'येथे बहुतांचे हित'

Marathwada Mitra Mandal's

COLLEGE OF ENGINEERING

Karvenagar, Pune - 52.

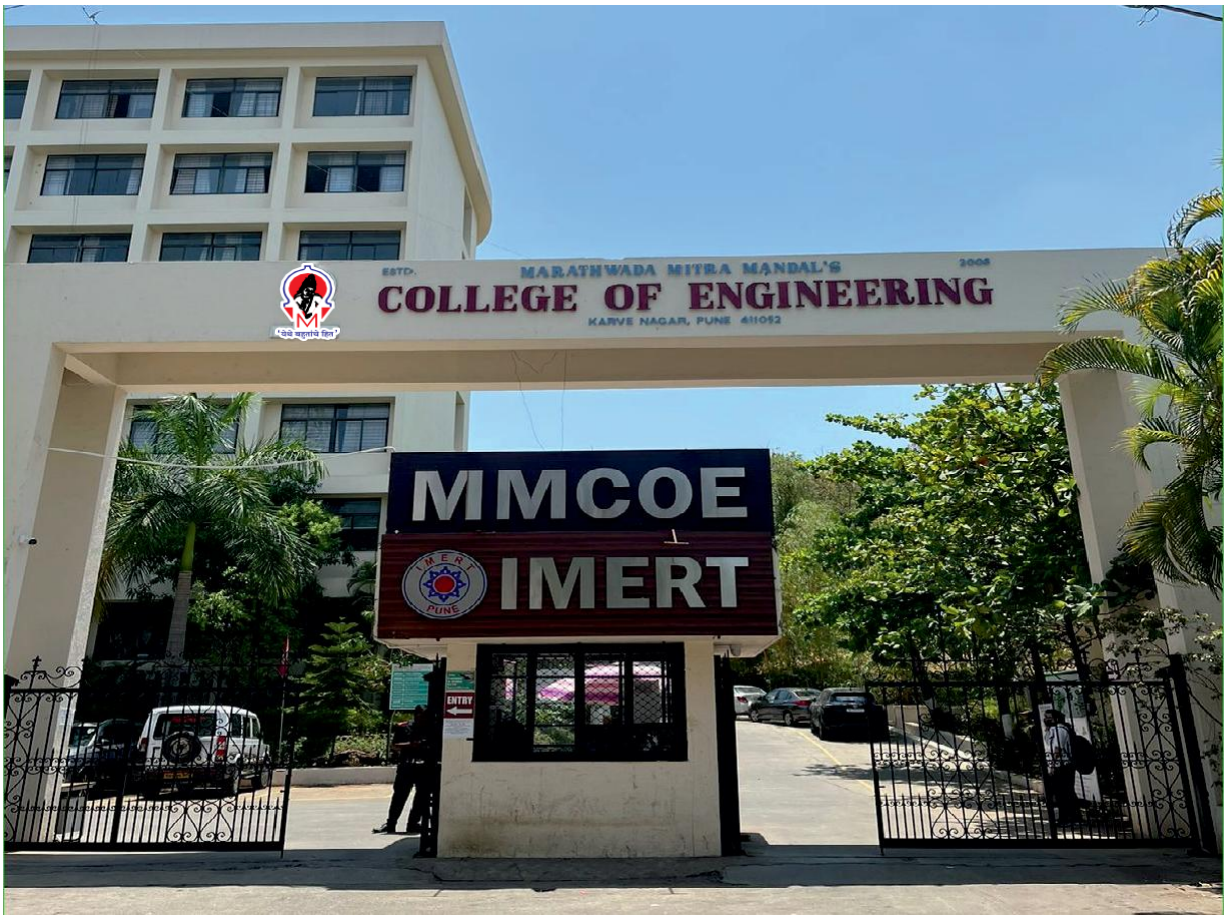
An Autonomous Institute affiliated to SPPU

Accredited with A++ Grade by NAAC
Recipient of Best College award by SPPU | Accredited by NBA
Recognized under 2(f) and 12(B) of UGC Act 1956

www.mmcoe.edu.in

Curriculum Structure and Syllabus

Second Year B.Tech. Electrical Engineering



Academic Year 2025-26

Marathwada Mitra Mandal's College of Engineering

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CONTENTS

Institute Vision

To be a globally renowned institution through excellence in engineering education for sustainable and holistic development

Institute Mission

M1: Empower students with cutting-edge technologies and global competencies

M2: Foster culture of research and entrepreneurial mindset

M3: Imbibe social and professional values

M4: Provide an inclusive environment for lifelong learning

Department Vision

To be center of excellence in electrical engineering by developing globally skilled professionals through innovation, sustainability and technological growth

Department Mission

M1: To provide quality education in electrical engineering through multidisciplinary, practical and industry oriented learning.

M2: To develop ethical and skilled engineers with expertise in emerging electrical technologies.

M3: To nurture lifelong learning and adaptability for addressing global, societal and future challenges.

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes (PO)

1. **PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. **PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
3. **PO3**: **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
4. **PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
5. **PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
6. **PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
7. **PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
8. **PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
9. **PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
10. **PO10: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. **PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Educational Objectives (PEO)

Engineering Graduates will be able to:

PEO1: Impart innovation and core knowledge to identify, analyze and solve the electrical engineering problems.

PEO2: Excel in Research and enhance their industry oriented professional skills.

PEO3:Demonstrate leadership qualities to lead diverse teams and exhibit commitment towards societal and global needs.

Program Specific Outcomes (PSOs)

After successfully completing the degree program. Electrical engineering graduates will be able to:

PSO1: Design and validate efficient electrical system through core and professional skills .

PSO2: Exhibit multidisciplinary skills in the area of Robotics, AI and Machine Learning for Electrical engineering applications.

PSO3: Formulate sustainable solutions for research in societal and industrial needs pertaining to green technology.

Abbreviations	
BSC:	Basic Science Course
UG:	Undergraduate Programme
ESC:	Engineering Science Course
PCC:	Program Core Courses
PEC:	Program Elective Courses
MDM:	Multidisciplinary Minor Courses
OEL:	Open Elective
VSE:	Vocational & Skill Enhancement Course
AEC:	Ability Enhancement Course
EEM:	Entrepreneurship/Economics/Management
IKS:	Indian Knowledge System
VEC:	Value Education Course
RMD:	Research Methodology
CEP/FPR:	Comm. Eng. Project (CEP)/Field Project (FP)
PRJ:	Project
INT/OJT:	Internship/On-Job Training
CCC:	Co-Curricular Courses
IT:	Internal Tool
ET:	External Tool
ETE:	End –Term Examination
CIE:	Continuous Internal Evaluation
TW:	Term work
OR:	Oral Examination
PR:	Practical Examination
L:	Lecture
P:	Practical
T:	Tutorial
OL:	Online Teaching
ODL:	Open Distance Learning

Assessment Tool Guidelines for Continuous Internal Evaluation (CIE)

AY: 2025-26

Distribution of CIE 40 marks for each subject is as below:

Sr. No.	Unit No.	Weightage	Assessment Tools
1	Unit 1	8 Marks	Class Test
2	Unit 2	8 Marks	
3	Unit 3	8 Marks	1. Quizzes 2. Home Assignments 3. Case Study 4. Field work 5. Report writing 6. Presentations/Seminar Topics 7. Mini projects/Course Projects 8. Mind map 9. Poster Presentation 10. Problem Solving and Coding 11. Parametric Study 12. Any other assessment tool with permission of BoS chairperson
4	Unit 4	8 Marks	
5	Unit 5	8 Marks	

1. Above are the suggestive assessment tools for CIE.
2. The class test is a one-time assessment; no retests will be conducted
3. Module coordinators should review and verify the assessment tools implemented for each course.
4. Course coordinators are required to maintain softcopy records of the respective CIE assessment tools used for their classes.

Curriculum Structure Sem-III & IV

Second Year B. Tech Electrical Engineering - SEMESTER - III															
Course Code	Couse Name	Course Type	Teaching Scheme (Hrs/week)			Examination Scheme						Credits			
			L	P	T	CIE	ETE	TW	PR	OR	Total	L	P	T	Total
EE24PCC201	Analog and Digital Electronics	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
EE24PCC202	Network Analysis	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
EE24PCC203	Power System- I	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
*	MDM TH	MDM	2	-	-	40	60	-	-	-	100	2	-	-	2
EE24PCC205	Analog and Digital Electronics Lab	PCC	-	2	-	-	-	-	50	-	50	-	1	-	1
EE24PCC206	Network Analysis Lab	PCC	-	2	-	-	-	-	50	-	50	-	1	-	1
*	MDM Lab	MDM	-	2	-	-	-	25	-	-	25	-	1	-	1
EE24CEP208	Project Based Learning Lab	CEP	-	4	-	-	-	50	-	-	50	-	2	-	2
EE24AEC209	Professional Ethics	AEC	-	-	2	-	-	50	-	-	50	-	-	2	2
SH24VEC201	Environment Sustainability	VEC	-	-	2	-	-	50	-	-	50	-	-	2	2
Total			**11**	**10**	**4**	**160**	**240**	**175**	**100**	**-**	**675**	**11**	**5**	**4**	**20**

* Refer separate MDM Booklet

Second Year B. Tech Electrical Engineering - SEMESTER-IV															
Course Code	Couse Name	Course Type	Teaching Scheme (Hrs/week)			Examination Scheme						Credits			
			L	P	T	CIE	ETE	TW	PR	OR	Total	L	P	T	Total
EE24PCC251	Electrical Machines-I	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
EE24PCC252	Power Electronics	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
EE24PCC253	Electromagnetic Field Theory	PCC	3	-	-	40	60	-	-	-	100	3	-	-	3
**	Open Electrive	OEL	3	-	-	40	60	-	-	-	100	3	-	-	3
EE24PCC255	Electrical Machines-I Lab	PCC	-	2	-	-	-	-	50	-	50	-	1	-	1
EE24PCC256	Power Electronics Lab	PCC	-	2	-	-	-	-	50	-	50	-	1	-	1
EE24VSE257	Programming & Simulation for Electrical Applications Lab	VSE	-	4	-	-	-	50	-	-	50	-	2	-	2
EE24VEC258	Industrial and Technology Management	VEC	-	-	2	-	-	50	-	-	50	-	-	2	2
SH24AEC202	Professional Communication and Personality Development	AEC	-	-	2	-	-	50	-	-	50	-	-	2	2
Total			**12**	**8**	**4**	**160**	**240**	**150**	**100**	**-**	**650**	**12**	**4**	**4**	**20**

** Refer separate OEL Booklet

L- Lecture P- Practical T- Tutorial CIE-Continuous Internal Evaluation
ETE- End Term Examination TW- Term work PR- Practical OR- Oral
L : 1 Hr.= 1 credit P: 2 Hr. = 1 Credit T: 1 Hr. = 1 Credit

SEMESTER III

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: EE24PCC201 **Course Name: Analog and Digital Electronics**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3	-	-	-	-	40	60	-	-	-	100	3		-	3

Prerequisite: Engineering Mathematics, Basic Electrical Engineering, Basic Electronics Engineering, Numbering system, Logic gates, Flip-Flops.

Course Objectives:

- To understand the fundamental principles, configurations and applications of operational amplifiers (OP-AMP) in open loop and closed loop modes.
- To design and analyze active filters, multivibrators using timer ICs, and voltage regulators using standard ICs.
- To study fundamentals of Boolean algebra and apply techniques like K-map for simplification and realization of combinational logic circuits.
- To construct sequential logic circuits using flip flops and K map
- To acquire knowledge of data conversion techniques and select suitable ADC (Analog to Digital Converter) and DAC (Digital to Analog Converter) for real-world applications.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Apply and analyze applications of OPAMP in open and closed loop condition

CO2: Design and construct Active filter circuit using op-amp IC,Multivibrators using Timer IC, Voltage Regulators using different voltage regulator IC.

CO3: Design logical and combinational digital circuit using K-Map.

CO4: Design logical and sequential digital circuit using K-Map.

CO5: Select appropriate ADC & DAC for real time applications.

Unit	Contents	Duration (Hrs.)
1	**Operational Amplifiers (Op-Amp)** Block Diagram & internal structure of OP-Amp Specifications, Linear & Non-Linear Applications of OP-Amp	8
2	**Analog Circuits** Filters: Classification, Configuration & analysis of filters using OP-Amp. Multivibrators:Types & Applications, Sequence Generator, Voltage Regulator	8
3	**Combinational Digital Circuits** Standard representation for logic functions,K-map representation, simplification of logic functions using K-map,Multiplexer, De-Multiplexer, Subtractors,BCD arithmetic, Adder, digital comparator, parity checker, code converters, priority encoders,decoders	8
4	**Sequential Logic Circuits** Flip-Flops: Types &Applications, Counters: Synchronous, Asynchronous Counters, Counter design using flip-flops. Shift Registers:Types and Applications	8
5	**A/D and D/A Converters** Analog to digital converters,Types,Specifications & Applications Digital to analog converters,Types,Specifications & Applications	8
	Total Hours	40

Text Books
1. Floyd and Jain, "Digital Fundamentals",8th edition,Pearson Education,2009. 2. Ramakant A. Gayakwad," OP-Amps & Linear Integrated Circuits",2ndEdition,PHI,1991. 3. G.K.Kharate," Digital Electronics", OXFORD University Press,2010. 4. R. P. Jain," Modern Digital Electronics", McGraw Hill Education, 2009.
Reference Books
1. Anand Kumar,"Fundamentals of Digital Circuits", 2nd Edition,Pearson Education,PHI,1991. 2. A.P. Malvino and Donald P.Leach, "Digital Principles and Applications",2nd Edition,Tata McGraw- Hill, New Delhi, 1993. 3. J. V. Wait, L. P. Huelsman and G. A. Korn," Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
Online References
1. NPTEL Course:Dr. Shouribrata Chatterjee, IIT Delhi,"Analog Electronics". (https://nptel.ac.in/courses/108102112) 2. NPTEL Course: Prof.Goutam Saha, IIT Kharagpur,"Digital Electronics". (https://onlinecourses.nptel.ac.in/noc22_ee55)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: EE24PCC202 **Course Name: Network Analysis**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3	-	-	-	-	40	60	-	-	-	100	3	-	-	3

Prerequisite: Basic Electrical Engineering, Engineering Mathematics , Physics

Course Objectives:

- To introduce Laplace transform techniques for analyzing electrical networks.
- To develop analytical skills for AC circuit resonance and frequency response.
- To understand and evaluate transient and steady-state behavior in DC excited networks
- To analyze filters, attenuators, and two-port networks for signal processing and system modeling

Course Outcomes:

After learning the course, the students will be able to:
CO1: Simplify the basic of networks using Laplace transform.
CO2: Execute A.C circuit analysis.
CO3: Evaluate steady state and transient performance of DC circuit.
CO4: Analyze different filters and attenuators.
CO5: Derive two port network parameters.

Unit	Contents	Duration (Hrs.)
1	**Networks and Laplace Transform** Network equations, formulation of network equations, initial conditions in networks and network solution with Laplace transformation, step, ramp and impulse functions, initial and final value theorem and convolution integral, transform impedance and transform circuits.	8
2	**AC Circuit Analysis** Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across inductor (L) and capacitor (C) with respect to frequency. Effect of resistance on frequency response, Selectivity, bandwidth and Quality factor. Parallel resonance – resonance frequency, variation of impedance & admittance with frequency, Selectivity and bandwidth.	9
3	**Transient Response with DC excitation** Analysis of RC, RL, and RLC networks with DC excitation with and without initial conditions using Laplace transforms. Steady state & transient response (Voltage & Current)	8
4	**Filters & Attenuators** Filters: Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant, phase shift constant, propagation constant, characteristic impedance, relationship between decibel and neper. Attenuators-Definition, classification- T type, Π type attenuator.	7
5	**Two Port Network** Open circuit impedance (Z) parameters, short circuit admittance(Y) parameters, hybrid (H) parameter, Transmission parameters (ABCD), Interrelation of different parameters, Interconnections of two port network (Series, Parallel, Cascaded, Series- Parallel) Network functions: Network functions for one port and two port networks,	8

	Driving point impedance and admittance of one port network, Driving point impedance, admittance and different transfer function of two port network (Z ,Y,H & T).	
		Total Hours 40

Text Books

1. A. Sudhakar & Shyammohan S. Palli, "Circuit & Network – Analysis & Synthesis", Tata McGraw Hill Publications, 6th Edition, 2025.
2. William H. Hayt, Jack E. Kemmerly & Steven M. Durbin, "Engineering Circuit Analysis", McGraw- Hill Higher Education, 7th Edition, 2006.
3. C. P. Kuriakose, "Circuit Theory: Continuous and Discrete- Time Systems, Elements of Network Synthesis", Prentice- Hall of India, 2005.

Reference Books

1. Charles K. Alexander & Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw- Hill Education, 7th Edition, 2020.
2. M. E. Van Valkenburg, "Network Analysis", Pearson Education / PHI, 3rd Edition, 2006.
3. C. L. Wadhwa, "Network Analysis and Synthesis", New Age International Pvt. Ltd., 3rd Revised Edition, 2007.

Online References

1. NPTEL Course: Prof. Tapas Kumar Bhattacharya, IIT Kharagpur, "Network Analysis". (https://onlinecourses.nptel.ac.in/noc25_ee53/preview)
2. NPTEL Course: Prof. Ashok Kumar Pradhan, IIT Kharagpur, "A Basic Course on Electric and Magnetic Circuit". (https://onlinecourses.nptel.ac.in/noc25_ee158/preview)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: EE24PCC203 **Course Name: Power System-1**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3	-	-	-	-	40	60	-	-	-	100	3	-	-	3

Prerequisite: Engineering Mathematics, Engineering Physics, Basic of Electrical Technology.

Course Objectives:

- To introduce to the procedure and importance of drafting specifications for various electrical equipment used in power systems.
- To develop an understanding of the mechanical design and structural aspects of overhead transmission lines.
- To equip with the analytical skills to calculate inductance and capacitance for various transmission line configurations.
- To provide knowledge and tools required to design mechanical components of overhead transmission systems.
- To familiarize with the principles of grounding and the layout and operation of electrical distribution systems.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Draft specifications of electrical equipment in power system.
CO2: Understand mechanical aspects in overhead transmission lines.
CO3: Evaluate Inductance and Capacitance of different transmission line configuration.
CO4: Design mechanical aspects in overhead transmission lines.
CO5: Understand the Grounding and Distribution System.

Unit	Contents	Duration (Hrs.)
1	**Power System Components** Single line diagram of Power system, Brief description of power system elements. Supply System, Transmission Lines.	8
2	**Over Head Transmission Lines** Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines Representation and performance of short, medium and long transmission lines, Ferranti effect, Surge impedance loading.	8
3	**Corona and Interference** The phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference. Electrostatic and electromagnetic interference with communication lines. Overhead line Insulators: Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency.	8
4	**Mechanical Design of Overhead lines and insulators** Main components of overhead lines, Various types of line supports, Conductor spacing, Length of span, Calculation of sag for equal and unequal supports and effect of ice and wind loading. Insulated cables: Type of cables and their construction, dielectric stress, grading	8

	of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables.	
5	**Neutral grounding:** Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices. Distribution Systems: Distribution system layout, Introduction of Distribution System, Primary & Secondary distribution, Design consideration, distribution system losses, Classification of Distributed system- Radial Ring interconnected systems, Stepped distribution.	8
	Total Hours	40

Text Books

1. C.L. Wadhwa, "Electrical Power System", New age international Ltd. Third Edition, 2009
2. Asfaq Hussain, "Power System", CBS Publishers and Distributors, 2007.
3. B. R. Gupta, "Power System Analysis and Design", Third Edition, S. Chand & Co., 2016.
4. M. V. Deshpande, "Electrical Power System Design", Tata McGraw Hill, 2001.
5. Kothari &Nagrath, "Power System Engineering", Tata McGraw-Hill Education, 2019.

Reference Books

1. Soni, Gupta &Bhatnagar, "A Course in Electrical Power ", DhanpatRai& Sons, 1987.
2. S.L. Uppal, "Electric Power", Khanna Publishers, 2018.
3. S.N. Singh, "Electric Power Generation, Transmission &Distribution", PHI Learning, 2021.
4. S. Sivanagaraju & S. Satyanarayana, "Electric Power Transmission and Distribution", Pearson Education, 2008.

Online References

1. NPTEL Course: Prof. Debapriya Das, IIT Kharagpur, "Power System Engineering". (nptel.ac.in/courses/108105104)
2. NPTEL Course: Prof. A.K. Sinha, IIT Kharagpur, "Power System Analysis". (nptel.ac.in/courses/108105067)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code:EE24PCC205 **Course Name: Analog and Digital Electronics Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	2	-	-	-	-	-	-	-	50	50	-	1	-	1

Prerequisite: Basic handling and identification of lab instruments(Digital multimeter, oscilloscope, signal generator,regulated power supply),testing of components, Basic Circuit Theory, Number Systems and Logic Basic

Course Objectives:

- To understand fundamental concepts and practical implementation of analog circuits using operational amplifiers (Op-Amps), including linear and non-linear applications.
- To construct and analyze frequency response of active filter circuits,and gain experience with circuit simulation tools.
- Design and working of multivibrator and timer circuits using IC555 and to explore their practical applications.
- To construct and acquire basic knowledge of combinational and sequential logic circuits, focusing on the design and verification of different circuits using simulation as well as hardware tools for analysis.
- To develop students' ability to understand applications like Analog-to-Digital and Digital-to-Analog Converters.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Analyze and implement analog circuits using operational amplifiers (Op-Amps) such as linear and non-linear circuits

CO2: Examine and simulate the frequency response of first order filter circuits using appropriate simulation tool

CO3:Design and verify the operation of timing circuits like multivibrator circuit using IC555 and interpret their applications.

CO4:Demonstrate understanding of combinational logic circuits by verifying binary to octal decoding using 3:8 decoder and simulating full adder circuits

CO5: Implement and test combinational logic circuit and sequential logic circuit using appropriate IC and extend concept for conversions such as ADC and DAC

List of Experiments

Sr. No.	Name of the Experiment	Duration (Hrs.)
1	Comparator and Schmitt trigger using OP-AMP.	2
2	Generation of Sine, Square and Triangular wave using OP-AMP.	2
3	Observe frequency response of first order high pass and low pass filter using OP-AMP in P-Spice.	4
4	Verify operation of Astable multi-vibrator using IC555.	4
5	Verify 3:8 Decoder for binary to octal decoding.	2
6	Implement 4-bit Parallel Adder/ Subtractor using IC 7483.	4

7	Simulate Full- Adder using simulation tool.	4
8	Realize (i) Mod-N Asynchronous Counter using IC7490 and (ii) Mod-N Synchronous counter using 9. IC74192.	4
	Total Hours	26

Text Books

1. Floyd and Jain, "Digital Fundamentals",8th edition,Pearson Education,2009.
2. Ramakant A. Gayakwad," OP-Amps & Linear Integrated Circuits",2ndEdition,PHI,1991.
3. G.K.Kharate," Digital Electronics", OXFORD University Press,2010.
4. R. P. Jain," Modern Digital Electronics", McGraw Hill Education, 2009.

Reference Books

1. Anand Kumar,"Fundamentals of Digital Circuits", 2nd Edition,Pearson Education,PHI,1991.
2. A.P. Malvino and Donald P.Leach, "Digital Principles and Applications",2nd Edition,Tata McGraw- Hill, New Delhi, 1993.
3. J. V. Wait, L. P. Huelsman and G. A. Korn," Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.

Online References

1. NPTEL Course:Dr. Shouribrata Chatterjee, IIT Delhi,"Analog Electronics" (https://nptel.ac.in/courses/108102112)
2. NPTEL Course: Prof.Goutam Saha, IIT Kharagpur,"Digital Electronics" (https://onlinecourses.nptel.ac.in/noc22_ee55)
3. Virtual lab : (https://de-iitr.vlabs.ac.in/)
4. Virtual lab (https://www.vlab.co.in/broad-area-electronics-and-communications)
5. Virtual lab (https://de-iitg.vlabs.ac.in/)
6. Virtual lab - (https://de-iitr.vlabs.ac.in/, https://pe1-iitd.vlabs.ac.in/)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: EE24PCC206 **Course Name: Network Analysis Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	2	-	-	-	-	-	-	-	50	50	-	1	-	1

Prerequisite: Basic Electrical Engineering, Engineering Mathematics, Engineering Physics.

Course Objectives:

- To enable students to verify fundamental DC network theorems through hands-on experiments.
- To develop practical skills in analyzing transient behavior of RC, RL, and RLC circuits.
- To provide experience in determining two-port network parameters using lab and simulation tools
- To enhance understanding of theoretical concepts by correlating them with experimental observations.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Demonstrate DC network theorems through practical experiments.
CO2: Measure the charging and discharging characteristics of RC circuits.
CO3: Analyze the transient response of RL circuits to step DC input.
CO4: Determine the parameters of two-port networks using lab and simulation tools
CO5: Validate theoretical concepts by comparing them with experimental results.

List of Experiments

Sr. No.	Name of the Experiment	Duration (Hrs.)
1	Verification of Superposition Theorem in D.C. Circuits	04
2	Verification of Thevenin's Theorem in D.C. Circuits	02
3	Verification of Reciprocity Theorem in D.C. Circuits	04
4	Verification of Maximum Power Transfer Theorem in D.C. Circuits	02
5	Verification of Millman Theorem	02
6	Determination of Time Response of R-C Circuit to Step D.C. Voltage Input Charging and discharging of a capacitor through a resistor.	04
7	Determination of Time Response of R-L Circuit to Step D.C. Voltage Input Rise and decay of current in an inductive circuit	02
8	Determination of Parameters of Two-Port Network (V Lab)	02
9	Determination of Time Response of R-L-C Series Circuit to Step D.C. Voltage Input	02
10	Determination of Current Under Parallel Resonance Condition	02
	Total Hours	26

Text Books

1. A. Sudhakar & Shyammohan S. Palli, "Circuit & Network – Analysis & Synthesis", Tata McGraw Hill Publications, 6th Edition, 2025.
2. William H. Hayt, Jack E. Kemmerly & Steven M. Durbin, "Engineering Circuit Analysis",

McGraw- Hill Higher Education, 7th Edition, 2006.
3. C. P. Kuriakose, "Circuit Theory: Continuous and Discrete- Time Systems, Elements of Network Synthesis", Prentice- Hall of India, 2005.

Reference Books

1. Charles K. Alexander & Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw- Hill Education, 7th Edition, 2020.
2. M. E. Van Valkenburg, "Network Analysis", Pearson Education / PHI, 3rd Edition, 2006.
3. C. L. Wadhwa, "Network Analysis and Synthesis", New Age International Pvt. Ltd., 3rd Revised Edition, 2007.

Online References

1. NPTEL Course: Prof. Tapas Kumar Bhattacharya, IIT Kharagpur, "Network Analysis" . (https://onlinecourses.nptel.ac.in/noc25_ee53/preview)
2. NPTEL Course: Prof. Ashok Kumar Pradhan, IIT Kharagpur, "A Basic Course on Electric and Magnetic Circuit". (https://onlinecourses.nptel.ac.in/noc25_ee158/preview)
3. Virtual lab (https://asnm-iitkgp.vlabs.ac.in/exp/two-port-network/)

Second Year B. Tech Electrical Engineering

Semester-III

Course Code: EE24CEP208 **Course Name: Project Based Learning Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	**P**	**T**	**OL**	**ODL**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**TOTAL**	**L**	**P**	**T**	**TOTAL**
-	**4**	**-**	**-**	**-**	**-**	**-**	**50**	**-**	-	**50**	**-**	**2**	**-**	**2**

Prerequisite: Knowledge of electrical circuit, rectifiers, renewable energy systems, simulation, interfacing of components.

Preamble:

For a better real-time learning experience, along with traditional classroom teaching and laboratory learning, project-based learning (PBL) has been introduced to motivate students to work cooperatively in groups to solve offered statements. PBL is a student-centered and experiential approach to education that promotes 'deeper learning' through active exploration of real-world problems and challenges. A central goal of PBL is to facilitate rigorous hands on experience and deeper learning process to support students in acquiring complex cognitive competencies, such as rigorous content knowledge and critical thinking skills. PBL engages students in problem definition, the design process, contextual understanding, and systems thinking approaches. In the PBL approach, learning based on memorization is de-emphasized, with greater emphasis placed on the understanding and application of engineering design principles.

Scope : Bridge the gap between theory and real world electrical systems and helps student to apply core subjects into practical solutions**.**

Course Objectives: To enable students to gain knowledge and understanding in the following aspects:

- Impart technical knowledge and skills, build critical thinking, problem solving, creativity and innovation among students.
- Make students aware of their own academic, personal, and social developments.
- To unable students to apply engineering to real word problems through hands on, collaborative projects, teamwork and communication skills, while promoting self-directed and lifelong learning.
- Design and implement innovative solutions grounded in engineering principles to solve real world problems.
- Recognize environmental challenges encountered local communities.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Identify, formulate, and analyze the simple project problem.
CO2: Apply knowledge of mathematics, electrical engineering fundamentals to develop solutions for the project.
CO3: Learn to work in teams, and to plan and carry out different tasks that are required during a project.
CO4: To understand their own and teammate's strengths and skills.
CO5: To apply academic knowledge to real life community issues, enhancing experimental Learnings

Guidelines:

1. Statements are provided to the students related to practical, scientific, social or technical relevance.
2. Guidance, orientation programs, and resources to support the successful execution of the projects will be offered to students. Evaluation will be rubric based.
3. The students are instructed to form a group of 4 to 5 students to carry out the tasks.
4. The mentor will help the students in selecting any eight problem statement mentioned below.
5. The students are free to choose their own problem statement relevant to engineering, social or industry issues other than the given statements.
6. The students will developed a work schedule, outline expected outcomes, and divide the project into individual tasks with clear targets.
7. The progress will be regularly reviewed on a weekly basis, providing feedback and guidance to ensure steady advancement.
8. The students are free to present their completed hardware / software project in the form of final report/ PPT presentation/3D modelling, demonstrating their learning w.r.t. individual and team performance, focusing on understanding and involvement of team.
9. Culture of collaboration, self-motivation, and personal responsibility among students throughout the project will be observed and cultivated in the students.

List of Lab Activities (Problem statements)

(Students can select any 8 from given 10, one for each PBL group or they are free to choose their own Statements. One community activity is compulsory for each batch)

Sr. No.	Activities	Duration (Hrs)
1	Traffic signal controller using logic gates.	28
2	System to check heartiness of earthling system and alert in case of fault or malfunction.	
3	Smart Fan with Auto-Temperature Cutoff.	
4	Design of inverter using MOSFET.	
5	Password based circuit breaker.	
6	Implementation of hybrid renewable energy sources for grid integration.	
7	Implementation of hybrid renewable energy sources for grid integration.	
8	Activity base on of Plantation and soil protection	
9	To create health awareness and hygiene among society	
10	Health and hygiene of the school going students, homemakers and old persons	
	Total Hours	**28**

Project Based Learning (PBL) Procedure

P1	Identification of problem statement and literature survey.	**28**
P2	Selection of base paper and develop block diagram and circuit model with group discussion.	
P3	Presentation of selected problem statement with base report.	
P4	Preparation of final interfacing circuit ,selection of respective components.	
P5	Simulation of Problem statement circuit,develop a simulation circuit.	
P6	Testing and interfacing of components it on PCB/BREADBOARD.	

P7	Designing hardware model for respective problem statement	
P8	Community activity 1 : Health awareness and hygiene among society	
P9	Community activity 2 : Activity base on of Plantation and soil protection,	
P10	Community activity 3: Health and hygiene awareness of the school going students and old persons from poor community.	
	Total Hours	**28**

Text Books

1. Digital Design – M. Morris Mano, Michael D. Ciletti
2. Internet of Things: A Hands-On Approach" – Arshdeep Bahga, Vijay Madisett
3. Smart Grid: Technology and Applications– Janaka Ekanayake
4. Power Electronics – P.S. Bimbhra
5. Energy Storage– Robert A. Huggins

Reference Books

1. M.H.Rashid -Power Electronics Handbook,
2. Butterworth-Heinemann publication,
3. M.S. Jamil Asghar, Power Electronics, PHI.

Online References

1. NPTEL: Digital Circuits by Prof. S. Srinivasan, IIT Madras. (https://nptel.ac.in/courses/117106086)
2. NPTEL: Power Electronics by Prof. L.Umanand. (https://nptel.ac.in/courses/108101126)
3. NPTEL:Electrical Power Distribution by Prof. D.P. Kothari. (https://nptel.ac.in/courses/108102047)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: EE24AEC209 **Course Name: Professional Ethics**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	-	2	-	-	-	-	50	-	-	50	-	-	2	2

Prerequisite: Communication Skills, Engineering Physics, Engineering Chemistry

Course Objectives:

- To provide foundational understanding of human values and their relevance in personal and professional contexts.
- To familiarize students with key business and managerial terminologies essential for effective communication and decision-making.
- To enable to understand and apply fundamental legal concepts in the context of business operations.
- To impart knowledge about the core provisions of important business laws and their application in organizational functioning.
- To develop the ability to analyze and evaluate the practical use of various Acts and case laws in real-world business and legal scenarios.

Course Outcomes:

After learning the course, the students will be able to:
CO1: State basic concepts in human values.
CO2: Explain various key terms from business and managerial perspective.
CO3: Applying the legal terms in the context of business.
CO4: Various provisions of business laws in its functioning.
CO5: Illustrate and evaluate the use of Acts in business situations and the various facets of basic case laws of each Act from a legal and managerial perspective.

Unit	Contents
1	**Human Values** Morals, values and Ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Character. Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.
2	**Engineering Ethics** Senses of ' Engineering Ethics' Variety of moral issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Models of professional roles, Theories about right action, Self-interest, Customs and Religion, Uses of Ethical Theories.
3	**Engineering As Social Experimentation** Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law.
4	**Safety, Responsibilities And Rights** Safety and Risk, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk, Respect for Authority, Collective Bargaining, Confidentiality, Conflicts of Interest, Occupational, Crime, Professional Rights, Employee Rights. Intellectual Property Rights (IPR) – Discrimination. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)

5	**Global Issues** Multinational Corporations, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and Advisors, Moral Leadership, Code of Conduct, Corporate Social Responsibility**.**

List of Tutorial

Sr. No.	Name of the Tutorial	Duration (Hrs.)
1	Group discussions on 'ethical' vs. 'legal	2
2	Yoga and meditation for professional excellence and stress management.	4
3	Prepare a report on Senses of 'Engineering Ethics' Variety of moral issues.	4
4	Implementation of Ethical Theories.	4
5	Safety and Risk	2
6	Intellectual Property Rights (IPR)	4
7	Environmental and Computer Ethics	4
8	Corporate Social Responsibility	2
	Total Hours	26

Text Books

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
3. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
4. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.

Reference Books

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
3. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.
4. World Community Service Centre, 'Value Education', Vethathiri publications, Erode, 2011.

Online References

1. Tutorials Point- Professional Ethics in Profession (https://www.tutorialspoint.com/professional_ethics/ethics_in_profession.htm)
2. Tutorials Point -Professional Ethics - Legal vs. Ethical (https://www.tutorialspoint.com/professional_ethics/legal_vs_ethical.htm)

Second Year B.Tech Electrical Engineering

Semester-III

Course Code: SH24VEC201 **Course Name: Environment Sustainability**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	-	2	-	-	-	-	50	-	-	50	-	-	2	2

Prerequisites: A basic understanding of environmental science, Geography or Social studies

Course Objectives:

- Understand the foundational concepts of sustainability, including its social, environmental, and economic dimensions, and the global need for sustainable development.
- Gain insights into the 17 United Nations Sustainable Development Goals (SDGs) and the role of technology, international cooperation, and policy in achieving them.
- Identify and explain different types of pollution (air, water, solid waste), their sources and impacts, and sustainable approaches to waste management including the 3Rs (Reduce, Reuse, Recycle) and zero-waste concepts.
- Evaluate global and local environmental challenges, including climate change, global warming, ozone depletion, and resource degradation.

Course Outcomes:

After learning the course, the students will be able to:
CO1: Describe the fundamental ideas of environmental sustainability.
CO2: Examine sustainability's social, economic, and environmental facets.
CO3: Analyse how human actions affect Environmental systems.
CO4: Propose strategies for sustainable development in various sectors.

Contents

1	**Introduction to Environmental Sustainability:** Global environmental issues, Foundations of Environmental Sustainability. Sustainability: Challenges, potential; role of technology, policies.
2	**Environmental Pollution and Waste Management:** Air Pollution: Sources and Effects of Air Pollution. Water Pollution: Sources of Water Pollution, Sustainable Wastewater Treatment. Solid Waste zero Waste Concepts (3R Concept).
3	**Climate Change and Energy:** Understanding Climate Change, Science and impacts of climate change Climate modeling and adaptation, Sustainable Energy Solutions, Renewable energy technology, Efficient energy system and conservation
4	**Sustainable Development Practices:** Sustainability in Cities, infrastructure and cities that are sustainable, green buildings and smart cities.

List of Tutorial (Any 8)

Sr. No.	Name of the Tutorial	Duration (Hrs.)
1	Examine the river pollution in Pune.	4
2	Prepare a climate change strategy for your town, city, or building.	4
3	Initiate a campaign to bring emphasis to a sustainability concern.	4

4	Examine The Current Environmental Issue	2
5	Examine a successful sustainability attempt from the real world	2
6	**Home energy audit:** Have students make a list of all the appliances and light bulbs in their house. How much energy does their house use if all the lights are on for 4 hours per day? If their appliances are on for 2 hours per day? How much energy could they save if they switched to energy-efficient appliances or lightbulbs?	2
7	**Use recycled material in art projects:** recycled materials can make beautiful art projects such as jewelry, planters, and birdhouses. Incorporating materials that would otherwise be thrown away into art projects can show your students how to find new uses for these items.	2
8	**Life cycle:** One way to show students what happens when you put something in the trash versus recycling or reusing the object is to do a life cycle analysis. This is a flowchart that shows the environmental impacts of an object, from extracting the raw materials to decomposition and everything in between. When something is put in the trash instead of being reused or recycled, the life cycle assessment will show a bigger environmental impact. When something is reused or recycled, the environmental impact is less because raw materials don't need to be extracted to create something new.	4
9	**Go on a field trip:** Visit your local landfill, recycling center, or a nearby composting facility where the students can see firsthand what is happening to waste and learn about the lifecycle of waste and its effect on the environment.	2
10	**Compare carbon footprints** of different materials used in construction or manufacturing in India.	2
	Total Hours	26

Text Books

1. Sharma, "P.D. Ecology and Environment", Rastogi Publications,2020.
2. Kaushik, C.P., Kaushik, Anubha, "Perspectives in Environmental Studies New Age",International Publishers, 2021.
3. Agarwal, S.K. "Environmental Management", APH Publishing Corporation, 2005.

Reference Books

1. Kalam, A.P.J. Abdul, Srijan Pal Singh, "Target 3 Billion Innovative Solutions Towards Sustainable Development", Penguin Books,2011.
2. Kolbert, Elizabeth, "The Sixth Extinction: An Unnatural History", Henry Holt and Co.,2014.

Online References

1. NPTEL Course : Prof. Trupti Mishra, IIT Bombay "Business and Sustainable Development". (https://nptel.ac.in/courses/110101153)
2. NPTEL Course :By Prof. Brajesh Kumar Dubey , IIT Kharagpur "Sustainable Engineering Concepts And Life Cycle Analysis". (https://onlinecourses.nptel.ac.in/noc23_ce90/preview)

SEMESTER IV

Second Year B.Tech Electrical Engineering

Semester-IV

Course Code: EE24PCC251 **Course Name: Electrical Machines - I**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3	-	-	-	-	40	60	-	-	-	100	3	-	-	3

Prerequisite: Basic knowledge of mathematics, physics, magnetic circuits, basic electrical technology and knowledge of elementary differential equations are prerequisites for this course.

Course Objectives:

- To provide a strong theoretical foundation in electrical machines operation and working principle.
- To familiarize students with various characteristics of electrical machines and their applications.
- To develop problem-solving skills related to electrical machine design and analysis.
- To enable students to apply their knowledge in real-world scenarios, including procurement, installation and energy-efficient systems.
- To introduce basic knowledge of advanced machines and its applications to support career in electrical engineering and related fields

Course Outcomes:

After learning the course, the students will be able to:

CO1: Explain construction, working and testing of transformers.

CO2: Recognize technical specifications of transformer and role of instrument transformers for industrial applications.

CO3: Focus on the study of electro-mechanical energy conversion & classification of electrical machines.

CO4: Analyze DC machines and understand concepts, characteristics and need for energy efficient motors.

CO5: Illustrate the construction , principle of operation, control aspects and performance characteristics of permanent magnet brushless D.C motors.

Unit	Contents	Duration (Hrs.)
1	**Transformer I** Working Principle, Construction, Types, No Load and Load vector diagram equivalent circuit, losses, Testing of transformer, Parallel operation, aut transformer, all day efficiency.	8
2	**Transformer II** Technical specifications during procurement of transformer, Installation, operation and maintenance of transformer, comparison of classical and recent transformers in terms of technological advancements, factors affecting life span of transformers in industry, Current and potential transformers **Three Phase Transformer:** Connections, phasor diagrams, Scott connection	8
3	**Electromechanical Energy Conversion** Concept of electromagnetic and electromechanical energy conversion, Determination of Mechanical Force, Mechanical Energy and Torque Equation, Energy balance, General classifications of Electrical Machines, Single and Multiply excited Systems.	8

4	**DC Machines** **DC Generator:** Working principle, Construction, Armature Winding (related terms, types of winding), Generator Classification, Emf Equation, Losses, Characteristics, Armature reaction (descriptive only), Commutation (descriptive only), Parallel Operation, Power ratings wise efficiency as per BIS norms. **DC Motor:** Working Principle, Back Emf, Torque Equation, Types, Characteristics, Trouble shooting of newly installed and in service motors, Need for energy efficient motors.	8
5	**Permanent Magnet Brushless DC Motors** Fundamentals of Permanent Magnets- Types- Working Principle of BLDC – Sensors and Inverter, EMF and Torque equations- Characteristics- Applications	8
	Total Hours	40

Text Books

1. Dr. P. S. Bimbhra, Electrical Machinery, Theory: Performance & Applications, Khanna Publishers, 2021.
2. Fitzgerald and Kingsley's electric machinery by Stephen D. Umans–TMH Publishers, 7th Edition, 2020.
3. Nagarath & D.P.Kothari: Electrical Machines,TMH Publishers,5th edition 2017.
4. B.L.Theraja, "A text book on electrical technology", Vol- 2. ,S.Chand Publications, 2005.

Reference Books

1. H. Cotton, "Electrical Technology " 7th edition, CBS Publications and Distributors, 2018.
2. E. Hughes, "Hughes Electrical and Electronics Technology", 11th Edition Pearson, 2012.

Online References

1. NPTEL: Electrical Machines by Prof. G. Bhuvaneshwari, IIT Delhi. (https://nptel.ac.in/courses/108102146)
2. NPTEL: Electrical Machines I by Prof. Tapas Kumar Bhattacharya, IIT Karagpur. (https://onlinecourses.nptel.ac.in/noc23_ee114/preview)
3. NPTEL: Electrical Machines I by Prof. D Kastha, Prof. Suman Maiti, IIT Karagpur. (https://nptel.ac.in/courses/108105017)

Second Year B.Tech Electrical Engineering

Semester-IV

Course Code: EE24PCC252 **Course Name: Power Electronics**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3		-	-	-	40	60	-	-	-	100	3	-	-	3

Prerequisite:
Knowledge of semiconductor material like Diode, BJT and their characteristics, Working of Diode based rectifier, concept of RMS and average value

Course Objectives:
To enable students to gain knowledge and understanding in the following aspects:
- Fundamentals of power electronic devices and their characteristics
- Working principle, triggering circuits of power converters
- Control techniques and applications of power converters
- Performance analysis of power converters

Course Outcomes:
After learning the course, the students will be able to:
CO1: Identify the requirements of an ideal switch and plot the characteristics of power semiconductor switches.
CO2: Design a dc-dc converter based on the load requirements
CO3: Analyze single phase and three phase-controlled rectifiers.
CO4: Analyze single phase and three phase-controlled inverters.
CO5: Explain the working principle of AC voltage regulators.

Unit	Contents	Duration (Hrs.)
1	**Power Semiconductor Switches:** Thyristors - basic structure - static and dynamic characteristics - device specifications and ratings – thyristor protection- Snubber Circuit- Gate triggering circuits. IGBTs - Basic structure, Transfer and Output characteristics. MOSFETs - Basic structure, Transfer and Output characteristics. Gate Driver Circuits for IGBTs and MOSFETs, TRIAC.	8
2	**DC-DC converter:** Principle of operation of chopper, Buck converter, Boost Converter, Buck-Boost Converter, Continuous and Discontinuous Conduction Modes, Control techniques: CLC, TRC, PWM and FM Techniques, Flyback converter.	8
3	**Single Phase AC-DC Converter:** Single Phase Half wave rectifier with R and RL Loads. Fully controlled converters with R and RL loads - Half controlled converter with R and RL loads. Derivation of Average and RMS output voltage.	8
4	**Single phase DC-AC Converter:** Single Phase Voltage Source Inverter, Current Source Inverter, Voltage control techniques. PWM techniques: Single pulse, multiple pulse and sinusoidal pulse modulation.	8
5	**Three phase Converters and AC Voltage regulator:** Three Phase Half wave-controlled rectifier with R and RL loads – Three Phase full converters with R and RL loads Three phase VSI using 120^0 and 180^0 mode and comparison, Multilevel inverter concept. Single phase AC Voltage regulator; operation with R and RL Load, Derivation of Average and RMS output voltage.	8
	Total Hours	40

Text Books

1. M.H.Rashid "Power Electronics" 2nd Edition, Pearson publication, 2017.
2. Ned Mohan, T.M. Undeland, W.P. Robbins, "Power Electronics", 3rd Edition, John Wiley and Sons, 2022.
3. Ashfaq Ahmed, "Power Electronics for Technology", LPE Pearson Edition, 1998.
4. Dr. P.S. Bimbhra, "Power Electronics", Third Edition, Khanna Publication, 2018
5. M. D. Singh and K. B. Khandchandani, "Power Electronics", Tata McGraw Hill, 2008.

Reference Books

1. Vedam Subramanyam, "Power Electronics", New Age International, New Delhi, 2018.
2. Dubey, Donalda, Joshi,Sinha, "Thyristorised Power controllers", Wiely Eastern New Delhi, 1986.
3. L. Umanand, "Power Electronics – Essentials and Applications", Wiley Publication, 2009.
4. J. Michael Jacob, "Power Electronics Principal and Applications", 2001.
5. V.R. Moorthi, "Power Electronics Devices, circuits, and Industrial applications", Oxford University, Press,2010.

Online References

1. NPTEL Course: Prof. L. Umanand, IISC Bangalore, "Fundamental of Power. Electronics". (https://nptel.ac.in/courses/108101126)
2. NPTEL Course: Dr. M. M. Rajan Singaravel, IIT Kharagpur, "Fundamentals of Power Electronics". (https://onlinecourses.swayam2.ac.in/ntr25_ed137)
3. NPTEL Course: Prof. Vivek Agrawal, IIT Bombay, "Fundamentals of Power Electronics". (https://onlinecourses-archive.nptel.ac.in/noc19_ee03)
4. NPTEL Course:Prof. D. Prasad, Prof. N. K. De, Dr. D. Kastha, Prof. Sabyasachi Sengupta, IIT Kharagpur, "Power Electronics". (https://nptel.ac.in/courses/108105066)

Second Year B.Tech Electrical Engineering

Semester-IV

Course Code: EE24PCC253 **Course Name: Electromagnetic Field Theory**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
3	-	-	-	-	40	60	-	-	-	100	3	-	-	3

Prerequisite: Engineering Mathematics, Engineering Physics, Basics of Electrical Technology.

Course Objectives:

- To introduce the concept of different coordinate systems and their significance in electromagnetic field analysis.
- To develop the ability to evaluate electromagnetic field quantities in various media using fundamental laws such as Gauss's Law.
- To understand the nature and behavior of static electric fields, boundary conditions, and dielectric materials.
- To explain steady magnetic fields, their properties in various media, and analyze inductance through associated electromagnetic laws.
- To familiarize with Maxwell's equations in differential and integral forms and their application in different types of media.

Course Outcomes:

After learning the course, the students will be able to:

CO1: Recognize and apply the knowledge of different co-ordinate systems.

CO2: Evaluate the physical quantities of electromagnetic fields in different media and apply Gauss law.

CO3: Describe static electric fields boundary conditions, nature of dielectric materials and evaluate potential fields.

CO4: Explain steady magnetic fields, their behavior in different media, associated laws and inductance.

CO5: Apply Maxwell's equations in different forms and different media.

Unit	Contents	Duration (Hrs.)
1	**Co-Ordinate System and Transformation** Definition of Scalars and vectors quantities, Vector Algebra, Rectangular Co-ordinate System, Cylindrical Co-ordinate System, Spherical Co-ordinate System and transformation of Cartesian to Cylindrical, Cartesian to Spherical and vice versa.	8
2	**Laws and Application of Electrical field intensity and density** Coulombs Law, Electric field intensity, field due to continuous volume charge distribution, field of point charge, field of line charge, field of sheet charge, Electric Flux density, Gauss ' s law and Applications of Gauss ' s law, the divergence theorem.	8
3	**Potential of charge system** Definition of potential difference and potential, the potential field of a point charge, the potential field of a system of charges, potential gradient. Metallic conductors, conductor properties, the nature of dielectric materials, boundary conditions for perfect dielectric materials, Capacitance of parallel plate capacitor, capacitance of two wire line.	8
4	**The steady Magnetic Field and Magnetic forces** Biot Savart ' s law, Ampere ' s Circuital law, Stoke ' s theorem, magnetic flux	8

	density, scalar and vector magnetic potentials. Force on moving charge, force between differential current elements, nature of magnetic material, Magnetization and permeability, Inductance and mutual inductance.	
5	**Boundary conditions, Maxwell's equation and wave propagation** Magnetic boundary conditions, Faraday's law, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Wave propagation, Poynting vector, skin effect.	8
	Total Hours	40

Text Books

1. W.H. Hayt , "Engineering Electromagnetics" ,TMH Publication 2006.
2. N.N. Rao, "Fundamentals of Electromagnetic for Engineering", Pearson Education.
3. Shevgaonkar Electromagnetic Waves, Tata Mc Graw Hill 2002.
4. Matthew, N. O. Sadiku Elements of Electromagnetics, Oxford University publication, 6th edition, 2014

Reference Books

1. Fawwaz T.Ulaby Applied Electromagnetics, Prentice Hall. 1999.
2. Krauss Electromagnetic Engg. IV Edition, Tata Mc Graw Hill. 2003.

Online References

1. NPTEL Course: Prof. Pradeep Kumar., IIT Kanpur, "Electromagnetic Theory". (https://onlinecourses.nptel.ac.in/noc21_ee83/preview)
2. NPTEL Course: Prof. Harishankar Ramachandran, IIT Madras, "Electromagnetic Fields". (https://nptel.ac.in/courses/108106073)

Second Year B.Tech Electrical Engineering

Semester-IV

Course Code: EE24PCC255 **Course Name: Electrical Machines - I Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	2	-	-	-	-	-	-	-	50	50	-	1	-	1

Prerequisite: Basic knowledge of mathematics, physics, magnetic circuits, basic electrical technology and knowledge of elementary differential equations are prerequisites for this course.

Course Objectives:

- To enable students to operate various DC machines under no load and load conditions.
- To observe the behavior of transformer during parallel operation.
- To become aware of maintenance of machines and troubleshoot in case of failure.

Course Outcomes:

After learning the course, the students will be able to:

CO1:Perform various tests on single phase transformer to analyze its performance

CO2:Perform tests on DC machines to determine its characteristics

CO3:Analyze trouble shooting and maintenance of DC and BLDC motors

CO4:Simulate given machines and compare the results with actual experimentation results.

List of Experiments

Sr. No.	Name of the Experiment	Duration (Hrs.)
1	O.C. and S.C. test on single phase Transformer a. Determination of equivalent circuit parameters from the test data b. Determination of voltage regulation and efficiency	04
2	Polarity test on single phase and three phase transformer	02
3	Parallel operation of Single phase transformer	04
4	Brake load test on D.C. Shunt motor	04
5	Open circuit and load test on DC Generator	02
6	Maintenance and Troubleshooting of DG set	04
7	Torque Speed Characteristics on BLDC motor	04
8	Maintenance and Troubleshooting of BLDC motor	02
9	V lab	02
10	V lab	02
	Total Hours	30

Text Books

1. Dr. P. S. Bimbhra, Electrical Machinery, Theory: Performance & Applications, Khanna

Publishers, 2021.
2. Fitzgerald and Kingsley's electric machinery by Stephen D. Umans–TMH Publishers, 7th Edition, 2020.
3. Nagarath & D.P.Kothari: Electrical Machines,TMH Publishers,5th edition 2017.
4. B.L.Theraja, "A text book on electrical technology", Vol- 2. ,S.Chand Publications, 2005.

Reference Books

1. H. Cotton, "Electrical Technology " 7th edition, CBS Publications and Distributors, 2018.
2. E. Hughes, "Hughes Electrical and Electronics Technology", 11th Edition Pearson, 2012.

Online References

1. NPTEL: Electrical Machines by Prof. G. Bhuvaneshwari, IIT Delhi. (https://nptel.ac.in/courses/108102146)
2. NPTEL: Electrical Machines I by Prof. Tapas Kumar Bhattacharya, IIT Karagpur. (https://onlinecourses.nptel.ac.in/noc23_ee114/preview)
3. NPTEL: Electrical Machines I by Prof. D Kastha, Prof. Suman Maiti, IIT Karagpur. (https://nptel.ac.in/courses/108105017)
4. Virtual lab (https://ems-iitr.vlabs.ac.in/)
5. Virtual lab (https://em-coep.vlabs.ac.in/)

Second Year B.Tech Electrical Engineering

Semester-IV

Course Code:EE24PCC256 **Course Name: Power Electronics Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	2	-	-	-	-	-	-	-	50	50	-	1	-	1

Prerequisite: Basics of DC and AC power Supply, Measurement of Current, Voltage, Resistance using multimeter, Measurement of voltage, time and frequency using CRO, Single phase AC waveforms for R and RL load

Course Objectives:

- To familiarize students with the fundamental concepts of power Electronics devices, their switching characteristics and triggering circuits
- To demonstrate the students working of power electronics converter circuits
- To develop the students to design the power electronics converter circuits and analyze their performance for R and RL load using simulation tool.

Course Outcomes:

After completing the course, the students will be able to:

CO1: Demonstrate the switching characteristics and triggering circuits of power electronics devices

CO2: Explain the working and control of power electronics converter circuits

CO3: Design and analyze the performance of power Electronics converter circuits using simulation tool

List of Experiments

Sr. No.	Name of the Experiment	Duration (Hrs.)
1	Static VI characteristic of SCR	4
2	Output and Transfer Characteristic of MOSFET and IGBT	2
3	Design and develop gate triggering circuits for SCR	4
4	Single phase fully controlled converter with R and RL Load	2
5	Single phase A.C. voltage regulator with R and RL load.	2
6	Buck Converter	4
7	Simulate three phase AC-DC fully controlled bridge converter using R and RL load	4
8	Simulate three phase voltage source inverters using 120^0 and 180^0 conduction mode	4
9	Simulate a power converter based real life application	2
10	Case study of Power Electronic Techniques used for various Industrial Applications	2
	Total Hours	30

Text Books

1. M.H.Rashid "Power Electronics" 2nd Edition, Pearson publication, 2017.
2. Ned Mohan, T.M. Undeland, W.P. Robbins, "Power Electronics", 3rd Edition, John Wiley and Sons, 2022.
3. Ashfaq Ahmed, "Power Electronics for Technology", LPE Pearson Edition, 1998.

4. Dr. P.S. Bimbhra, "Power Electronics", Third Edition, Khanna Publication, 2018
5. M. D. Singh and K. B. Khandchandani, "Power Electronics", Tata McGraw Hill, 2008.

Reference Books

1. Vedam Subramanyam, "Power Electronics", New Age International, New Delhi, 2018.
2. Dubey, Donalda, Joshi,Sinha, "Thyristorised Power controllers", Wiely Eastern New Delhi, 1986.
3. L. Umanand, "Power Electronics – Essentials and Applications", Wiley Publication, 2009.
4. J. Michael Jacob, "Power Electronics Principal and Applications", 2001.
5. V.R. Moorthi, "Power Electronics Devices, circuits, and Industrial applications", Oxford University, Press,2010.

Online References

1. NPTEL Course: Prof. L. Umanand, IISC Bangalore, "Fundamental of Power Electronics". (https://nptel.ac.in/courses/108101126)
2. NPTEL Course: Dr. M. M. Rajan Singaravel, IIT Kharagpur, "Fundamentals of Power Electronics" . (https://onlinecourses.swayam2.ac.in/ntr25_ed137)
3. NPTEL Course: Prof. Vivek Agrawal, IIT Bombay, "Fundamentals of Power Electronics" . (https://onlinecourses-archive.nptel.ac.in/noc19_ee03)
4. NPTEL Course:Prof. D. Prasad, Prof. N. K. De, Dr. D. Kastha, Prof. Sabyasachi Sengupta, IIT Kharagpur, "Power Electronics". (https://nptel.ac.in/courses/108105066)
5. Virtual lab (https://pe-iitr.vlabs.ac.in/)

Second Year B. Tech Electrical Engineering

Semester-IV

Course Code: EE24VSE257 **Course Name: Programming and Simulation for Electrical Applications Lab**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	4	-	-	-	-	-	50	-	-	50	-	2	-	2

Prerequisite: Knowledge of electrical filters, rectifiers, renewable energy systems, DC motor & Induction motor and power systems

Course Objectives: To enable students to gain knowledge and understanding in the following aspects:

- To Develop foundational programming skills using MATLAB/Simulink for solving Electrical Engineering problems.
- To Integrate theoretical knowledge of Electrical Engineering with software tools
- To Enhance problem solving and debugging skills
- To Interpret and analyze simulation results to evaluate system behavior under various operating conditions

Course Outcomes:

After learning the course, the students will be able to:

CO1: Describe the fundamental concepts of programming and Simulink for electrical applications.
CO2: Design electrical filters, rectifiers, and renewable energy systems using simulation, based on specific engineering criteria.
CO3: Analyze the performance and control of DC motor & Induction motor and power systems through simulations, identifying key operational parameters.
CO4: Integrate renewable energy sources into electrical systems using simulation models, demonstrating their impact on overall system performance.

Contents in Association with Industry

Programming for Electrical Circuits, Electrical Machines, Power Systems, Development of PBL based project as per industry requirement, testing & troubleshooting.

List of Lab Activities

Sr. No.	Activities	Duration (Hrs)
1	Simulate PWM technic and implement it to control brightness of LED.	05
2	Develop an algorithm to control the speed of DC motor and validate the result with hardware.	05
3	Design a solar charge controller and simulate it verify the result with developed hardware.	05
4	Simulate a single-phase inverter circuit and verify the result with developed hardware	05
5	Design power consumption monitoring system and developed a hardware	05

6	Testing and troubleshooting of given converter circuit.	07
	Total Hours	**32**
Project Based Learning (PBL) Topics		
P1	Simulate a buck converter and i microcontroller	**28**
P2	Conduct a Survey for estimation of system connected load and prepare report to develop suitable hardware.	
P3	Perform a Testing and troubleshooting of given Stepper Motor and prepare a suitable report.	
P4	Design & Simulate an H-Bridge inverter and develop suitable hardware.	
P5	Develop a Simulation circuit to control Brushless DC (BLDC) motor and verify the result through hardware.	
P6	Design and simulate Boost converter & implement it with PV panel.	
P7	Design and develop power inverter and perform fault diagnosis.	
P8	Simulate a solar panel system and interface it with a battery charging circuit	
	Total Hours	**28**

Text Books

1. Sulaymon Eshkabilov"Beginning MATLAB and Simulink: From Beginner to Pro", 2nd edition, Apress, 2018.

Reference Books

1. "MATLAB Programming for Beginners and Professionals", Irfan Turk, Create Space,2018.
2. "Programming for Electrical Engineers: MATLAB and Spice", James C. Squire, Julie Phillips Brown, Academic Press, 2012.
3. "MATLAB Programming for Engineers (Electrical Engineering)", Stephen Chapman, Nelson Engineering, 2020.
4. "Power Electronic Systems: Walsh Analysis with MATLAB", Anish Deb, Suchismita Ghosh, CRC Press, Inc., 2012.
5. " Design and Simulation of Electrical Machines with Matlab", L. Ashok Kumar, Nova Science Publishers,2021
6. " Power System Analysis 2e, T. K. Nagsarkar, M.S. Sukhija , Oxford University Press Electrical", Viktor Perelmuter, CRC Press, Inc., 2018.
7. "Reliability of Power Electronics Converters for Solar Photovoltaic Applications", Ahteshamul Haque, Frede Blaabjerg , Huai Wang, Yongheng Yang (Editor), Zainul Abdin Jaffery, Institution of Engineering and Technology, 2015.
8. "Simulation of Power Electronics Converters Using PLECS" Farzin Asadi , Kei Eguchi, Academic Press Inc., 2015.
9. "Exploring Arduino: Tools and Techniques for Engineering Wizardry", Jeremy Blum, John Wiley & Sons Inc.2021

Online References

1. Self-Paced Online Courses- MATLAB Programming Techniques - (https://in.mathworks.com/learn/training/matlab-programming-techniques.html?s_tid=srchtitle_site_search_2_MATLAB%20Programming%2)
2. Self-Paced Online Courses- Advanced MATLAB Programming Skills- - (https://matlabacademy.mathworks.com/details/advanced-matlab-programming-skills/lpmlamp?s_tid=srchtitle_site_search_3_MATLAB%20Programming%20).
3. Self-Paced Online Courses- MATLAB Programming Techniques (https://matlabacademy.mathworks.com/details/matlab-programmingtechniques/mlpr?s_tid=srchtitle_site_search_5_MATLAB%20Programming%20)

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Second Year B.Tech Electrical Engineering

Semester-IV

Course Code: EE24VEC258 Course Name: Industrial and Technology Management

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	-	2	-	-	-	-	50	-	-	50	-	-	2	2

Prerequisites: Basics Electrical Engineering

Course Objectives:

- To develop an understanding of planning and decision-making processes in industrial management.
- To explain the principles of organizing and demonstrate their application in real-world industrial scenarios.
- To introduce the scope and role of technology management in driving innovation and sustainability.
- To analyze the 5-R principles of materials management and their role in efficient procurement.

Course Outcomes:

After learning the course, the students will be able to:
CO1: Analyze the importance of planning in industrial management
CO2: Evaluate the principles of organizing and their practical application.
CO3: Understand the fundamental role of technology management.
CO4: Explore the significance of the 5-R principles in materials management.
CO5: Understand how financial management supports business objectives.

Contents

1	**Industrial Management** Definition of Management, Management environment. Planning- Need, objectives, Strategy, Policies, Procedures, Steps in Planning, Decision Making, Forecasting Organizing- Process of organizing importance and principle of organizing, departmentation, organizational relationship, Authority, Responsibility.
2	**Human Resource Management** Nature, Purpose, Scope, Human Resource Planning, Policies, Recruitment Procedure training and development, appraisal methods. Leading- Communication Process, Barriers, remedies, motivation, importance, Theories: Herzbergs theory, Maslows therory, McGregors theory, Leadership style.
3	**Technology Management** A) Technology Management: Definition of technology Management and its relation with society, development, application and its scope. B) Classification of Technology Management: Classification of technology management at various levels- its importance on National Economy, Ethics in technology management, Critical factors in technology management.
4	**Materials Management** Definition, scope, advantages of material management, functions of material management, Purchase objectives,5-R Principles of Purchasing, Functions of Purchase department, Purchasing cycle, Purchase Policy & Procedure, Evaluation of Purchase Performance

List of Tutorial

Sr. No.	Name of the Tutorial	Duration (Hrs.)
1	Steps in Planning and Its Significance in Industrial Management Guidelines: a. Explain the need for planning in industrial settings. b. Discuss each step in the planning process with real-world examples. c. Highlight decision-making and forecasting in achieving objectives.	4
2	Principles and Importance of Organizing in Industrial Management Guidelines: a. Define organizing and its importance. b. Discuss principles like unity of command, division of labor, and span of control. c. Provide examples of how these principles are applied in industries like Manufacturing or IT.	4
3	Case Study: Leadership and Motivation in Any Industry Focus Areas: a. Industry leadership styles in managing diverse teams. b. Application of Maslows and Herzberg's theories in employee motivation. c. Overcoming communication barriers in a multicultural organization. d. Policies and training programs to ensure employee growth and retention.	4
4	Definition and Scope of Technology Management Guidelines: a. Define technology management and explain its relation to society. b. Discuss its scope, including innovation, application, and sustainability. c. Provide examples of how it shapes industries like healthcare, IT, and Manufacturing	4
5	Case Study : Consider any industry: Technology management for sustainability	2
6	Application of the 5-R Principles in Purchasing Guidelines: a. Define each principle (right quality, quantity, time, source, and price). b. Analyze how companies like Amazon or Tata Motors implement these principles. c. Discuss the impact of the 5-Rs on supplier relationships and cost control.	4
7	Case Study : Consider any industry: Materials Management System Focus Areas: a. Scope and advantages of the materials management approach b. Application of the 5-R principles in purchasing c. Evaluation of purchase performance	4
	Total Hours	26

Text Books

1. O.P. Khanna, *"Industrial Engineering and Management"*, Dhanpat Rai Publications, 1998.
2. S.C. Sharma and Banga T. R., "Industrial Organization & Engineering Economics", Khanna

Publications,2017.
3. A.R. Aryasri, *"Managerial Economics and Financial Analysis"*, TMH Publications, 2014.

Reference Books

1. K.C. Jain and L.N. Agarwal, *"Production Planning Control & Industrial Management"*, Khanna Publishers, 2018.
2. Anil Kumar Mukhopadhyay, *"Value Engineering: Concept, Technique and Application"*, SAGE Publishing, 2012.
3. T.R. Banga and S.C. Sharma, *"Industrial Engineering and Management Science"*, Khanna Publishers, 2016.

Online References

1. NPTEL Course: Prof. P.K.J.Mohapatra, Economics/management/entrepreneurship. (https://nptel.ac.in/courses/110105067)

Second Year B.Tech Engineering

Semester-IV

Course Code: SH24AEC202 **Course Name: Professional Communication & Personality Development**

Teaching Scheme (Hours/Week)					Examination Scheme						Credits			
L	P	T	OL	ODL	CIE	ETE	TW	OR	PR	TOTAL	L	P	T	TOTAL
-	-	2	-	-	-	-	50	-	-	50	-	-	2	2

Prerequisite: Basic understanding of LSRW skills, grammar, and vocabulary of the English Language.

Course Objectives:

- To develop students' rhetorical and persuasive abilities for effective oral communication and audience engagement.
- To familiarize students with key business and managerial terminologies essential for effective communication and decision-making.
- To strengthen analytical and critical thinking skills for constructing logical arguments and making informed decisions.
- To cultivate professional and technical writing competence, ensuring clarity, accuracy, and etiquette in communication.

Course Outcomes:

After learning the course, the students will be able to:

CO1 Demonstrate effective rhetoric, persuasive skills, audience engagement, and adaptability in communication.

CO2: Apply visual aids, body language, voice modulation, and confidently manage audience questions and maintain engagement throughout.

CO3: Analyze information and construct logical arguments to solve problems and make informed Decisions.

CO4: Exhibit professional and technical writing skills and avoid common pitfalls, ensuring clear, polite, and informative communication.

Contents

1	**Public Speaking** Using Persuasive language and understanding the context in public speaking Controlling nervousness, building confidence, stage presence, poise, and impact Employing voice modulation, pace, volume & pitch.
2	**Presentation Skills** Structuring a presentation & using visual aids Understanding audience connection strategies & feedback Handling Q&A sessions with confidence.
3	**Critical Thinking** Working on Case Studies and Situational Analysis Structuring the argument and handling rebuttal Analyzing logical fallacies and cognitive biases.
4	**Technical Writing** Structuring emails for different purposes (requests, complaints, updates, and follow-

	ups) Avoiding common mistakes and making the right use of CC, BCC, and reply-all options Blog/article/ newsletter/survey report format and examples.
5	**Group Discussion** Implementing coherence and cohesion in structuring the argument Integrating non-verbal communication in the conversation Managing disagreement and aggression in the discussion.

List of Tutorials

Sr. No.	Name of the Tutorial	Duration (Hrs.)
1	Ice-breaking Session	2
2	Storytelling	4
3	Idea Presentation	4
4	Advertisement Creation	4
5	Case Study Analysis	2
6	Debate	2
7	Email Writing (Professional & Personal)	2
8	Blog Writing	2
9	Survey Reports	2
10	Group Discussion	2
	Total Hours	26

Text Books

1. Stephen E. Lucas, *The Art of Public Speaking*, McGraw Hill Publication, ISBN-10: 1260914275 | ISBN-13: 9781260914276., 2022.
2. Jaishri Jethwaney and Sanjay Bhargava, *Corporate Communication: Principles and Practices*.
3. Dr. Ranjit Singh, *Critical Thinking and Problem Solving*.
4. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand & Sons, 2011. ISBN: 8180547299, 9788180547294.

Reference Books

1. Shiv Khera, *You Can Win*, Bloomsbury India, ISBN-10: 9382951717 · ISBN-13: 9789832951711.
2. Carmine Gallo, *Talk Like TED*, Macmillan Business.
3. Garr Reynolds, *Presentation Zen: Simple Ideas on Presentation Design and Delivery*, New Riders.
4. Peter Facione and Carol Ann Gittens, *Think Critically*.
5. Lewis Vaughn, *The Power of Critical Thinking*, Oxford University Press.
6. Emily Post and Peter Post, *The Etiquette Advantage in Business: Personal Skills for Professional Success*.

Online References

1. NPTEL Course: *Technical English for Engineers* – (https://onlinecourses.nptel.ac.in/noc20_hs56/preview)
2. SWAYAM Course: *English for Research Paper Writing* –

(https://onlinecourses.swayam2.ac.in/ntr24_ed15/preview)
3. SWAYAM Course: *Personality Development and Communication Skills* – (https://onlinecourses.swayam2.ac.in/cec22_cm03/preview)

AICTE Approved Programmes

Branch	Intake			Career Options
	B.Tech.	M.Tech.	Working Professional Direct Second Year	
Computer Engineering	180	Computer Engineering:18	---	Data Science, Artificial Intelligence (AI), Big Data Analytics, High Performance Computing (HPC), Machine Learning, Database Engineering, Computer Networks, Cyber Security, IOT
Electrical Engineering	60	Power Electronics & Drives: 06	30	Public Sector, Power Sector, Software Development, Maintenance Engineering, Contractor & Supervisor, Energy Auditor, Internet of Things (IoT), Robotics and Automation, Industry 4.0, Chartered Engineer, Electric Vehicles,
Electronics & Telecommunications Engineering	180	VLSI and Embedded System: 06	---	Internet of Things (IoT), Robotics and Automation, Industry 4.0, Wireless Communication 4G, 5G, 6G, Artificial Intelligence, VLSI, Embedded Systems, Satellite Communication, Data Science, Power Electronics, Computer Networking, Blockchain Technology, Signal Processing, Electronic Design
Information Technology	180	Data Science: 06	---	Software Development &Testing, Cyber Security, Cloud Computing, Big Data Analytics, IoT, Machine Learning, Artificial Intelligence, Blockchain, Database Management, Data Engineer, Data Science
Mechanical Engineering	120	Design Engineering: 06	30	Machine Design, System Modeling, Simulation, Robotics, Mechatronics, Rapid Prototyping, 3D Printing, Composite Materials, Automotive & Electrical Vehicles, Manufacturing Sector, HVAC Systems, Energy Engineering and Process Industry, Robotics, Data Science, Public Sector, Power Sector, Software Development, Mechanical Design Engineer, Design Quality Assurance Manager, Engineering, Service, Teaching, Designing Machines & Tools
Artificial Intelligence and Data Science	180	---	---	Cyber Security Analyst, Software Development Expert, Artificial Intelligence Engineer, Data Scientist, Data Analysis, Machine Learning Engineer, Machine Learning Architect, Product Analyst, Software Architect, Data Warehouse Engineer, Product Manager, Front-end Developer, Full Stack Developer
Ph.D Research Center in Computer Engineering.				

Industry Connect through Professional Bodies / Students' Chapters

- CII
- ISHRAE
- ACM
- ISRD
- GDSC
- IE(I)
- TATA
- ASHRAE
- IETE
- DICCI
- IEEE
- ISACA
- MCCIA
- SAEINDIA
- CSI
- ISTE
- STP

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