003	GIRIDHARAN R	B
53	231143	22EEL006	PADMASEELAN K	B
54	230752	22EEL007	RAMPRASATH M	B

Class Advisor	HoD	Dean Academics	Director cum Principal
(Dr. D. Sivaraj)	(Dr.P.Jamuna)	(Dr.S.Anbumalar)	(Dr.V.S.K.Venkatachalapathy)

2.A.1.108

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF PROFESSIONAL ELECTIVE COURSE

ODD SEMESTER – JULY 2024 TO DECEMBER 2024

Batch: 2021 - 2025 Year / Sem / Sec: IV / VII / A

S.NO	Name of the Professional Elective Course	Course Code	No of students opted
1	Fuzzy Logic and Neural Networks	U20ICCM01	69
		Total no of students	69

Class Advisor
(Dr.S.Ganesh Kumaran)

HOD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director Cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.109

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF PROFESSIONAL ELECTIVE COURSE

Batch: 2021 - 2025 Year / Sem / Sec: IV / VII / A

Name of the Professional Elective: Fuzzy Logic and Neural Networks

Course Code: U20ICCM01

S.NO	Enroll Number	Register Number	Name	Sec
1.	211101	21UEE001	ABDUL HAFREED H	A
2.	220193	21UEE002	ARCHANA R	A
3.	220200	21UEE004	DEVANATHAN A	A
4.	220209	21UEE005	DHIVYASHREE M	A
5.	210652	21UEE006	DINESH R S	A
6.	220191	21UEE007	ELAMPARUTHI K	A
7.	211853	21UEE008	GANDHAM NAGENDRA KARTHIK	A
8.	220026	21UEE009	GAYATHRY G	A
9.	211845	21UEE010	GLADSON JOSHUA PAULRAJ I	A
10.	220210	21UEE011	GUNAPRIYA S	A
11.	210913	21UEE012	GURUDEVAN L	A
12.	220197	21UEE013	HEMANATHAN D	A
13.	220118	21UEE014	JAYAKUMAR D	A
14.	210639	21UEE015	JEEVASUDHAN G	A
15.	210637	21UEE016	JOTHIKRISHNAN.K	A
16.	220128	21UEE017	KALAIYARASSI M	A
17.	211355	21UEE018	KARTHIKEYAN P	A
18.	210726	21UEE019	KARTHIKRAJA S.D	A
19.	220063	21UEE020	KASTHURI C	A
20.	220168	21UEE021	KAVEEYA K	A
21.	210867	21UEE022	KAVIARASAN M	A
22.	210695	21UEE023	KAVIYA S	A
23.	212011	21UEE024	KEERTHIRAJ. V	A
24.	211591	21UEE025	LOGESH S	A
25.	211253	21UEE026	LOKESH N	A
26.	210778	21UEE027	LOKESHWARI D	A
27.	210650	21UEE028	MAHEYNDIRAN S	A
28.	210688	21UEE029	MOHAN LAL S	A

2.A.1.110

29.	211897	21UEE030	MURUGAN S	A
30.	211584	21UEE031	NIRMAL D	A
31.	211217	21UEE032	NIVEDHA G	A
32.	211400	21UEE033	PRANAV B	A
33.	220102	21UEE034	PRIYADHARSHINI A	A
34.	211769	21UEE035	RAGHUL R	A
35.	211148	21UEE036	RAHUL T	A
36.	220138	21UEE037	RAMANAKRISHNAN S	A
37.	211606	21UEE038	ROSHAN ARVIND. V	A
38.	211404	21UEE039	SABARIGIREESANE J	A
39.	210787	21UEE040	SABARISH R	A
40.	211291	21UEE041	SAI SIDDARTH T S	A
41.	211433	21UEE042	SANJAI S	A
42.	210680	21UEE043	SANTHANA KRISHNAN E	A
43.	220137	21UEE044	SATHISH FRANCIS XAVIER R	A
44.	211987	21UEE045	SIVAGANESH M	A
45.	220090	21UEE046	SONIYA V	A
46.	210702	21UEE047	SOWMYA.S	A
47.	220100	21UEE048	SREE VARDNI P	A
48.	211973	21UEE049	SRIDHASAN NAMBI	A
49.	210667	21UEE050	SRINIVASAN S	A
50.	211040	21UEE051	SUSANGATI SAMANTARAY	A
51.	211503	21UEE052	SWETHA S	A
52.	211970	21UEE053	THAMIZHARASAN. S	A
53.	220073	21UEE054	THILAK BASKARAN C M	A
54.	210813	21UEE055	TOM TIJO EDATTUKARAN	A
55.	211193	21UEE056	VENKATESHWARAN R	A
56.	211334	21UEE057	VIGNESHWARAN V	A
57.	220119	21UEE058	VIJAYALAKSHMI S	A
58.	220159	21UEE059	VINISHA LAXMI G	A
59.	210716	21UEE061	YOGARAJAN R	A
60.	211975	21UEE062	YOGESH .R	A
61.	221057	21EEL001	ABILASH P	A
62.	220405	21EEL002	GAUTHAM G.D	A
63.	221360	21EEL003	NIJANTHAN S	A
64.	220382	21EEL004	PASUPATHI S	A
65.	220968	21EEL005	PERIASAMY R	A
66.	221959	21EEL006	SESHATHRI N	A

2.A.1.111

67.	220644	21EEL007	SOWMIYA J	A
68.	221522	21EEL008	VISUVAMOORTHY G	A
69.	220407	21EEL009	YUVARAJ N	A

Class Advisor
(Dr.S.Ganesh Kumaran)

HOD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director Cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.112

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF OPEN ELECTIVE COURSE

ODD SEMESTER – JULY 2024 TO DECEMBER 2024

Batch: 2021 - 2025 **Year / Sem / Sec: IV / VII / A**

S.NO	Name of the Open Elective Course	Course Code	No of students opted
1	Internet of Things	U20ECCM04	69
		Total no of students	69

Class Advisor
(Dr.S.Ganesh Kumaran)

HOD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director Cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.113

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

DETAILS OF OPEN ELECTIVE COURSE

Batch: 2021 - 2025 Year / Sem / Sec: IV / VII / A

Name of the Open Elective: Internet of Things

Course Code: U20ECCM04

S.NO	Enroll Number	Register Number	Name	Sec
1.	211101	21UEE001	ABDUL HAFREED H	A
2.	220193	21UEE002	ARCHANA R	A
3.	220200	21UEE004	DEVANATHAN A	A
4.	220209	21UEE005	DHIVYASHREE M	A
5.	210652	21UEE006	DINESH R S	A
6.	220191	21UEE007	ELAMPARUTHI K	A
7.	211853	21UEE008	GANDHAM NAGENDRA KARTHIK	A
8.	220026	21UEE009	GAYATHRY G	A
9.	211845	21UEE010	GLADSON JOSHUA PAULRAJ I	A
10.	220210	21UEE011	GUNAPRIYA S	A
11.	210913	21UEE012	GURUDEVAN L	A
12.	220197	21UEE013	HEMANATHAN D	A
13.	220118	21UEE014	JAYAKUMAR D	A
14.	210639	21UEE015	JEEVASUDHAN G	A
15.	210637	21UEE016	JOTHIKRISHNAN.K	A
16.	220128	21UEE017	KALAIYARASSI M	A
17.	211355	21UEE018	KARTHIKEYAN P	A
18.	210726	21UEE019	KARTHIKRAJA S.D	A
19.	220063	21UEE020	KASTHURI C	A
20.	220168	21UEE021	KAVEEYA K	A
21.	210867	21UEE022	KAVIARASAN M	A
22.	210695	21UEE023	KAVIYA S	A
23.	212011	21UEE024	KEERTHIRAJ. V	A
24.	211591	21UEE025	LOGESH.S	A
25.	211253	21UEE026	LOKESH N	A
26.	210778	21UEE027	LOKESHWARI D	A
27.	210650	21UEE028	MAHEYNDIRAN.S	A
28.	210688	21UEE029	MOHAN LAL S	A

2.A.1.114

29.	211897	21UEE030	MURUGAN.S	A
30.	211584	21UEE031	NIRMAL D	A
31.	211217	21UEE032	NIVEDHA G	A
32.	211400	21UEE033	PRANAV B	A
33.	220102	21UEE034	PRIYADHARSHINI A	A
34.	211769	21UEE035	RAGHUL R	A
35.	211148	21UEE036	RAHUL T	A
36.	220138	21UEE037	RAMANAKRISHNAN S	A
37.	211606	21UEE038	ROSHAN ARVIND. V	A
38.	211404	21UEE039	SABARIGIREESANE J	A
39.	210787	21UEE040	SABARISH R	A
40.	211291	21UEE041	SAI SIDDARTH T S	A
41.	211433	21UEE042	SANJAI S	A
42.	210680	21UEE043	SANTHANA KRISHNAN E	A
43.	220137	21UEE044	SATHISH FRANCIS XAVIER R	A
44.	211987	21UEE045	SIVAGANESH M	A
45.	220090	21UEE046	SONIYA V	A
46.	210702	21UEE047	SOWMYA.S	A
47.	220100	21UEE048	SREE VARDNI P	A
48.	211973	21UEE049	SRIDHASAN NAMBI	A
49.	210667	21UEE050	SRINIVASAN S	A
50.	211040	21UEE051	SUSANGATI SAMANTARAY	A
51.	211503	21UEE052	SWETHA S	A
52.	211970	21UEE053	THAMIZHARASAN. S	A
53.	220073	21UEE054	THILAK BASKARAN C M	A
54.	210813	21UEE055	TOM TIJO EDATTUKARAN	A
55.	211193	21UEE056	VENKATESHWARAN R	A
56.	211334	21UEE057	VIGNESHWARAN V	A
57.	220119	21UEE058	VIJAYALAKSHMI S	A
58.	220159	21UEE059	VINISHA LAXMI G	A
59.	210716	21UEE061	YOGARAJAN R	A
60.	211975	21UEE062	YOGESH .R	A
61.	221057	21EEL001	ABILASH P	A
62.	220405	21EEL002	GAUTHAM G.D	A
63.	221360	21EEL003	NIJANTHAN S	A
64.	220382	21EEL004	PASUPATHI S	A
65.	220968	21EEL005	PERIASAMY R	A
66.	221959	21EEL006	SESHATHRI N	A

2.A.1.115

67.	220644	21EEL007	SOWMIYA J	A
68.	221522	21EEL008	VISUVAMOORTHY G	A
69.	220407	21EEL009	YUVARAJ N	A

Class Advisor
(Dr.S.Ganesh Kumaran)

HOD
(Dr.P.Jamuna)

Dean Academics
(Dr.S.Anbumalar)

Director Cum Principal
(Dr.V.S.K.Venkatachalapathy)

2.A.1.116

ANNEXURE – V
Details of SWAYAM/ MOOC Courses

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LIST OF FACULTY ENROLLED FOR NPTEL COURSE FOR ACADEMIC YEAR 2023-2024 EVEN SEM

12 weeks	8 Weeks	Total enrollment
20	2	22

S.No	Name	Designation	Name of the course enrolled	Duration of the Course
1.	Dr.P.Jamuna	Professor	EV – Vehicle Dynamics and Electric Motor Drives	08 Weeks
			Intellectual Property	12 Weeks
2.	Dr.D.Raja	Professor	Introduction to Intellectual Property	12 Weeks
3.	Dr.G.GaneshKumaran	Associate Professor		
4.	Dr.D.Sivaraj	Assistant Professor		
5.	Mr.S.John Powl	Assistant Professor		
6.	Mr.B.Parthiban	Assistant Professor	Introduction to Intellectual Property	12 Weeks
			EV – Vehicle Dynamics and Electric Motor Drives	08 Weeks
7.	Mr.A.Janagiraman	Assistant Professor	Introduction to Intellectual Property	12 Weeks
8.	Mr.K.Thangaraj	Assistant Professor		
9.	Mr.J.Muruganandam	Assistant Professor		
10.	Mr.C.Adrien Perianayagam	Assistant Professor		
11.	Mr.R.Ragupathy	Assistant Professor		
12.	Mr.I.Shivashankar	Assistant Professor		
13.	Ms. T.Abinaya saraswathy	Assistant Professor		
14.	Mr. G.Rajavel	Assistant Professor		
15.	Mr.R.Vignesh	Assistant Professor		
16.	Mr.S. Ellanthamizh	Assistant Professor		
17.	Mrs.D. Meena	Assistant Professor		
18.	Mr.Gnanavel	Assistant Professor	Intellectual Property	12 Weeks
19.	Mr.Rajesh kumar	Assistant Professor	Introduction to Intellectual Property	
20.	Mrs.Amathullah	Assistant Professor	Intellectual Property	

Coordinator

HOD

2.A.1.117

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

List of students enrolled for NPTEL exam for academic year 2023-2024 EVEN SEM

12 weeks	8 weeks	4 weeks
01	56	02

Final year	Third year
39	20

S.No	Name of the Student	Year/Sec	Name of the course enrolled	Duration of the Course
1	KIRUBHANIDHI T	IV Year/ A Sec	A brief introduction of Micro - Sensors	4 Weeks
2	VENKATESHWARAN R	III Year/ A sec	Advanced Textile Printing Technology	8 Weeks
3	KAVIYA S	III Year/ A sec	Air pollution and Control	8 Weeks
4	ARCHANA	III Year/ A sec	Block chain and its Applications	8 Weeks
5	GOPINATH K	IV Year/B Sec	Cloud computing and distributed systems	8 Weeks
6	YOGARAJAN R	III Year/ A sec	Computer Networks And Internet Protocol	8 Weeks
7	NIJANTHAN S	III Year/ A sec	Electrical Machines - II	8 Weeks
8	SATHISH FRANCIS XAVIER R	III Year/ A sec	Environmental Remediation of Contaminated Sites	8 Weeks
9	KRISHNA KUMAR.R	IV Year/ A Sec	EV - Vehicle Dynamics and Electric Motor Drives	8 Weeks
10	MARAN VIKAS	IV Year/ A Sec		
11	RAGHUL.S	IV Year/B Sec		
12	SIVAGURU S	IV Year/ A Sec		
13	POOBATHI P	IV Year/B Sec	Forests and their Management	12 Weeks
14	NIJANTHAN S	III Year/ A sec	Fundamentals Of Electronic Materials And Devices	8 Weeks
15	P SREE VARDNI	III Year/ A sec	IC Engines And Gas Turbines	8 Weeks
16	ANBARASAN N	IV Year/ A Sec	Introduction to programming in C	8 Weeks
17	SRIMANIKANDAN S	IV Year/ A Sec		
18	VAITHEESWARAN N	IV Year/B Sec		
19	GURUDEVAN L	III Year/ A sec	Introduction to Psychology	8 Weeks
20	KEERTHIRAJ V	III Year/ A sec		
21	RAGHUL R	III Year/ A sec		
22	KASTHURI C	III Year/ A sec	Non-conventional energy Resources	8 Weeks
23	THILAK BASKARAN	III Year/ A sec		
24	GODESHWARAN K	IV Year/B Sec	Plastic waste management	8 Weeks
25	HARIHARAN G	IV Year/B Sec		
26	AKASH SV	IV Year/B Sec		
27	KOUSHIK S	IV Year/ A Sec		
28	SANJAI R	IV Year/B Sec		
29	SASIDHARAN R	IV Year/ A Sec		
30	SRINEVAN V	IV Year/ A Sec		
31	ABDULLAH E K	IV Year/B Sec		
32	V.ARTHI	IV Year/B Sec		
33	BADHMA PRIYA M	IV Year/B Sec		
34	DANUSH BALAJI S	IV Year/B Sec		
35	DHINAKARAN.N.D	IV Year/B Sec		
36	KALPANA DEVI M	IV Year/B Sec		

2.A.1.118

37	LATCHIAVASAN.M	IV Year/ A Sec		
38	NARESH.S	IV Year/ A Sec		
39	NAVANITHIYAN K	IV Year/ A Sec		
40	PAVITHRAN S	IV Year/B Sec		
41	PREMKUMAR T	IV Year/B Sec		
42	SIVABALAN G	IV Year/ A Sec		
43	VIJAYA BOOPATHY.S	IV Year/ A Sec		
44	KEERTHIRAJ V	III Year/ A sec		
45	A PRIYADHARSHINI	III Year/ A sec	Product Design and Manufacturing	8 Weeks
46	TOM TIJO EDATTUKARAN	III Year/ A sec		
47	VIGHNESHWAR V	IV Year/B Sec	Python for Data Science	4 Weeks
48	KIRUBAGARAN P	IV Year/B Sec	Waste to Energy Conversion	8 Weeks
49	BHUVANESH M	IV Year/B Sec		
50	DEVAPRIYA. D	IV Year/B Sec		
51	KABILAN S	IV Year/B Sec		
52	KIRANKUMAR S	IV Year/B Sec		
53	KOKILAVANI S	IV Year/B Sec		
54	SURENDHAR V	IV Year/B Sec		
55	TAMILVANAN A	IV Year/B Sec		
56	ARUN PRASATH S	III Year/ A sec		
57	A PRIYADHARSHINI	III Year/ A sec		
58	TOM TIJO EDATTUKARAN	III Year/ A sec		
59	SATHISH FRANCIS XAVIER R	III Year/ A sec	Water and waste water treatment	8 Weeks

Coordinator

HOD

2.A.1.119

ANNEXURE – VI
LIST OF EXAMINERS

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
DETAILS OF EXAMINER

Specialization		Power Electronics and Drives		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1.	Dr.J.Ramesh Rahul	Assistant Professor / EEE, National Institute of Technology, Andhra Pradesh	7989923036	rahuljammy1925@gmail.com
2.	Dr.K.K.Saravanan	Assistant Professor / EEE, University College of Engineering, Thirukuvalai campus, Nagapattinam	9789695832	saravanan.santi@gmail.com
3.	Dr. S. Jeyasudha	Professor / EEE, K.Ramakrishnan College of Technology, Trichy	9629054969	jeayasudhas.eee@krct.ac.in
4.	Dr.S.A.Elankurisil	Professor & Head / EEE, Adhiparasakthi Engineering College, Melmaruvathur.	9442936797	saelankurisil@gmail.com
5.	Dr.V.Vasan Prabhu	Assistant Professor / Department of Automotive Electronics, SRM Institute of Science and Technology, Chennai.	7358682007	vasanprv@srmist.edu.in
6.	Dr.V.Krishna kumar	Associate Professor / EEE, St.Joseph's college of Engineering, Chennai	9944235196	v.krishnakumarsjce@gmail.com
7.	Dr.R.Raja Singh	Associate Professor / Department of Energy and Power Electronics, VIT, Vellore.	9894250650	rrajasingh@vit.ac.in
8.	Dr.C. Kumar	Professor and Head / EEE M Kumarasamy College of Engineering Thalavapalayam Post, Karur Tk,	9994942022	kumarc@bitsathy.ac.in
9.	Dr.Srinivasan Pradabane	Assistant Professor / EEE, National institute of Technology, Warangal, Telegana	8639352033	spradabane@nitw.ac.in
10.	Dr.P.Velmurugan	Associate Professor / EEE, St.Joseph's College of Engineering, Chennai	9976949243	velupriya10@gmail.com
11.	Dr.N.Shobanadevi	Professor , University College of Engineering, Ariyalur.	8778149535	shobanadevi1975@gmail.com
12.	Dr.D.Zamrooth	Asst. Professor, Department of EEE, University college of Engineering, Kanchipuram	9176773605	zam.shireen@gmail.com

2.A.1.120

13.	Dr.A.Saraswathi	Asst.Professor, Department of EEE, University college of Engineering - Villupuram	9994549910	saraswathiask@gmail.com
14.	Dr.S.Prabhu	Associate Professor, Department of EEE, SreeVidyanikethan Engineering College, Sree Sainath Nagar, Tirupati.	9600646211	prabhutajmahal6@gmail.com
15.	Dr.R.Natarajan	Associate Professor / EEE Fatima Michael College of Engineering and Technology, Madurai	9655986026	natarajanrajavel369@gmail.com
16.	Mr.C.Nandakumar	Assistant Professor / EEE Arunai Engineering College, Velu Nagar, Mathur, Tiruvannamalai	9865714571	nandha30electra@gmail.com
17.	Dr.PadmajaSankala	Asst. Professor / EEE, All India Shri Shivaji memorial Society's College of Engineeirng,Pune	9923669024	pksankala@aissmscoe.com
18.	Dr.S.Priyadharashni	Assistant Professor / EEE, Arunai Engineering College, Velu Nagar, Mathur, Tiruvannamalai, Tamilnadu.	9994576791	priyamshanmugam@gmail.com
19.	Dr.R.Thamaraiselvi	Assistant Professor/EEE, University College of Engineering, Villupuram	9487363388	r.thamaraiselvi1@gmail.com
20.	Dr.R.Murugesan	Asst. Professor, Department of EEE, Annamacharya Institute of Technology and Sciences Thirupati	9944228455	rmurugesandr@gmail.com
21.	Dr.T.S.Balaji Damodhar	Associate Professor / EEE, Ranipettai Engineering College, Walajah, Vellore	9944665102	balajidamodhar@gmail.com
22.	Dr.C.Kannan	Associate Professor / EEE, Arunai Engineering College, Thiruvannamalai.	9841005438	kannanc305@gmail.com
23.	Dr.K.Sedhuraman	Associate Professor / EEE, Manakula Vinayagar Institute of Technology, Puducherry.	9092882883	sedhuramaneee@mvit.edu.in
24.	Mr.S.Rajkumar	Assistant Professor / EEE, Manakula Vinayagar Institute of Technology, Kalitheerthalkuppam, Puducherry.	9952628247	rajkumareee@mvit.edu.in
25.	Mr.M.Saravanakumar	Assistant Professor / EEE, Mailam Engineering College, Mailam	9786863566	saravanakumareee@mailamengg.com
26.	Mr.G.G.Muthukumar	Assistant Professor / EEE, Mailam Engineering College, Mailam	9894762505	muthukumareee@mailamengg.com
27.	Dr.S.Satthiyaraj	Associate Professor / EEE, University College of Engineering, Panruti	9500405949	satthiya@gmail.com
28.	Dr. N. Arunkumar	Associate Professor / EEE, Dhanalakshmi Srinivasan Engineering College, Perambalur	9894949670	narunme26@gmail.com

2.A.1.121

29.	Mr.A.Vinothkumar	Assistant Professor / EEE, SRI College of Engineering and Technology, Vandavasi.	6379224893	vinothkumareee91@gmail.com
30.	Dr.G.Madhusudanan	Professor / EEE, SRM Nagar, Kattankulathur, Chengalpattu.	9884413903	madhusudanang.eee@valliammai.co.in
31.	Dr.G.Haridoss	Associate Professor/EEE, M. A. M College of Engineering and Technology, Siruganur, Trichy	9865481065	haridossg@gmail.com
32.	Dr.S.Albert Alexander	Associate Professor / EEE, Kongu Engineering College, Perundurai, Erode.	9865931597	ootyalex@gmail.com
33.	Dr.K.Arul Kumar	Assistant Professor / EEE, Madanapalle Institute of Technology & Science, Madanapalle- Andhra Pradesh	9994822651	karuleee@gmail.com
34.	Dr.Mahendran Nagalingam	Professor / HOD, SAINTGITS College of Engineering Kottayam, Kerala	9894243719	drnmpower@gmail.com
35.	Dr.R.Natarajan	Associate Professor /EEE Fatima Michael College of Engineering and Technology, Madurai	9655986026	natarajanrajavel369@gmail.com
36.	Dr.T Suresh Padmanabhan	Associate Professor, Department of ECE, E.G.S Pillay Engineering College, Nagapattinam.	9444025552	drtsp@egspec.org
37.	Dr.Ra.Selvaganapathy	Assistant Professor / EEE, AVC College of Engineering Mayiladuthurai.	9940621275	selvaganapathyeee@avccengg.net
38.	Dr.S.S.Kumaresh	Asst.Prof / EEE, University college of Engineering, Kanchipuram.	9940545961	kumareshlive@gmail.com
39.	Dr.R.Murugesan	Assistant Professor / EEE, Annamacharya Institute of Technology and Sciences, Tirupati	9944228455	rmurugesandr@gmail.com
40.	Dr.S.Arockiaraj	Assistant Professor / EEE, Mepco Schlenk Engineering College, Sivakasi. Sivakasi.	9626044699	arockiaraj.s@mepcoeng.ac.in
41.	Dr.C.Kamal	Assistant Professor/EEE, Sri Venkateswara College of Engineering, Sriperumbudur – 602117.	9791121025	kamalc@svce.ac.in
42.	Dr.K.Kirubananthan	Professor and Head /EEE Surya Group of Institutions, Vikravandi	9677062845	kirubananthan81@gmail.com
43.	Dr.A.George Ansfer	Assistant Professor / EEE, St. Xavier's Catholic College of Engineering, Nagercoil.	9488926063	georgeansfer@gmail.com
44.	Dr J Leon Bosco Raj	Assistant Professor / EEE, St. Xavier's Catholic College of Engineering, Nagercoil.	9488218404	sanbosco2006@gmail.com

2.A.1.122

45.	Dr.D.Periyaazhagar	Associate Professor / EEE, Krishnasamy College of Engineering & Technology, Cuddalore.	9843664423	periyaazhagar@gmail.com
46.	Dr.Ramji Tiwari	Assistant Professor / EEE, Sri Krishna College of Engineering and Technology, Coimbatore.	8220818480	ramjitiwari@skcet.ac.in
47.	Dr.P.Vinoth kumar	Associate Professor / EEE, Sri Krishna College of Engineering and Technology, Coimbatore	9940944235 9080070126	vinothkumarktp@gmail.com
48.	Dr.S.Sivasakthi	Professor / EEE, Krishnasamy college of Engineering And Technology, Cuddalore.	9842016590	sivasakthi_gayu@yahoo.co.in
49.	Dr.R.Thamaraiselvi	Assistant Professor / EEE University College Engineering, Anna University Villupuram Campus.	9080376056	r.thamaraiselvi75@gmail.com
50.	Dr.S.M.Balamurugan	Associate Professor /EEE, Sri Venkateswara College of Technology, Sriperumbudur.	9994218756	ersmbala@gmail.com

Specialization		**Power Systems**		
S. No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1.	Dr.N.Chidambararaj	Associate Professor / EEE, St.Joseph's College of Engineering, OMR, Chennai	9840826431	chidambararajn@stjosephs.ac.in
2.	Dr.A.Ragavendiran	Asst. Professor / EEE, AVC College of Engineering, Mayiladudurai	8248781797	ragavendiran.as@gmail.com
3.	Dr. V. Subha Seethalakshmi	Associate Professor / EEE, Dhanalakshmi Srinivasan Engineering College, Perambalur	9865724662	vsubha05@gmail.com
4.	Dr.S.P.Mangaiyarkarasi	Asst.Professor , Department of EEE, University college of Engineering, Panruti.	8903678363	mangaisowmeya@gmail.com
5.	Dr.R.Karthikeyan	Asst. Professor/EEE, University college of Engineering, Pattukottai.	9047656765	kar_thamarai82@yahoo.com
6.	Dr.Arul Murugan	Professor & Head / EEE Excel Group of Institutions Erode, TamilNadu	9842909393	arulpvp@gmail.com
7.	Dr.P.Sathish Babu	Asst. Professor/ EEE, University college of Engineering, Panruti	8667313405	psathishbabu@yahoo.co.in
8.	Dr.V.Arun	Associate Professor/EEE, Sree Vidyanikethan Engineering College, SreeSainath Nagar, Tirupati.	8667244175	arunphd1986@gmail.com
9.	Dr.S.Durai	Assistant Professor, Department of EEE, Annamalai University	8667264066	abcddurai@gmail.com

2. A.1.123.

10.	Dr.S.Karthikeyan	Assistant Professor Department of EEE, Annamalai University	8825793371	karthikaueee79@gmail.com
11.	Dr.M.Sathya	Assistant Professor/EEE Government college of Engineering, Srirangam, Trichy	7010271378	mrsathyaa@gces.edu.in
12.	Dr. R. Suresh	Associate Professor / EEE, SKP Engineering College Thiruvannamalai	9943863622	rsureshskp@gmail.com
13.	Dr.P.Ajay.D.Vimal Raj	Associate Professor Department of EEE, Pondicherry Engineering College.	9486142839	ajayvimal@pec.edu
14.	Ms.V.Logeshwari	Assistant Professor/EEE, Government College of Engineering, Srirangam.	8778727201	logulagam@gmail.com
15.	Dr. S. A.Elankurisil	Professor and Head/ EEE Adhiprasakthi Engineering College, Melmaruvathur,	9442936797	saelankurisil@gmail.com
16.	Dr.S.Srinivasan	Associate Professor / EEE, K.S.Rangasamy College of Technology, Tiruchengode - 637215	9994143687	srinivasan@ksrct.ac.in
17.	Dr.M.Suman	Associate Professor / EEE, Maha Barathi Engineering College, Chinnasalem – 606201	8248407486	suman.auvdl@gmail.com
18.	Dr.M.Mohanraj	Associate Professor/EEE, Kumaraguru College of Technology, Coimbatore.	9842973377	mohanraj.m.eee@kct.ac.in
19.	Dr.G.Ganesan @ Subramanian	Research Head, Nethaji Subash Chandra bose Group of Institutions, Thiruvarur.	9150409651	researchnscbgoitvr@gmail.com
20.	Dr.V.Kandasamy	Associate Professor Department of EEE Kumaraguru college of technology, Coimbatore.	9150205779	kandasamy.v.eee@kct.ac.in
21.	Dr.K.Suresh	Assistant Professor / EEE, Coimbatore institute of Technology, Avinashi. Road, Coimbatore.	9442002145	sureshhayagreeva@gmail.com
22.	Dr.A.Suresh	Professor / EEE, AMET University, Chennai.	7305342590	asurez@gmail.com
23.	Dr.K.Kannan	Associate Professor, Department of EEE, Annapoorna Engineering College, Salem.	9894818483	k.kannan79@gmail.com
24.	Dr.I.Mahendravarman	Assistant Professor/EEE, AVC College of Engineering, Mayiladuthurai.	7904048832	89.mahe@gmail.com

Specialization		**Electrical Drives and Control**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr.A.Venkadesan,	Assistant Professor / EEE, National Institute of Technology, Karaikal, Puducherry.	7598566739	venkadesan@nitpy.ac.in

2.A.1.124

2	Dr. R .Gunabalan	Associate Professor, School of Electrical Engineering, VIT, Chennai.	9894919269	gunabalan.r@vit.ac.in
3	Dr.V.Krishnakumar	Associate Professor / EEE St.Joseph college of Engineering, Chennai.	9944235136	v.krishnakumarjce@gmail.com
4	Dr.D.Lenine	Professor/EEE R.G.M College of Engineering and Technology, Nandyal, Andhra Pradesh.	9866723784	lenine.eee@gmail.com
5.	Dr.C.Carunaiselvane	Assistant Professor, Department of Automobile Engineering SRM Institute of Science and Technology, KTR Campus, Chennai	8265804594	carunaic@srmist.edu.in
6.	Dr.V.Venkatachalam	Assistant Professor / EEE, Surya Group of Institutions, Vikravandi, Villupuram.	9500999251	venkatsgieee@gmail.com

Specialization		**Electrical Engineering**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr.S.Senthikumar	Associate Professor / EEE University College of Engineering, Ariyalur.	7810062427	senthil21575@gmail.com
2	Dr.S.R.Sivarasu	Professor / EEE, Sri Eshwar College of Engineering (Autonomous) Coimbatore.	8056719372 / 9942029372	sivarasu.s.r@sece.ac.in

Specialization		**Image Processing**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr. S. Karthick	Associate Professor / EEE, Sengunthar Engineering College, Thudupathi Post, Perundurai, Erode	9486937253	resumekarthick@gmail.com

Specialization		**Very Large Scale Integration**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr.T.Venishkunmar	Associate Professor / EEE, Sethu Institute of Technology, Pulloor, Kariapatti – Virudhunagar, Tamilnadu	9095577477	tvenishkumar@gmail.com

Specialization		**Control System and Instrumentation**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr.S.N.Sivaraj	Associate Professor/ EEE Velammal Engineering College, Chennai	9944238133 / 9080801268	sivarajsn@gmail.com
2	Dr. P. Manikannan	Professor / EEE, AKT Memorial College of Engineering and Technology, Kallakurichi	9786658571	p.manikannan@gmail.com

2.4.1.25

4	Mr.P.Jekan	Assistant Professor / EEE, SRM University, Kattankulathur, Chengalpattu.	9884937734	jeganp@srmist.edu.in
5.	Dr.B.Balraj	Associate Professor, Department of ECE, K.Ramakrishnan College of Technology, Trichy.	9444295557	balrajb.eee@krct.ac.in

Specialization		**Applied Electronics**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr. J.P.Srividhya	Associate Professor / EEE, Arunai Engineering College, Tiruvannamalai	9486985422	sriviprakash2007@gmail.com

Specialization		**Automotive Technology, Material Science**		
S.No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr. S. Roseline	Professor / EEE, M. A. M College of Engineering and Technology, Siruganur, Trichy	9443435493	roselines1969@gmail.com

Specialization		**Embedded Systems**		
S. No	**Name of the Examiner**	**Designation & Institution Name**	**Mobile No**	**Mail ID**
1	Dr.R.Venkatesh	Professor, Department of EEE, Annapoorna Engineering College, Salem.	9944401677	arkvenki@gmail.com

2.A.1.196

ANNEXURE - VII
Details of FDP, Engineering Clinic Activities and MoU

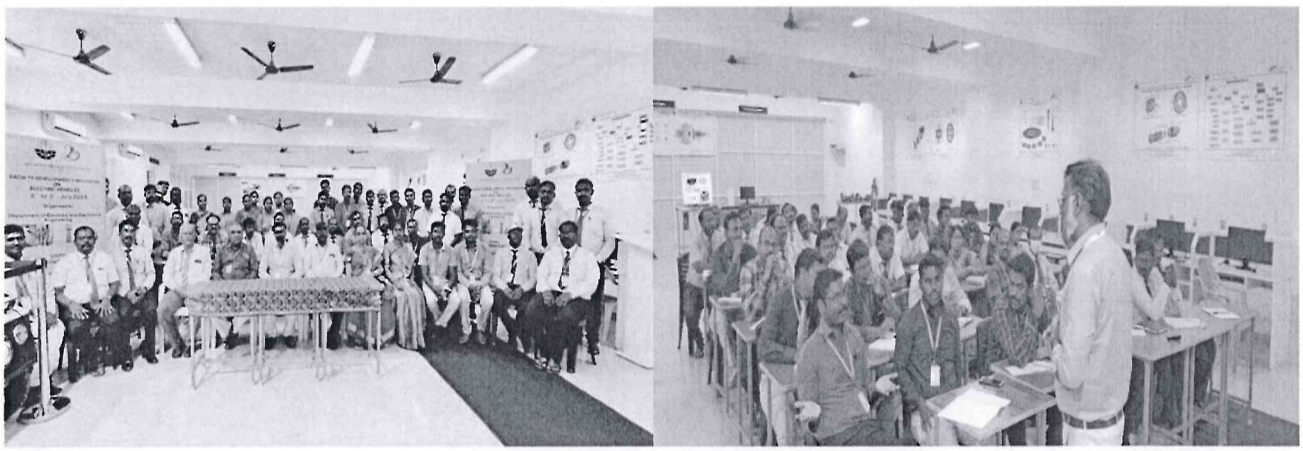
SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FACULTY DEVELOPMENT PROGRAMME ORGANISED

S. No.	Title of the Event	Resource Person / Centre	Duration
1	Faculty Development Programme on "Electric Vehicles"	TVS Training & Services, Chennai	02.07.2024 to 05.07.2024
2	FDP on "Patent and Copyright Filing"	Dr. Jayakumar, Patent consultant	08.07.2024
3	One Day Workshop on "PLC and it Implementation"	Mr. S. Raja, Product Development Engineer Silicon System, Coimbatore	24.07.2024

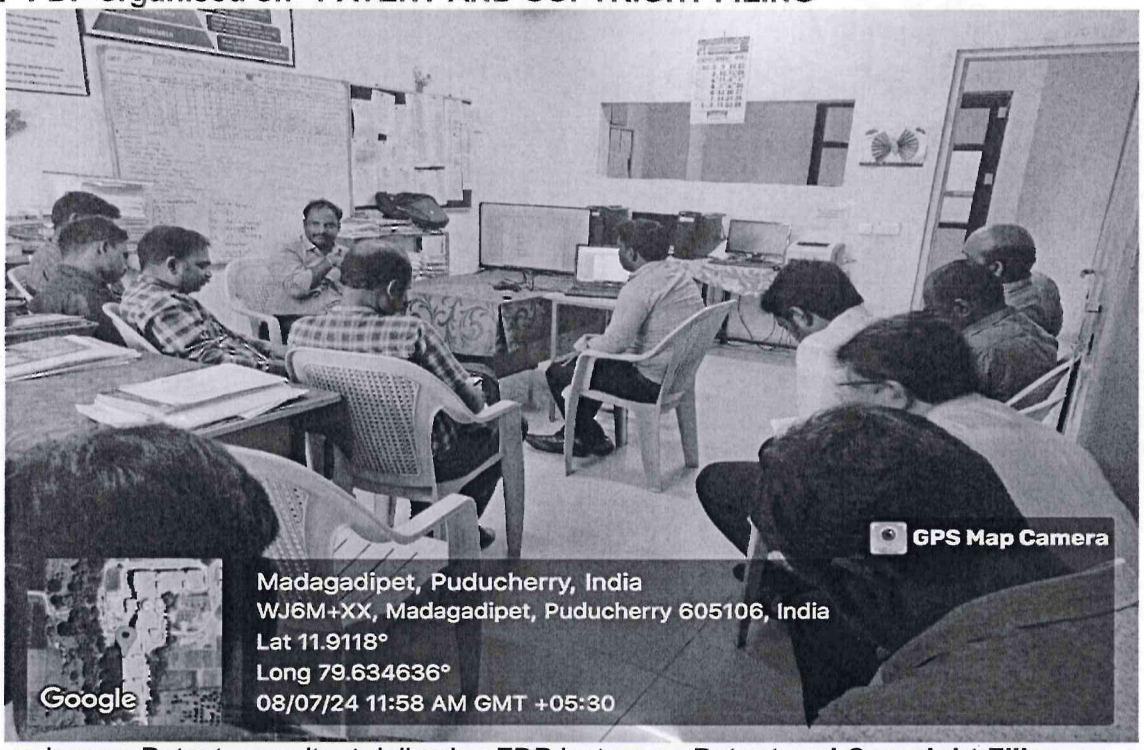
1. FDP organised on "ELECTRIC VEHICLES"



Department of Electrical and Electronics Engineering organized Faculty Development Programme on **"Electric Vehicles"** from **02.07.2024 to 05.07.2024**. The training was provided by Mr. Vinoth Rajasekar, Manager, TVS Training & Services, under Industry Institute Collaboration at Electric Vehicle, Centre of Excellence, SMVEC.

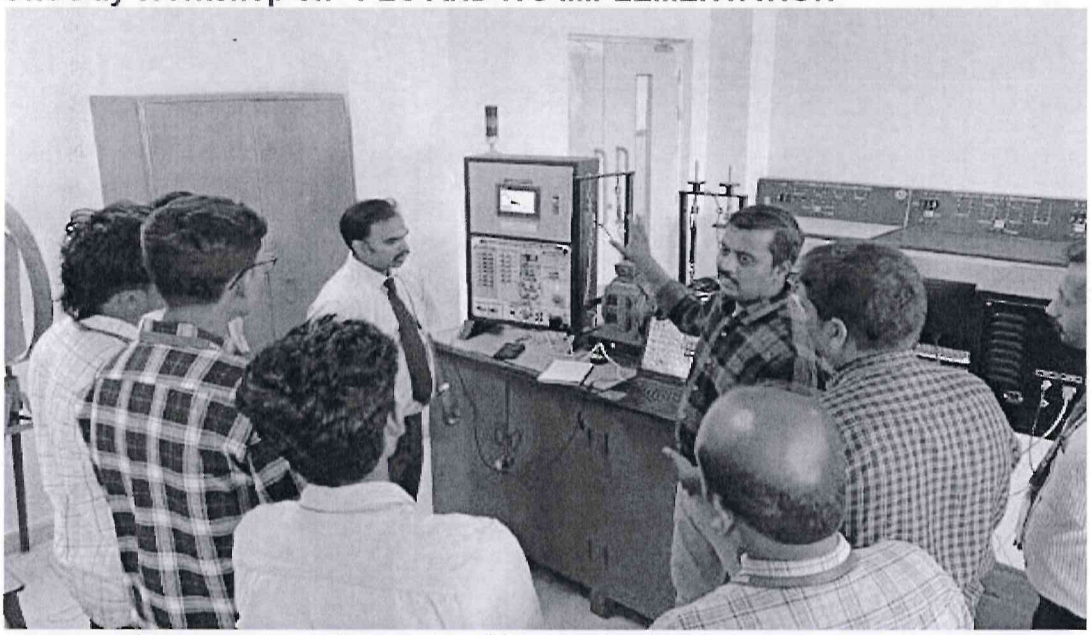
2.A.1.127.

2. FDP organised on "PATENT AND COPYRIGHT FILING"



Dr. Jayakumar, Patent consultant delivering FDP lecture on **Patent and Copyright Filing**, organized by the Department of Electrical and Electronics Engineering on **08.07.2024**

3. One Day Workshop on "PLC AND ITS IMPLEMENTATION"



Department of Electrical and Electronics Engineering organized a **One Day Workshop on "PLC and its Implementation" on 24.07.2024.** The sessions was handled by Mr. S. Raja, Product Development Engineer, Silicon System, Coimbatore.

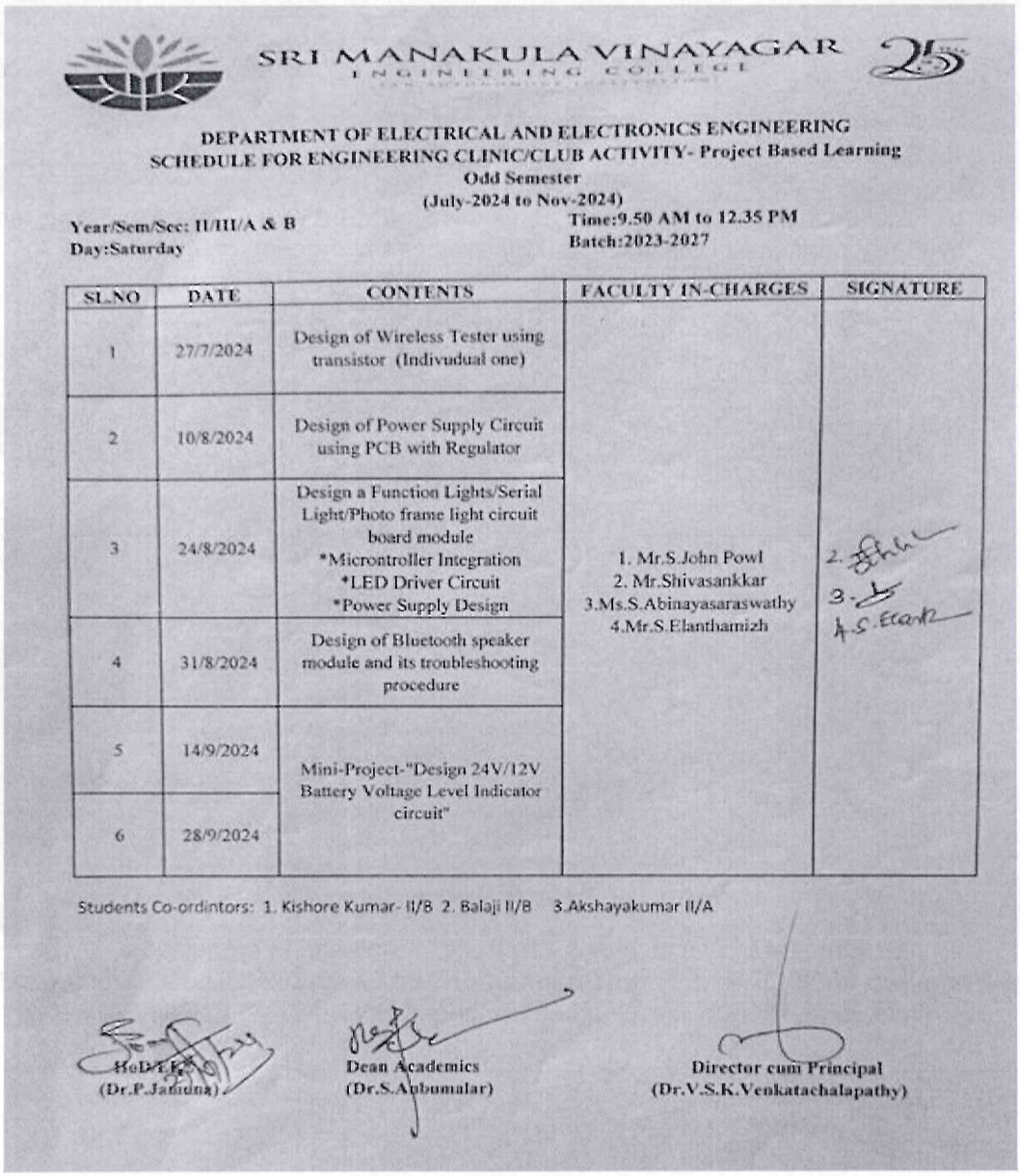
2.A.1.128

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ENGINEERING CLINIC SCHEDULE

[JULY 2024 TO NOV 2024]

Engineering Clinic is designed to provide students with a **platform to explore the troubleshooting** of various **Electrical and Electronics home appliances**, along with **learning new technologies**. In addition to hands-on repair experiences, the event will include sessions on **building small Electronic circuits** to reinforce understanding of electronic principles. Participants will gain practical skills in **circuit design**, diagnostics, and **component-level troubleshooting**, making this a comprehensive learning experience that combines both **repair techniques** and **innovative circuit construction**.



SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEDULE FOR ENGINEERING CLINIC/CLUB ACTIVITY- Project Based Learning
Odd Semester
(July-2024 to Nov-2024)

Year/Sem/Sec: II/III/A & B
Day:Saturday

Time:9.50 AM to 12.35 PM
Batch:2023-2027

SL.NO	DATE	CONTENTS	FACULTY IN-CHARGES	SIGNATURE
1	27/7/2024	Design of Wireless Tester using transistor (Indivudual one)	1. Mr.S.John Powl 2. Mr.Shivasankkar 3.Ms.S.Abinayasaraswathy 4.Mr.S.Elanthamizh	
2	10/8/2024	Design of Power Supply Circuit using PCB with Regulator		
3	24/8/2024	Design a Function Lights/Serial Light/Photo frame light circuit board module *Microntroller Integration *LED Driver Circuit *Power Supply Design		
4	31/8/2024	Design of Bluetooth speaker module and its troubleshooting procedure		
5	14/9/2024	Mini-Project-"Design 24V/12V Battery Voltage Level Indicator circuit"		
6	28/9/2024			

Students Co-ordintors: 1. Kishore Kumar- II/B 2. Balaji II/B 3.Akshayakumar II/A

HoD/EEE (Dr.P.Jamuna) | Dean Academics (Dr.S.Arbumalar) | Director cum Principal (Dr.V.S.K.Venkatachalapathy)

2.A.1.129

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEDULE FOR ENGINEERING CLINIC/CLUB ACTIVITY- Project Based Learning
Odd Semester
(July-2024 to Nov-2024)

Year/Sem/Sec: III/V/A **Time: 2.05 PM to 4.50 PM**
Day:Saturday **Batch:2022-2026**

SL.NO	DATE	CONTENTS	FACULTY IN-CHARGES	SIGNATURE
1	27/7/2024	Design of Water Level Controller Circuit	1. Mr.G.Rajavel 2. Mrs.Amathullah	
2	10/8/2024	Design of Mosquito Killer Bat Circuit		
3	24/8/2024	Design of Mobile Phone Detector Circuit		
4	31/8/2024	Design of Mains Heat Monitoring Circuit		
5	14/9/2024	Design of Metal Detector Circuit (Gold)		
6	28/9/2024	Design of Timer with Music Alarm Circuit		

Students Co-ordintors: 1. Mukesh Kumar- 2. Arokia Ananthu Prasanth 3. Lalithkumar

HoD/EEE (Dr.P.Jansirani) | Dean Academics (Dr.S.Anbumalar) | Director cum Principal (Dr.V.S.K.Venkatachalapathy)

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEDULE FOR ENGINEERING CLINIC/CLUB ACTIVITY- Project Based Learning
Odd Semester
(July-2024 to Nov-2024)

Year/Sem/Sec: III/V/B **Time: 2.05 PM to 4.50 PM**
Day:Saturday **Batch:2022-2026**

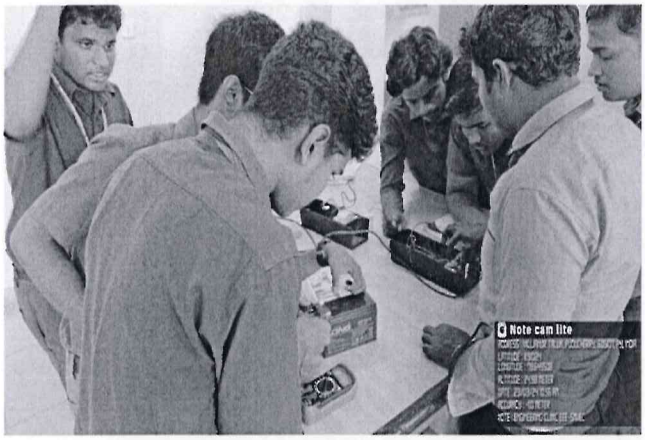
SL.NO	DATE	CONTENTS	FACULTY IN-CHARGES	SIGNATURE
1	27/7/2024	Design of Mobile Phone Detector Circuit	1. Dr.S.Sivaraj 2. Mr.R.Ragupathy	
2	10/8/2024	Design of Stabilizer Autocut Circuit		
3	24/8/2024	Design of Water Level Controller Circuit		
4	31/8/2024	Design of Transformerless 220V Light Activated Switch Circuit		
5	14/9/2024	Design of Mains Heat Monitoring Circuit		
6	28/9/2024	Design of Metal Detector Circuit (Gold)		

Students Co-ordintors: 1. Hemachandasanam- 2. Thilipansivahari 3. Keerthana

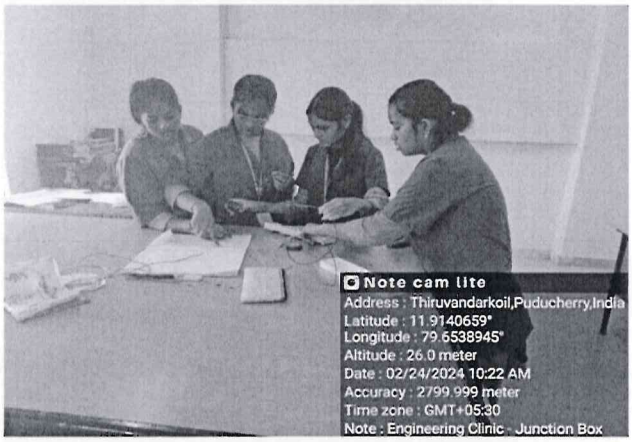
HoD/EEE (Dr.P.Jansirani) | Dean Academics (Dr.S.Anbumalar) | Director cum Principal (Dr.V.S.K.Venkatachalapathy)

2.A.1.130

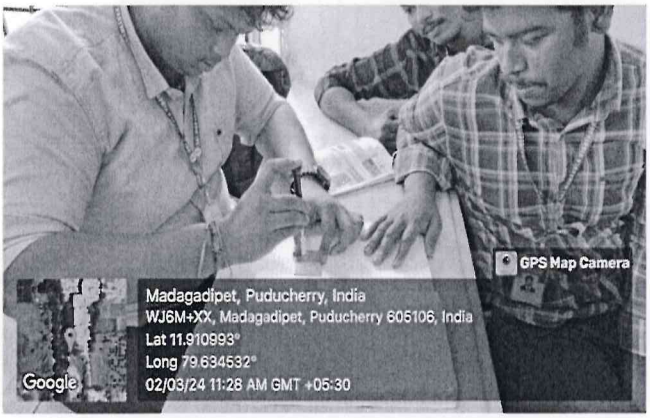
ENGINEERING CLINIC ACTIVITIES



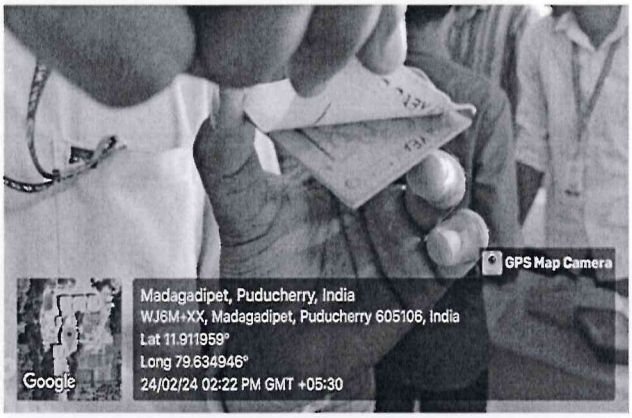
TROUBLESHOOTING DOMESTIC ELECTRICAL APPLIANCES



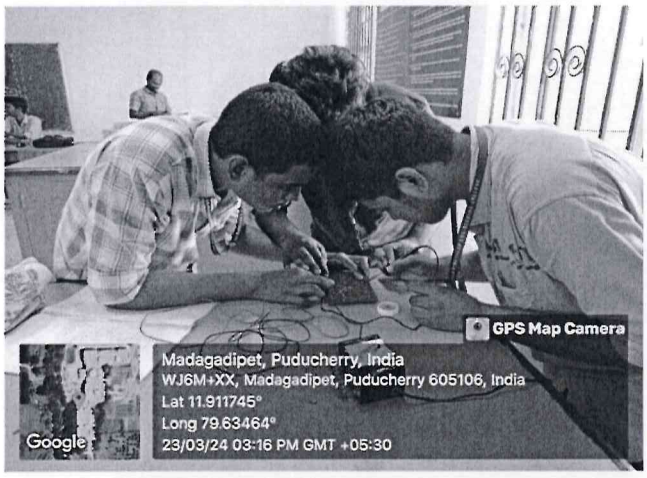
CONSTRUCTING A JUNCTION BOX



BATTERY CHARGING CIRCUIT



PCB ETCHING PROCESS FOR BATTERY CHARGER CIRCUIT



POWER SUPPLY CIRCUIT

POWER SUPPLY CIRCUIT USING PCB WITH A REGULATOR

2.A.1.131

ELECTRICAL VEHICLE - CENTRE OF EXCELLENCE

Sri Manakula Vinayagar Engineering College and TVS Training & Services, Chennai signed a Memorandum of Understanding (MoU) to establish a Centre of excellence in Electric Vehicle. The centre of Excellence laboratory has been set up at the SMVEC campus and training will be provided by TVS Training & Services.

This centre of Excellence has been equipped with state-of-the-art facilities to provide a conductive environment for research and is expected to make a valuable contribution to the development of electrical vehicle technology. It will serve as a hub for research, innovation, and collaboration in electric vehicle cutting-edge technology.

Also, it will provide a platform for the exchange of knowledge and idea to facilitate the development of skills and expertise in this field. TVS - Training & Services will take care of Training, Assessment and placement support. This centre of excellence provides value-added training and placement support to external candidates from other colleges, Industries and Polytechnic colleges.

MoU for Electrical Vehicle - Centre of Excellence was signed by **Dr.V.S.K.Venkatachalapathy, Director cum Principal**, Sri Manakula Vinayagar Engineering College and **Mr. Mohammed Samiuddin, Deputy General Manager**, TVS - Training & Services

2.A.1.139

ANNEXURE - VIII
R2023 Common Courses

Department	Electrical and Electronics Engineering			Programme: **B. Tech.**			
Semester	IV			Course Category: **ES**		End Semester Exam Type: **TE**	
Course Code	U23EETC02	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**POWER ELECTRONICS AND DRIVES**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

MECHATRONICS

Prerequisite	Basics of Electrical and Electronics Engineering	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain about various power switching devices used in Electrical drives	**K2**
	CO2 Differentiate the operations of controlled rectifiers for different types of Loads	**K2**
	CO3 Illustrate the usage of different types of chopper controlled drives	**K3**
	CO4 Apply different types of power converters for speed control of induction motor.	**K3**
	CO5 Describe the concept of BLDC motor drives and their control using power electronic circuits	**K2**

UNIT – I	**Introduction**	**Periods:09**
Power Devices-MOSFET, IGBT, SCR, GTO, DIAC, TRIAC. Electrical drive system-Advantages-Types of Electric drives-Dynamics of Drives- selection of electrical drives- Modes of operation of electrical drives- closed loop control of Drives.		**CO1**
UNIT – II	**Controlled Rectifier Fed DC Drives**	**Periods:09**
Single Phase Half wave converter, semi-converter, fully controlled converter with R, RL and RLE loads, Continuous and discontinuous current operations- Evaluation of performance parameters - Phase controlled DC drives.		**CO2**
UNIT – III	**Chopper Fed DC Drives**	**Periods:09**
Principle of operation of chopper- Time ratio control, Types-Four Quadrant Chopper Circuits- Buck and Boost Chopper fed DC machines. Phase Locked Loop Control, Microcomputer Control of DC Drives		**CO3**
UNIT – IV	**Induction Motor Drives**	**Periods:09**
Single phase bridge inverters with R and RL loads - Phase controlled Induction motor drive-Frequency controlled Induction motor drives-Variable frequency Drives Three phase 120 and 180 degree mode Inverter fed AC machine – Vector controlled Induction motor drives		**CO4**
UNIT – V	**Permanent Magnet Synchronous and Brushless DC Motor Drives**	**Periods:09**
Synchronous Machines with PMs-Vector control of PMSM-Permanent magnet brushless DC motor- Brushless DC Motor Drives, Sensor less control of BLDC motor.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Mohammed H Rashid, "Power electronics" Pearson Education India, 4th Edition, 2023.
2. R. Krishnan, "Electrical motor drives modelling, analysis and control" Pearson India, 2015.
3. Gopal K. Dubey, "Fundamentals of Electrical Drives" Narosa Publishing house, 2nd Edition, 2022.

Reference Books

1. P. S. Bimbhra, "Power Electronics", KHANNA PUBLISHSERS-DELHI, 7th Edition, 2022.
2. Bimal Bose, "Power Electronics and Motor Drives: Advances and Trends" Academic Press, 2nd Edition, 2021.
3. Bogdan M. Wilamowski, J. David Irwin, "Power Electronics and Motor Drives", CRC Press, 1st Edition, 2017.
4. Bimal K Bose, "Modern Power electronics and AC drives" Prentice hall, 1st Edition, 2015.

Web References

1. https://www.youtube.com/watch?v=f7oXhDatwtY
2. https://nptel.ac.in/courses/108105066
3. https://onlinecourses.nptel.ac.in/noc23_ee127/preview
4. https://www.youtube.com/watch?v=jgh0TNfx0gQ
5. https://www.coursera.org/courses?query=power%20electronics

2.A.1.133

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	3	-	-	-	-	-	-	2	3	2	2
2	3	2	2	3	3	-	-	-	-	-	-	2	3	2	2
3	3	2	2	3	3	-	-	-	-	-	-	2	3	2	2
4	3	2	2	3	3	-	-	-	-	-	-	2	3	2	2
5	3	2	2	3	3	-	-	-	-	-	-	2	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.134

Department	Electrical and Electronics Engineering	Programme : **B.Tech.**						
Semester	**IV**	Course Category: **ES**			End Semester Exam Type: **LE**			
Course Code	**U23EEPC02**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**POWER ELECTRONICS AND DRIVES LABORATORY**	-	-	2	1	50	50	100

MECHATRONICS

Prerequisite	Basics of Electrical and Electronics Engineering	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Illustrate the construction, operation and characteristics of different types of power semiconductor devices.	**K3**
	CO2 Differentiate the operation, characteristics and performance parameters of converters and choppers	**K4**
	CO3 Demonstrate the operation and characteristics of inverters and its related techniques.	**K3**
	CO4 Apply the knowledge on solid-state DC drives and its control.	**K3**
	CO5 Interpret different solid-state AC drives used for controlling the motors	**K3**

List of Experiments

1. Gate Pulse Generation using R, RC and UJT.
2. Characteristics of SCR and TRIAC.
3. Characteristics of MOSFET and IGBT
4. AC to DC half controlled converter
5. AC to DC fully controlled Converter
6. Step down choppers
7. Step up choppers
8. IGBT based single phase PWM inverter
9. IGBT based Three Phase PWM Inverter Fed AC Drives
10. AC Voltage controller
11. Characteristics of PMBLDC motor.
12. Vector control of Induction Motor Drive

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30

Reference Books

1. Bogdan M. Wilamowski, J. David Irwin, "Power Electronics and Motor Drives", CRC Press, 1st Edition, 2017.
2. K Sundareswaran, "Elementary Concepts of Power Electronic Drives", CRC Press, 1st Edition, 2019.
3. Vinod Kumar, Ranjan Kumar Behera, Dheeraj Joshi, Ramesh Bansal, "Power Electronics, Drives, and Advanced Applications",CRC press, 1st Edition, 2020.
4. Orlowska-Kowalska, Teresa, Blaabjerg, Frede, Rodríguez, José, "Advanced and Intelligent Control in Power Electronics and Drives", Springer, 1st Edition, 2014.
5. Vukosavic, Slobodan-Boban, "Digital Control of Electrical Drives", Springer, 1st Edition, 2011.

Web References

1. https://www.youtube.com/watch?v=f7oXhDatwtY
2. https://nptel.ac.in/courses/108105066
3. https://onlinecourses.nptel.ac.in/noc23_ee127/preview
4. https://www.youtube.com/watch?v=jgh0TNfx0gQ
5. https://www.coursera.org/courses?query=power%20electronics

2.A.1.135

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	3	-	-	-	3	-	-	1	2	2	2
2	3	3	3	3	3	-	-	-	3	-	-	1	2	2	2
3	3	3	3	3	3	-	-	-	3	-	-	1	2	2	2
4	3	3	3	3	3	-	-	-	3	-	-	1	2	2	2
5	3	3	3	3	3	-	-	-	3	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	Viva				
Marks	15	5	5	15	10	50	100

2.A.1.136

Department	Electrical and Electronics Engineering	Programme: **B. Tech.**						
Semester	V/VI	Course Category: **OE**			End Semester Exam Type: **TE**			
Course Code	U23EEDC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ELECTRICAL SAFETY ENGINEERING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Common to ECE, ICE, MECH, CIVIL, CCE, BME, IT, CSE, AI&DS, MECHATRONICS, CSE&BS								
Prerequisite	**Basics of Electrical and Electronics Engineering**							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Describe the Indian Electricity (IE) acts and various rules for electrical safety.	K2
CO2	Recognize the safety measures to prevent electrical shock in handling of domestic electrical appliances.	K2
CO3	Illustrate the safety aspects during installation of plant and equipment.	K2
CO4	Describe the various hazardous area and application of electrical safety in various places.	K2
CO5	Explain the importance of electrical safety training to improve quality management in electrical systems	K2

UNIT – I	**Concepts and Statutory Requirements**	**Periods:09**
Objective and scope of electrical safety - National electrical Safety code - Statutory requirements – Indian Electricity acts related to electrical Safety - Safety electrical one line diagram - International standards on electrical safety safe limits of current and voltage -Grounding of electrical equipment of low voltage and high voltage systems - Safety policy - Electrical safety certificate requirement		**CO1**
UNIT – II	**Electrical Shocks and their Prevention**	**Periods:09**
Primary and secondary electrical shocks - Possibilities of getting electrical shock and its severity - Effect of electrical shock of human being - Shocks due to flash/ Spark over's - Firing shock - Multi storied building - Prevention of shocks - Safety precautions - Safe guards for operators - Do's and Don'ts for safety in the use of domestic electrical appliances - Case studies on electrical causes of fire and explosion		**CO2**
UNIT – III	**Safety During Installation, Testing and Commissioning, Operation and Maintenance**	**Periods:09**
Need for inspection and maintenance - Preliminary preparations - Field quality and safety - Personal protective equipment - Safe guards for operators - Safety equipment - Risks during installation of electrical plant and equipment - Effect of lightning current on installation and buildings - Safety aspects during installation -Safety during installation of electrical rotating machines - Importance of earthing in installation– Agricultural pump installation		**CO3**
UNIT – IV	**Hazardous Zones**	**Periods:09**
Primary and secondary hazards - Hazardous area classification and of electrical equipments (IS, NFPA, API and OSHA standards) - Explosive gas area classifications: Class I(Division 1) - Zone 0, Zone 1, zone 2 classified locations, Design Philosophy for Equipment and installations-Classification of equipment enclosure for various hazardous gases and vapors - flash hazard calculation and approach distances- calculating the required level of arc protection		**CO4**
UNIT – V	**Safety Management of Electrical Systems**	**Periods:09**
Principles of Safety Management - Occupational safety and health administration standards - Safety organization - Safety auditing - Employee electrical safety teams - Electrical safety training to improve Quality management - Total quality control and management – Importance of high load factor - Causes of low power factor - Disadvantages of low power factor - Power factor improvement - Importance of P.F. improvement - Case studies of electrical workplace safety practices.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. John Cadick, Mary Capelli Schellpfeffer, Dennis Neitzel, Al Winfield, "Electrical Safety Handbook", McGraw-Hill Education, 4th Edition, 2012.
2. Madden, M. John, "Electrical Safety and the Law: A Guide to Compliance", Wiley publications, 4th Edition, 2002.
3. Mohamed A. El-Sharkawi, "Electric Safety: Practice and Standards", CRC Press; 1st Edition, 2013.

Reference Books

1. Rob Zachariason, "Electrical Safety", Delmar Cengage Learning, 1st Edition, 2011.
2. Peter E. Sutherland, "Principles of Electrical Safety", Wiley-IEEE Press; 1st Edition, 2014.

2.4.1.187.

Web References

1. https://www.apeasternpower.com/downloads/elecact2003.pdf
2. https://safetyculture.com/topics/electrical-hazards/
3. https://www.jove.com/science-education/10114/electrical-safety-precautions-and-basic-equipment
4. https://electrical-engineering-portal.com/21-safety-rules-for-working-with-electrical-equipment
5. https://www.electrical4u.com/safety-precautions-for-electrical-system/
6. https://www.constellation.com/energy-101/electrical-safety-tips.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
2	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
3	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
4	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2
5	3	3	2	2	-	-	-	-	-	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.138

Department	Electrical and Electronics Engineering	Programme: B. Tech.						
Semester	V/VI	Course Category: OE			End Semester Exam Type: TE			
Course Code	U23EEOC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	SOLAR PHOTOVOLTAIC FUNDAMENTALS AND APPLICATIONS	3	0	0	3	25	75	100
Common to ECE, ICE, MECH, CIVIL, CCE, BME, IT, CSE, AI&DS, MECHATRONICS, CSE&BS								
Prerequisite	Physics, Basics of Electrical and Electronics Engineering							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Describe the basic concepts of solar cells and its properties.	K2
CO2	Discuss about the selection of interfacing components in solar grid connected systems.	K2
CO3	Classify various DC/AC equipment's used for stand-alone PV applications through requirements and design calculations	K2
CO4	Locate the applications of hybrid systems and define the structure of micro grid system	K2
CO5	Execute the cost analysis of solar PV systems	K3

UNIT – I	Photovoltaic Basics and Developing Technologies	Periods:09
Solar Cells: Structure and working - Types, Electrical properties - Cell properties and design - PV cell interconnection and Module fabrication - PV Modules and arrays. Commercial technologies: Mono crystalline and Multi crystalline, Silicon – Wafer based Solar cell, Thin film solar cells: A–Si, Cd–Te and CIGS, Concentrated PV cells, Developing technologies : Organic cells, Dye sensitized cells – Photovoltaic in global and Indian scenario		CO1

UNIT – II	Solar PV for On-Grid Applications	Periods:09
Solar cells to solar array – On–Grid PV system – With and Without storage – Balance of system – DC–DC converters – Inverters – Net Metering – Design and analysis – Performance evaluation and monitoring		CO2

UNIT – III	Solar PV for Off-Grid Applications	Periods:09
Off-Grid standalone PV system – System sizing – Module and Battery – Storage – Batteries for PV systems – Sun Tracking mechanism – Types of tracking – One–axis, Two–axis – Maximum power point tracking – Design and analysis – Performance evaluation and monitoring.		CO3

UNIT – IV	Hybrid Systems	Periods:09
Solar, Biomass, Wind and Diesel Hybrid systems - Comparison and selection criteria - simple hybrid systems – storage arrangements - Introduction to Micro grid – Comparison of micro grid with conventional power system – Architecture		CO4

UNIT – V	Cost Benefit Analysis for Solar PV Installations	Periods:09
Cost and manufacturability – Manufacturing economics – Scaling – Pricing – Trends in retail pricing – Energy economics – Gridtied power plant – Solar street lighting system - Simple payback calculation.		CO5

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

Text Books

1. C.S. Solanki, "Solar Photovotaics – Fundamentals, Technologies and Applications", PHI Learning Pvt. Ltd., 2nd Edition, 2011.
2. Martin A. Green, "Solar Cells Operating Principles, Technology, and System Applications", Prentice - Hall, 1st Edition, 2008

Reference Books

1. J. Nelson, "The Physics of Solar Cells", Imperial College Press, 1st Edition, 2003.
2. Thomas Markvart, "Solar Electricity", John Wiley and Sons, 2nd Edition, 2000.
3. Stuart R. Wenham, Martin A. Green, Muriel E. Watt, Richard Corkish, "Applied Photovoltaic", Earth scan, 3rd Edition, 2011.
4. Michael Boxwell, "The Solar Electricity Handbook", Green stream Publishing, 10th Edition, 2016.
5. RikDe Gunther, "Solar Power-Your Home for Dummies", Wiley Publishing Inc, 2nd Edition, 2010.

Web References

1. https://swayam.gov.in/nd1_noc20_ph21/preview
2. https://swayam.gov.in/nd2_nou20_ag13/preview
3. https://www.studentenergy.org/topics/solar-pv
4. https://www.eia.gov/energyexplained/solar/photovoltaics-and-electricity.php
5. https://www.energysage.com/solar/
6. https://www.bca.gov.sg/publications/others/handbook_for_solar_pv_systems.pdf
7. http://www.oas.org/dsd/publications/unit/oea79e/ch05.htm

2.A.1.139

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
2	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
3	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
4	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2
5	3	3	2	2	2	-	-	-	-	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT1	CAT2	Model Exam	Assignment*	Attendance		
Marks	5	5	5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.1.140

ANNEXURE - IX
R2020 EQUIVALENT PAPERS IN R2023 CURRICULUM

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)
(APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO PONDICHERRY UNIVERSITY)
(ACCREDITED BY NBA-AICTE, NEW DELHI, ACCREDITED BY NAAC WITH "A" GRADE)
MADAGADIPET, PUDUCHERRY - 605 107

DETAILS OF EQUIVALENT COURSES IN R 2023 CURRICULUM FOR THE COURSES IN R 2020

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Sl. No.	Year / Sem	Name of the Course with code under R-2020 Regulations (All the Courses in a semester to be mentioned with course code)	For Question Paper Setting with respect to R-2020 Regulations		
			Equivalent Course Name with Code in R-2023 Regulations (Courses which are not modified / content reduced)	Course is retained with modification in the content / Course content increased)	If Course is Removed (Yes)
1.	I / I	**Theory:**			
		1. Engineering Mathematics – I Calculus and Linear Algebra (U20BST101)	-	Engineering Mathematics – I (U23MATC01)	-
		2. Programming in C (U20EST101)	-	Programming in C (U23CSTC01)	-
		3. Engineering Mechanics (U20EST119)	-	Engineering Mechanics (U23ESTC02)	-
		4. Electrical Engineering (U20EET101)	-	Electrical Engineering (U23EET101)	-
		5. Electronic Devices (U20EET102)	-	Electronics – I (U23EET102)	-
2	I / II	**Theory:**			
		1. Engineering Mathematics –II Multiple Integrals and Transforms (U20BST215)	Engineering Mathematics –II (U23MATC02)	-	-
		2. Basic Engineering Science for Electrical Engineering (U20EST238)	-	-	Yes
		3. Electric Circuit Analysis (U20EET203)	-	Electric Circuit Analysis (U23EEB301)	-
		4. Electrical Machines – I (U20EET204)	Electrical Machines – I (U23EET305)	-	-
		5. Electronic Circuits (U20EET205)	-	Electronics – II (U23EET203)	-
		6. Digital Electronics (U20EET206)	-	-	Yes
3	II/III	**Theory:**			
		1. Complex Analysis and Applications of Partial Differential Equations (U20BST320)	-	-	Yes
		2. Data Structures (U20EST356)	-	Data Structure (U23CSTC03)	-
		3. Electrical Machines – II (U20EET307)	-	Electrical Machines – II (U23EET407)	-
		4. Linear Integrated Circuits (U20EET308)	-	Electronics – III (U23EET306)	-
		5. Electromagnetic Theory (U20EET309)	-	Electromagnetic Theory (U23EET304)	-
		6. Power Plant Engineering (U20EET310)	-	Conventional Power Engineering (U23EEE402)	-
4	II/IV	**Theory:**			
		1. Probability and Statistics (U20BST430)	-	Probability and Statistics (U23MATC03)	-
		2. Programming in JAVA (U20EST467)	-	Programming in JAVA (U23ITTC02)	-
		3. Measurements and Instrumentation for Electrical Engineering (U20EET411)	-	Electrical Measurements and Instrumentation (U23EET509)	-
		4. Microprocessor and Microcontroller (U20EET412)	-	Microprocessor and Microcontroller (U23EET510)	-
		Professional Elective :			
		5. Electrical Safety Engineering (U20EEE401)	-	Electrical Safety Engineering (U23EEDC01)	-
		6. Energy Storage Technology (U20EEE405)	-	Energy Storage Technology (U23EEE404)	-
		Open Elective:			
		7. Engineering Computation with MATLAB (U20ECO401)	-	Engineering Computation with MATLAB (U23ECOC01)	-
		8. Web Development (U20CSO401)	-	-	Yes
5	III/V	**Theory:**			
		1. Numerical Methods and Optimization (U20BST542)	Numerical Methods and Optimization (U23MATC04)	-	-
		2. Power Electronics (U20EET513)	Power Electronics (U23EET613)		-
		3. Control Systems (U20EET514)	-	Control Systems (U23EEB402)	-

2.A.1.141