Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

Padmabhooshan Vasantraodada Patil Institute of Technology,
Budhgaon, Sangli (MS) – 416304

(An Autonomous Institute)

Affiliated to

Dr. Babasaheb Ambedkar Technological University,
Lonere, Raigad

(Accredited by NAAC)

Department of Electrical and Computer Engineering

Curriculum for Second Year Undergraduate Degree Programme

B. Tech. in Electrical and Computer Engineering

In accordance with National Education Policy (NEP – 2020)

w. e. f.
Academic Year: 2026-27

Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, BUDHGAON, SANGLI 416304

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

Department of Electrical and Computer Engineering

Curriculum Structure and Evaluation Scheme

(Academic Year 2026-27 Onwards)

S.Y. B. Tech Semester III Electrical and Computer Engineering

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					TOTAL
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0ECEES201	Applied Mathematics	3	1	0	4	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0ECEPCC202	DC Machines and Transformers	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0ECEPCC203	Network Analysis	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0ECEPCC204	Data Structure	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0ECEMDM205	MDM -I	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0ECEVEC206	Environmental studies	2	0	0	2	ISE	50	20	-	-	50
0ECEHSSM207	Principles of Management	2	0	0	2	ISE	50	20	-	-	50
0ECEPCL208	DC Machines and Transformers Lab	0	0	2	1	ISE ESE	- -	- -	50 50	20 20	50 50
0ECEPCL209	Data Structure Lab	0	0	2	1	ISE ESE	- 	- 	50 50	20 20	50 50
0ECECEP210	CEP / Lab	0	0	2	1	ISE	-	-	50	20	50
TOTAL		**19**	**1**	**8**	**23**	**TOTAL MARKS**					**850**
Total Contact Hours Per Week		**28**									

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Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	4	11		3	-	-	-	2	-	2	-	1	-	-	-	23
Cumulative	16	19	11	-	3	-	3	3	2	2	2	-	1	-	-	1	63

Multidisciplinary Minor Bucket offered by Electrical and Computer Engineering

MDM-I (SEM – III)	0ECEMDM205	Fundamentals of Electric Vehicles

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Department of Electrical and Computer Engineering

Curriculum Structure and Evaluation Scheme

(Academic Year 2026-27 Onwards)

S.Y. B. Tech Semester IV Electrical and Computer Engineering

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0ECEPCC251	Electrical Measurements & Instrumentation	3	1	0	4	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECEPCC252	Electrical Power Systems	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECEPCC253	AC Machines	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECEPCC254	Computer Architecture and Operating System	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECEMDM255	MDM -II	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECEOE256	Open Elective -I	2	0	0	2	ISE	50	20	-	-	50
0ECEAEC257	Soft Skills	0	0	2	1	ISE	25	10	-	-	25
0ECEVEC258	Universal Human Values	2	0	0	2	ISE	50	20	-	-	50
0ECEVSEC259	Computational Lab	0	0	2	1	ISE	-	-	25	10	25
0ECEPCL260	AC Machines Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE	-	-	50	20	50
0ECEPCL261	Python Programming Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE	-	-	50	20	50
TOTAL		19	1	8	24	TOTAL MARKS					850
Total Contact Hours Per Week		28									

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Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	-	15	-	3	2	1	1	-	-	2	-	-	-	-	-	24
Cumulative	16	19	26	-	6	2	4	4	2	2	4	-	1	-	-	1	87

Multidisciplinary Minor Bucket offered by Electrical and Computer Engineering

MDM-II (SEM – IV)	0ECEMDM255	EV Energy Storage and Charging Systems

Open Elective-I offered by Electrical and Computer Engineering

0ECEOE256	Sustainable Power Generation

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0ECEES201 APPLIED MATHEMATICS

Course Details:

Course Code and Course Title	**0ECEES201 – Applied Mathematics**			
Semester	III			
Prerequisites	Engineering Maths – I and II			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	1	-	
Credit	04			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	**Compute** Fourier Series coefficients for continuous-time periodic signals.	3
CO2	**Solve** linear differential equations with constant coefficients by using Laplace transform.	3
CO3	**Apply** statistical methods to interpret data using standard probability distributions	3
CO4	**Compute** Fourier Transforms of standard/simple functions used in engineering applications.	3
CO5	**Solve** discrete-time system problems using properties and theorems of Z-Transform.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Fourier Series** Dirichlet's conditions, Fourier coefficients (Euler's Formulae), Function having Point of Discontinuity, Even and odd functions, change of interval, Half range series.	7
Unit 2	**Laplace Transform** Definition, Properties of Laplace Transform, Inverse Laplace Transform using partial fraction method, Convolution theorem, Solution of linear differential equations with constant coefficients using Laplace Transform.	7
Unit 3	**Statistics** Mean, Median, Mode, Standard Deviation, Variance, Fitting of curves by method of Least squares, Coefficient of correlation and Spearman's rank correlation coefficients.	6
Unit 4	**Fourier Transform** Fourier Integral theorem, Continuous-Time Fourier Transform (CTFT), Fourier Sine and Cosine Transforms, Properties of Fourier Transform, Parseval's identity.	6
Unit 5	**Z-Transform** Definition, Z-Transform of basic discrete functions, Region of Convergence, Properties of Z-Transform, Convolution theorem, Initial value theorem, Final value	7

	theorem, Inverse Z-Transform using expansion method, partial fraction method and method of residues.	
Unit 6	**Probability Theory** Basic concepts of probability, Random variables, Probability density function, Probability distributions: Binomial, Poisson, and Normal distributions.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Engineering Mathematics	H. K. Dass	S. Chand Publishing	Revised Edition	2022
2	Advanced Engineering Mathematics	Jain and Iyengar	Narosa Publishing House	5th	2019
3	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	44th	2021
4	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India	10th	2015

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Probability and Statistics for Engineers and Scientists	Sheldon M. Ross	Academic Press	5th	2020
2	Numerical Methods for Scientific and Engineering Computation	M. K. Jain, S. R. K. Iyengar, R. K. Jain	New Age International Publishers	7th	2019
3	Signals and Systems	Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab	Pearson Education	2nd	2015
4	Advanced Engineering Mathematics	Dennis G. Zill, Warren S. Wright	Jones & Bartlett Learning	7th	2020

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0ECEPCC202 DC MACHINES AND TRANSFORMERS

Course Details:

Course Code and Course Title	0ECEPCC202 – DC Machines and Transformers			
Semester	III			
Prerequisites	Basic Electrical and Electronics Engineering			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Illustrate the construction, operating principles, and connections of transformers for understanding its operation.	2
CO2	Explain the operating principles, characteristics, speed control, and braking methods of DC motors for motor performance analysis.	2
CO3	Calculate transformer performance parameters and interpret testing, maintenance, and cooling methods for performance evaluation and troubleshooting.	3
CO4	Examine the operation, control techniques, and applications of BLDC motors and special purpose machines for machine performance analysis.	4

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Single Phase Transformer** Transformer construction, Ideal and practical transformer, exact and approximate equivalent circuits, no load and on load operation, phasor diagrams, power and energy efficiency, voltage regulation, parallel operation, Variable frequency transformer, voltage and current transformers, auto transformers, welding transformers.	7
Unit 2	**Three Phase Transformers:** Construction, working principle, connections, factors affecting the choice of connection, voltage phasor diagram, vector groups, open delta or V-V connection, Scott connections, performance characteristics, parallel operation of transformer.	6
Unit 3	**Testing and maintenance of Transformers:** Routine Tests, Type Tests, Routine and Breakdown Maintenance, troubleshooting, transformer cooling, on load tap changing of transformers.	6
Unit 4	**D.C. Motors** Principles of working, Significance of back emf, Torque Equation, Types, Characteristics and Selection of DC Motors, Starting of DC Motors, Speed Control, Losses and Efficiency, Condition for Maximum Efficiency, Braking of DC Motors, Effect of saturation and armature reaction on losses; Applications, Permanent Magnet DC Motors, Type and Routine test	7

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Unit 5	**Brushless DC Motors** Construction, Principle of operation, electronics commutation, types of BLDC motors, control of BLDC motor, comparison of conventional DC motor and BLDC motor, Applications.	7
Unit 6	**Special Purpose Machines** Universal motor, DC Servomotors, Permanent magnet DC motors, Stepper motors, SRM, Applications.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electric Machines	Ashfaq Husain, Haroon Ashfaq	Danpat Rai Publisher, New Delhi	3rd	2016
2	Principles of Electrical machines	V. K. Mehata, Rohit Mehata	S. Chand Publishers, New Delhi	2nd	2011
3	Alternating Current Machines	M.G. Say	Low price edition, ELBS	5th	1994
4	Special Electrical Machines	E.G. Janardanan	PHI learning private Limited, Delhi.	2nd	2014

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electrical Machines	Bhattacharya S. K.	McGraw Hill Education Private Limited, Chennai	4th	2014
2	Electrical Machines	D. R. Kothari, I. J. Nagrath	McGraw Hill education private limited, Chennai	5th	2018
3	Generalized Machine Theory	Bimbhra P.S.	Khanna Delhi	4th	1987
4	Electrical Machines	M.V. Deshpande	PHI Delhi	1st	2011
5	Electrical Machines	Samarjit Ghosh	Pearson	2nd	2012
6	Electrical Machines	Abhijit Chakrabarti	McGraw Hill education private limited, Chennai	2nd	2013

Useful link /Web Resources:
1. Prof. D Kastha, Prof. Suman Maiti, Electrical machines - I, IIT Kharagpur, https://nptel.ac.in/courses/108105017.
2. Prof. G. Sridhara Rao, Prof. P. Sasidhara Rao, Dr. Krishna Vasudevan, Electrical Machines I, IIT Madras, https://nptel.ac.in/courses/108106071.

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0ECEPCC203 NETWORK ANALYSIS

Course Details:

Course Code and Course Title	0ECEPCC203 – Network Analysis			
Semester	III			
Prerequisites	Basic Electrical and Electronics Engineering, Engineering Maths – I and II			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Classify circuit elements and apply circuit analysis techniques to simplify electrical networks.	3
CO2	Apply different network theorems to solve AC and DC circuits.	3
CO3	Examine AC circuits response using classical and Laplace Transform techniques.	3
CO4	Calculate parameters of two-port networks and AC filters.	4

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Circuit Elements** Types of sources: dependent & independent, R, L, C, Self & mutual inductance, Source transformation, Introduction of star-delta connection & it's interconversion. Classification of circuit elements: Lumped & distributed, Linear & non-linear, Unilateral & bilateral, Time variant & invariant.	7
Unit 2	**Network Theorems** KVL, KCL, Nodal analysis, Mesh analysis, Thevenin's, Norton's, Super position, Maximum power transfer theorem for AC & DC circuits.	7
Unit 3	**Transient Analysis** Initial & final condition of network & it's evaluation, solution of first & second order differential equations of series & parallel R-L, R-C. R-L-C circuits. Transient analysis of dc circuit by classical method for unit step, unit impulse only. Behavior of circuit elements under switching action.	6
Unit 4	**Circuit Analysis using Laplace Transform** Standard test input signal- unit step, impulse & ramp functions & their Laplace transformation, solution of differential equation using Laplace transform, solution of R-L, R C, R-L-C circuit using Laplace transform, transient & steady state response of RL, RC circuit using Laplace transform.	7

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Unit 5	**Two Port Network** Terminals& terminal pairs, driving points & transfer admittance, Transfer functions, Concept of poles & zeroes, two port networks, Z. Y & the transmission parameters relationship between parameter sets.	6
Unit 6	**Filter Design** Low-Pass, high pass, band-pass and band stop filters; Butter worth and Chebyshev approximations; Design of 1st order and 2nd order low pass filters; Elementary synthesis techniques.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Electric Circuits	Charles K. Alexander, Matthew N. O. Sadiku	McGraw Hill Education	5th	2013
2	Networks and Systems	Ashfaq Hussain	Khanna Book Publishing Co. (P) Ltd.	2nd	2019
3	Electrical Networks	Ravish R. Singh	McGraw Hill Education	3rd	2017
4	Network Analysis and Synthesis	Franklin F. Kuo	Wiley	2nd	2006
5	Electrical Circuit Analysis	Ashfaq Hussain	Dhanpat Rai & Co.	3rd	2016

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Network Analysis	M. E. Van Valkenburg, T. S. Rathore	Pearson Education India	Revised	2019
2	Network Analysis & Synthesis	U. A. Bakshi, A. V. Bakshi	Technical Publications	1st	2021
3	Network Analysis & Synthesis	C. L. Wadhwa	New Age International Publishers	3rd Edition	2007
4	Network Analysis and Synthesis	B. R. Gupta	S. Chand Publications	5th Edition	2010
5	Electric Circuits	James W. Nilsson, Susan Riedel	Pearson Education	10th Edition	2015

Useful link /Web Resources:
1. Prof. Tapas K. Bhattacharya, Network Analysis, Indian Institute of Technology Kharagpur, https://nptel.ac.in/courses/108105159.

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0ECEPCC204 DATA STRUCTURE

Course Details:

Course Code and Course Title	0ECEPCC204 – Data Structure			
Semester	III			
Prerequisites	Programming for Problem Solving in C			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Explain fundamental data concepts and memory representation of linear and non-linear data structures.	2
CO2	Illustrate appropriate data structures to solve specific computational and real-world problems.	2
CO3	Implement tree and graph data structures with standard operations.	3
CO4	Demonstrate proficiency by coding searching and sorting algorithms along with basic file handling techniques.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Data Structure** Data, Data types, Data structure, Abstract Data Type (ADT), representation of Information, characteristics of an algorithm, program, analysing programs. Arrays and Hash Tables: Concept of sequential organisation, linear and non-linear data structures, storage representation, array processing, sparse matrices, transpose of sparse matrices.	7
Unit 2	**Stacks and Queues** Introduction, stack and queue as ADT, representation and implementation of stack and queue using sequential and linked allocation, Circular queue and its implementation, Application of stack for expression evaluation and expression conversion, recursion, priority queue.	7
Unit 3	**Linked Lists** Concept of linked organization, singly and doubly linked list, and dynamic storage management, circular linked list, operations such as insertion, deletion, concatenation, traversal of linked list, dynamic memory management, garbage collection.	6
Unit 4	**Trees and Graphs** Basic terminology, binary trees and their representation, insertion and deletion of nodes in binary trees, binary search tree and its traversal, threaded binary tree, Heap, Balanced Trees, Terminology and representation of graphs using adjacency matrix, Warshall's algorithm.	7

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Unit 5	**Searching and Sorting** Sequential, binary searching, skip lists – dictionaries, linear list representation, skip list representation, operations – insertion, deletion, and searching. Insertion sort, selection sort, radix sort.	6
Unit 6	**Hashing & File Data Structure** Hash Tables, Direct address tables, Hash tables, Hash functions, Open addressing, Perfect hashing File handling.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data Structures using C and C++	Yedidyah Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum	Pearson	2nd	2006
2	Introduction to Data Structures	Trembley and Sorenson	PHI Publication	2nd	1983
3	A Simplified Approach to Data Structure	Vishal Goyal, Lalit Goyal	SPD Publication	1st	2014
4	Data Structures	S. Lipschutz	McGraw-Hill Publication	Revised 1st	2014

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Data Structures	Horowitz and Sahani	Universities Press	2nd	2008
2	Introduction to Algorithms	Thomas Cormen	PHI Publication	2nd	2002
3	Data Structures	Venkatesan & Rose	Wiley Publication	1st	2015
4	Data Structures & Algorithms in C++	Goodrich & Tamassia	Wiley Publication	2nd	2011

Useful link /Web Resources:
1. Prof. Naveen Garg, IIT Delhi, Stacks, Queues, Trees, Graphs, Sorting, Hashing, etc https://archive.nptel.ac.in/courses/106/102/106102064/.
2. Prof. Nitin Saxena , IIT Kanpur, Arrays, Trees, Graphs, Greedy, Dynamic Programming, https://onlinecourses.nptel.ac.in/noc25_cs81/preview.

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0ECEMDM205 FUNDAMENTALS OF ELECTRIC VEHICLES

Course Details:

Course Code and Course Title	0ECEMDM205 – Fundamentals of Electric Vehicles			
Semester	III			
Prerequisites	Basic Electrical and Electronics Engineering, Engineering Physics			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Classify electric vehicles using their architecture and operating characteristics, for identifying suitable EV types.	2
CO2	Illustrate electric vehicle architecture and subsystem integration using functional block diagrams, for understanding EV operation.	2
CO3	Determine vehicle performance parameters using electric traction principles, for EV propulsion analysis.	3
CO4	Compare hybrid and emerging electric vehicle configurations using operating characteristics, for identifying suitable mobility solutions.	3

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Introduction to Electric Vehicles:** Evolution and history of electric vehicles; need for electric mobility; classification of electric vehicles, BEV, HEV, PHEV, FCEV; comparison of electric vehicles with conventional vehicles; advantages and limitations of EVs; global and Indian EV scenario; environmental impact of EVs.	6
Unit 2	**Electric Vehicle Architecture and Components:** General layout of electric vehicles; functional block diagram of EV; traction motor, power converter, controller, battery pack, transmission system, auxiliary systems; vehicle body and chassis considerations; EV power flow during motoring and braking; overview of EV subsystems and their integration.	7
Unit 3	**Fundamentals of EV Propulsion Systems:** Basics of electric traction; force and torque requirements in EVs; rolling resistance, aerodynamic drag, hill climbing force; tractive effort and power calculations; acceleration and gradeability; transmission requirements in EVs; introduction to regenerative braking concept.	7
Unit 4	**Electric Motors for EV Applications:** Requirements of motors for EV applications; constructional features and operating principles of DC motor, BLDC motor, induction motor and PMSM; torque-speed characteristics; comparison of motors used in EVs; selection criteria of traction motors for electric vehicles.	7
Unit 5	**Power Electronics in Electric Vehicles:** Role of power electronics in EVs; overview of rectifiers, choppers and	6

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	inverters in EV applications; DC-DC conversion in EVs; PWM inverter concept; motor drive interface; onboard charger and converter overview; regenerative power flow concept.	
Unit 6	**Basics of Hybrid and Emerging Electric Vehicles:** Introduction to hybrid electric vehicles; series, parallel and series-parallel hybrid configurations; plug-in hybrid electric vehicles; fuel cell electric vehicles; solar assisted electric vehicles; introduction to electric buses, electric two-wheelers and autonomous electric mobility; challenges and future trends in EV technology.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electric & Hybrid Vehicles	A. K. Babu	Khanna Pub. House	2nd	2025
2	Electric And Hybrid Vehicle	Dr. Nitesh Tiwari, Dr. Shekhar Yadav	S. K. Kataria & Sons	2nd	2024
3	Electric and Hybrid Vehicles: Design Fundamentals	Iqbal Husain	CRC Press	3rd	2021
4	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles	Mehrdad Ehsani, Yimin Gao, Sebastien Gay, Ali Emadi	CRC Press	3rd	2018

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electric and Hybrid Vehicles	K.V.K. Prasad	Dreamtech Press	1st	2022
2	Electric Vehicle Technologies: Trends, Control, and Charging Solutions	Nitesh Tiwari, Shekhar Yadav, Sabha Raj Arya	Bentham Science Publishers	1st	2025
3	Power Electronics and Motor Drives in Electric, Hybrid Electric, and Plug-In Hybrid Electric Vehicles	Ali Emadi	CRC Press	1st	2017
4	Electric Vehicle Machines and Drives: Design, Analysis and Application	K. T. Chau	Wiley	1st	2015

Useful link /Web Resources:

1. Prof. Ashok Jhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha, Prof. L. Kannan, Fundamentals of Electric vehicles: Technology & Economics, https://nptel.ac.in/courses/108106170.

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OECEVEC206 ENVIRONMENTAL STUDIES

Course Details:

Course Code and Course Title	0ECEVEC206 – Environmental Studies		
Semester	III		
Prerequisites	--		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	-
Credit	2		
Evaluation Scheme	**ISE**		
	50 Marks		

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Explain the components and importance of Environment, ecosystems and Bio-diversity.	2
CO2	Discuss the various natural resources and strategies for their management.	3
CO3	Explain the sources of pollution, effects and control measures.	2
CO4	Apply the knowledge of EIA, EMS and Audits for the preparation of reports.	3

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Introduction to Environmental Studies:** Definition, scope and importance, Components of environment, Multidisciplinary nature of environmental studies. Ecosystems- Types, Structure and function, energy flow, food chains and food webs. Biodiversity- Types, Importance and conservation	6
Unit 2	**Natural resources and Management:** Natural resources- Forest, Water, Mineral food, Energy and Land. Energy resources- Renewable-Wind, Hydropower, Tidal, Ocean thermal, Solar, Biomass, Biogas, Geothermal and Hydrogen. Non-renewable- Coal Petroleum, Natural gas, Nuclear energy, Sustainable management of resources	6
Unit 3	**Environmental pollution and climate change:** Types of pollution- Water, Air, Solid waste, Soil and Noise, Sources, effects and control measures, Global effects of pollution	6
Unit 4	**EIA, EMS, Social issues and legislation:** Environmental Impact Assessment (EIA)- Purpose and process. Engineering Management Systems (EMS)-Principles and steps, Introduction to Environmental Audit and Green audit	6
	Total Hours	**24**

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Text/Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Ecological and Environmental studies	S. K. Garg	Khanna publishers	1st	2006
2	Essentials of Environmental studies	Kurian Joseph and R. Nagendran	Pearson Education, Singapore	2nd	2004
3	Environmental studies	Dr. Suresh K. Dhameja	Katson books	4th	2012
4	Environmental studies	Dr. P. D. Raut	Shivaji University, Kolhapur	4th	2012

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OECEHSSM207 PRINCIPLES OF MANAGEMENT

Course Details:

Course Code and Course Title	0ECEHSSM207 – Principles of Management		
Semester	III		
Prerequisites	---		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	-
Credit	2		
Evaluation Scheme	**ISE**		
	50 Marks		

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	Develop analytical and managerial abilities for solving organizational and workplace problems using management concepts and theories.	3
CO2	Identify and classify different types of plans such as policies, procedures, rules, programs, budgets, and strategies used in organizations..	3
CO3	Describe different types of organizational structures and evaluate their suitability in various business environments.	3
CO4	Identify and compare different leadership styles and major leadership theories used in management practices.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Management:** Definition, nature, scope, and importance of management, Functions of management, Levels of management, Managerial roles and skills, Evolution of management thought, Scientific Management – F.W. Taylor, Administrative Theory – Henri Fayol, Bureaucratic Theory – Max Weber, Human Relations Approach – Elton Mayo, Management as science, art and profession.	7
Unit 2	**Planning and Decision Making :** Nature and importance of planning, Types of plans, Planning process, Strategic planning, Forecasting techniques, Decision-making process, Types of decisions, Decision-making models, Problem-solving techniques, Management by Objectives (MBO).	5
Unit 3	**Organizing and Staffing:** Principles of organization, Organizational structure, Departmentation, Delegation and decentralization, Authority and responsibility, Span of control, Line and staff organization, Staffing process, Recruitment and selection, Training and development, Performance appraisal.	5
Unit 4	**Leadership, Motivation, and Communication:** Nature and importance of leadership, Leadership styles and theories, Motivation concepts, Maslow's Need Hierarchy Theory, Herzberg's Two-Factor Theory, McGregor's Theory X and Theory Y, Communication process, Types and barriers of communication, Team dynamics and conflict management, Emotional intelligence.	7
	Total Hours	**24**

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Essentials of Management: An International, Innovation, and Leadership Perspective	Harold Koontz and Heinz Weihrich	McGraw Hill Education	10th	2015
2	Principles of Management	P.C. Tripathi and P.N. Reddy	Tata McGraw Hill	4th	2008

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Management	Stephen Robbins and Mary Coulter	Pearson Education	13th	2017
2	Principles of Management	Dinkar Pagare	Sultan Chand & Sons	-	2013

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0ECEPCL208 DC MACHINES AND TRANSFORMERS LAB

Preamble:

The DC Machines and Transformers Lab is designed to provide practical exposure to the fundamental concepts of transformers and DC machines, which form the backbone of electrical engineering systems. This laboratory course complements the theoretical understanding by enabling students to perform experiments related to performance evaluation, characteristics, and operational aspects of electrical machines.

The course focuses on conducting standard tests on transformers to determine parameters such as core losses, copper losses, efficiency, and voltage regulation, along with the study of various transformer connections and their applications. It also includes experiments on DC machines to evaluate efficiency, analyze speed control methods, and understand the functioning of starters.

Course Code and Course Title	0ECEPCL208 – DC Machines and Transformers Lab		
Semester	III		
Prerequisites	Basic Electrical and Electronics Engineering		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	1		
Evaluation Scheme	**ISE**	**ESE**	
	50 Marks	50 Marks	

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Compute efficiency and voltage regulation of Single-Phase Transformer by conducting different transformer tests.	**3**
CO2	Test the performance of three-phase Transformer under different loading conditions using different connections.	**4**
CO3	Implement speed control methods of DC Motor under different operating conditions to achieve the desired motor performance.	**3**
CO4	Compute efficiency and losses of DC motors by conducting different tests.	**3**

Minimum 10 experiments from following list should be conducted.

1. To perform open circuit (OC) and short circuit (SC) test on single Phase transformer to estimate its core loss, copper loss and equivalent circuit parameters.
2. To perform direct load test on single phase transformer to obtain its efficiency and voltage regulation at various loading conditions.
3. Parallel operation of two single-phase transformers to study their load sharing under various operating conditions.
4. To perform open delta (V-V) connection of identical two single- phase transformers to obtain three phase transformation.
5. Verification of Scott-connection of two single-phase transformers to obtain 2-phase to 3-phase

transformation.
6. Verification and analysis of no-Load current waveform of single-phase transformer.
7. Separation of transformer core loss into eddy current loss and hysteresis loss.
8. Parallel connection of 3 phase DY1 and DY11 transformer to demonstrate load sharing.
9. Determination of efficiency of a dc shunt motor at various loading conditions.
10. Speed control of a separately dc Shunt motor by- (i) armature voltage control and (ii) Field current control method.
11. Direct load test on separately excited dc shunt motor to obtain it's on load Efficiency.
12. Estimation of efficiency of a dc shunt or compound machine by performing Swinburne's test.

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0ECEPCL209 DATA STRUCTURE LAB

Preamble:

The Data Structure Lab provides hands-on experience in implementing fundamental data structures using the C programming language. The course strengthens theoretical concepts by enabling students to develop programs for efficient data organization, management, and processing. Students perform experiments on linear and non-linear data structures such as stacks, queues, linked lists, trees, heaps, graphs, and hashing techniques, along with sorting and searching algorithms. The laboratory also introduces concepts of algorithm analysis, file handling, and memory-efficient programming, helping students develop problem-solving ability and programming skills for real-world software applications.

Course Code and Course Title	0ECEPCL209 – Data Structure Lab		
Semester	III		
Prerequisites	Programming for Problem Solving in C		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	1		
Evaluation Scheme	**ISE**	**ESE**	
	50 Marks	50 Marks	

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Explain fundamental concepts of data types, structures, ADTs, and analyse algorithms using asymptotic notation to determine their time and space complexity.	4
CO2	Solve computational problems using linear and non-linear data structures with their traversals and operations.	4
CO3	Select suitable data structures, algorithms, searching, sorting, and file handling techniques for efficient and scalable software solutions.	5

Minimum 8 experiments from following list should be conducted.
1. Construct a program to implement a stack using arrays to manage linear data.
2. Apply stack-based algorithms to evaluate a given postfix expression.
3. Execute the conversion of an infix expression to postfix form using stack operations.
4. Implement a circular queue using arrays to demonstrate efficient memory utilization.
5. Develop a program for a double-ended queue using arrays to support insertion and deletion from both ends.
6. Build a program to implement a single linked list and a double linked list for dynamic data management.
7. Implement hashing techniques using both (a) Separate Chaining and (b) Open Addressing methods.
8. Execute the following sorting algorithms: (a) Insertion sort, (b) Merge sort, (c) Quick sort, and

(d) Heap sort.
9. Demonstrate graph traversals by applying (a) Breadth-First Search (BFS) and (b) Depth-First Search (DFS).
10. Implement a stack using two queues by applying logic that ensures the push operation runs in constant time and the pop operation runs in linear time.
11. Differentiate between stack implementations using queues to determine which approach optimizes for push versus pop efficiency.
12. Demonstrate the implementation of a queue using two stacks to achieve constant time for one operation and linear time for the other.
13. Construct an AVL tree for a given set of keys and develop a function to handle the deletion of a key while maintaining tree balance.

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0ECECEP210 COMMUNITY ENGAGEMENT PROJECT

Preamble:

The Community Engagement Project is designed to foster social responsibility, civic awareness, and experiential learning among students by actively involving them in real-world community development activities. This course aims to bridge the gap between academic knowledge and societal needs by encouraging students to apply their skills and values for the betterment of the community.

Through this project, students engage with local communities to identify key social, environmental, educational, or health-related challenges. They work collaboratively with community members, organizations, and stakeholders to design and implement sustainable solutions. Activities may include awareness campaigns, educational initiatives, environmental conservation efforts, digital literacy programs, and support for underprivileged groups.

The course emphasizes teamwork, leadership, communication, and ethical responsibility. Students gain hands-on experience in problem identification, project planning, resource management, and impact assessment. It also nurtures empathy, cultural sensitivity, and a deeper understanding of societal issues.

The Community Engagement Project aims to create socially conscious individuals who are equipped to address real-world challenges and contribute meaningfully to sustainable community development.

Course Code and Course Title		0ECECEP210 – Community Engagement Project		
Semester		III		
Prerequisites		---		
Teaching Scheme (hours per week)		**Lecture**	**Tutorial**	**Practical**
		-	-	2
Credit		1		
Evaluation Scheme		**ISE**		
		50 Marks		
Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:				**BL**
CO1	Identify and classify the problems and challenges present in the community and society			2
CO2	Conduct surveys, collect relevant data, and interpret the results to understand community needs and issues.			3
CO3	Apply appropriate technical and engineering knowledge to design and propose feasible solutions for social problems.			3
CO4	Communicate with stakeholders by demonstrating teamwork and interpersonal skills.			3
Course Instructions: In order to solve real-life issues and advance sustainable development, a community engagement initiative aims to establish social responsibility and link students with nearby communities. By sharing their learning results and offering solutions to social and community issues, students are				

expected to give back to the community. "Campus to Community" is the community engagement project's motto. Under the teacher's guidance, students are encouraged to find socially significant projects or problems and either solve them or suggest answers. These initiatives promote social responsibility, empathy, and teamwork.
Projects may cover a wide range of topics, including health, where students can plan free check-up camps or mental health awareness campaigns; livelihood, through skill-sharing or support for micro entrepreneurship; and education, through workshops on digital literacy, mobile libraries, or career counseling camps. Projects that have an influence on the environment include solar lights in villages and raising awareness of rainwater collecting. Additionally, initiatives like recording local history or planning cultural exchanges support the celebration and preservation of communal identity. In addition to helping society, these programs give participants real-world experience, leadership training, and a better grasp of their civic responsibilities. Through these interactions, communities take an active role in development, resulting in a society that is more resilient and inclusive.

A. Project Scope:
The CEP should focus on addressing a specific community or societal issue. Projects may fall under the following themes:

1. Education and Awareness: Conduct workshops or awareness drives on topics like digital literacy, environmental sustainability, mental health, or career planning for local stakeholders.

2. Technology for Social Good: Develop a simple prototype or solution that addresses a real-world problem (e.g., a water saving device, simple mobile apps, or tools for community use).

3. Environmental Sustainability: Organize clean-up drives, tree plantations, recycling campaigns, or energy conservation initiatives.

4. Health and Wellness: Promote health through awareness programs on hygiene, nutrition, and exercise.

5. Skill Development: Teach basic computer or technical skills to students, staff, or the community.

B. Step-by-Step Execution Plan:
1. Planning Phase:

a. Team Formation: Form a team of 3-4 students with a balance of skills and interests.

The group should be cohesive, sharing and caring, contribute to the task assigned.

b. Project Selection: Choose a project theme and define a clear objective that aligns

with community needs.

c. Proposal Submission: Submit a one-page project proposal outlining:

- Title of the project.
- Objective and expected outcome.

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- Plan of execution (timeline and activities).
- Required resources (if any).
- Get approval from the designated faculty mentor.

2. Execution Phase:

a. Phase 1 Activities

- Conduct initial outreach and engage with the community or target participants.
- Implement planned activities with close teamwork and documentation.

b. Phase 2 Activities

- Continue engagement and collect feedback from the participants.
- Begin summarizing the outcomes of the project.

3. Reporting Phase:

a. Documentation: Create a detailed report containing:

- Title, objective, and scope of the project.
- Activities conducted and timeline.
- Outcomes and community feedback.
- Photos/videos of the activities (if permitted).
- Challenges faced and how they were addressed.

b. Presentation:

- Each team will present their project to a panel of faculty members or peers, showcasing their efforts and outcomes.
- Duration of presentation: 5-7 minutes per team.

C. Evaluation Criteria:

Projects will be evaluated based on:

1. Relevance: How well the project aligns with community needs.
2. Impact: The tangible and intangible benefits delivered to the community.
3. Innovation: Creativity in the approach or solution provided.
4. Teamwork: Collaboration and effective delegation within the group.
5. Documentation & Presentation: Clarity, depth, and overall delivery of the report and presentation.

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D. Guidelines for Conduct:

1. Behavior: Students should display professionalism, punctuality, and respect.

2. Safety: Follow all safety protocols during on-campus or fieldwork activities.

3. Feedback: Collect feedback from participants to measure the success and identify areas for improvement.

E. Best Practices:

1. Maintain a positive attitude and open communication with the community.

2. Respect cultural norms and values of the participants.

3. Adapt your plan based on real-time needs or challenges.

4. Faculty mentors has to be assigned to each group to guide them throughout the project.

5. The task carried out need to be maintained in field work diary by each group.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Sustainable Development Goals and India	B. N. Patel	Oxford University Press	1st	2021
2	Environmental Issues and Sustainable Development	Arjun Gope	Nation Press	1st	2020
3	Sustainable Development: Local Issues and Global Agendas	R. B. Patil	Rawat Publications	1st	2019

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Service-Learning: A Guide to Planning, Implementing, and Assessing Student Projects	Anne Waterman	Routledge	1st	1997
2	Community-Based Research: Teaching for Community Impact	Mary Beckman, Joyce F. Long	Stylus Publishing	1st	2016
3	Design Thinking for Social Innovation	IDEO.org	IDEO Press	1st	2015
4	Handbook of Research on Civic Engagement in Youth	Lonnie R. Sherrod, Judith Torney-Purta, Constance A. Flanagan	Wiley	1st	2010

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0ECEPCC251 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Details:

Course Code and Course Title	0ECEPCC251 – Electrical Measurements and Instrumentation			
Semester	IV			
Prerequisites	Basic Electrical and Electronics Engineering, Network Analysis			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	1	-	
Credit	4			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	Classify sources of errors and select appropriate instruments for measurement work.	2
CO2	Explain the construction and operation of analog and digital measuring instruments.	2
CO3	Perform the analysis of bridge circuit and Apply bridge techniques to measure resistance, inductance, and capacitance.	4
CO4	Select appropriate transducers for measurement of physical quantities and design suitable signal conditioning circuit.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Measurement and instrumentation** Introduction to Measurement, Methods of Measurements, Block dia. of Measurement System, Instruments, Performance Characteristics of Instruments & Measurement System, calibration, Errors in Measurement, Statistical analysis of errors.	6
Unit 2	**Basic Analog Movements and Measurements** Classification of Analog Instruments, Principle of Operation, Operating Torques, Different types of Damping and Control Systems- PMMC, Moving Iron, Electro-dynamometer type, Power Measurement: Power measurement in AC circuit, Electrodynamometer-type Wattmeter, Power measurement in Three-Phase systems, Power measurement with Instrument Transformers - Potentiometer and Current Transformer, Measurement of Energy: Induction-type Energy Meter.	7
Unit 3	**A.C. and D.C. Bridges** Measurement Resistance: Wheatstone Bridge, Kelvin Bridge Method, Kelvin Double Bridge Method, Example Problems, Measurement of Inductance: Maxwell Bridge, Hays Bridge, Measurement of Capacitance: Schering Bridge, Wien Bridge, Example Problems based on bridges.	7

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Unit 4	**Analog Measurement of Electrical Quantities** Cathode Ray Oscilloscope: Block diagram, CRT, deflection systems, modes of operation, applications, Signal generator, Analysers: Harmonic distortion Analyzer, Spectrum analyser.	6
Unit 5	**Digital Measurement of Electrical Quantities** Concept of Digital Measurement, Block diagram of Digital Instrumentation System, Digital versus Analog Instrument, Digital Voltmeter, Digital Frequency Meter, Digital Multi-meter, Digital Tachometer, Digital energy meter, Digital Storage Oscilloscopes: Block diagram, applications.	6
Unit 6	**Transducers and Signal Conditioning** Definition, Classification & selection of transducers, Characteristics, Transducers for measurement of displacement (RVDT & LVDT), Temperature (Thermocouple and RTD method), Speed, Force, Strain, Hall Effect transducer, Signal Conditioning for RTD Pt100, Thermistor, Thermocouple etc., Data Acquisition Systems – single & multichannel	7
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electrical & Electronic Measurement & Instrument	A.K. Sawhney	Dhanpat Rai & Sons	-	2013
2	Electronic Instrument & Measurement Technique	W.D. Cooper	Prentice Hall International publication	3rd	1985
3	Electrical Measurements and Measuring Instruments	H.S. Kalasi	McGraw Hill	4th	2019

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electrical Measurements and Measuring Instruments	J.B. Gupta	S.K. Kataria & Sons	Reprint	2012
2	Electrical Measurement	Harries	Willey Eastern Pvt. Ltd.	-	1952
3	Electronic Measurements and Instrumentation	S. N. Patil	Electrotech	1st	2012
4	Electrical Measurement & Measuring Instrument	E.W. Golding & F.C. Widdis	A. H. Wheeler & Co. India	3rd	2011

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0ECEPCC252 ELECTRICAL POWER SYSTEMS

Course Details:

Course Code and Course Title	0ECEPCC252 – Electrical Power Systems			
Semester	IV			
Prerequisites	Basic Electrical and Electronics Engineering, Network Analysis, DC Machines and Transformer			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Explain the fundamental concepts of electrical power generation and compare various power plants.	2
CO2	Summarize various types of underground cables used in transmission systems for understating their construction and Applications.	2
CO3	Calculate mechanical and electrical parameters of transmission lines to analyse transmission line performance.	4
CO4	Examine Electrical Distribution System to analyse the performance and operation of AC Distribution System.	4

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Electrical Power Generation** Evolution of Power Systems, Typical Layout of an Electrical Power System - Introduction to different sources of energy, Comparison of conventional and non - conventional energy sources Major electrical equipment in generating stations, Construction and working of thermal power Plant, Hydro power station, Nuclear Power Plant, Solar power plant with neat block diagram.	6
Unit 2	**Underground Cables** Underground Cables, Construction of Cables, Insulating Materials for Cables, Classification of Cables, Cables for 3-Phase Service, Types of Cable Faults, Loop Tests for Location of Faults in Underground Cables, Murray Loop Test, Varley Loop Test.	7
Unit 3	**Mechanical Aspects of Transmission Lines** Types of conductors, Choice of conductor materials, Stranded copper & ACSR conductor, Insulation consideration, Different types of insulators, supports, distribution of voltage across the insulator string, String efficiency, Effect of wind & ice coating on transmission line, sag calculations.	7
Unit 4	**Electrical Aspects of Overhead Transmission Lines** Line conductors, inductance and capacitance of line, concept of GMD and GMR, bundled conductors, Skin effect, proximity effect, Ferranti Effect. Corona: Introduction, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona.	7

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Unit 5	**Performance of Transmission Lines** Classification of overhead transmission lines, important terms, performance of 1-phase short transmission lines, three phase short transmission lines, generalized constant of transmission line, determination of generalized constant of transmission lines, percentage regulation, Transmission efficiency, numerical	6
Unit 6	**AC Distribution** Classification of Distribution system, Requirement of distribution system, design consideration in distribution system. AC Distribution. Calculations, method of Solving AC Distribution problem, Applications of AC Distribution.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Power System	V K Mehta & Rohit Mehta	S. Chand	-	2005
2	Transmission and Distributions of Electrical Power	J. B. Gupta	S.K. Kataria & Sons	10th	2012
3	Power System-I	Dr. H. P. Inamdar	Electrotech	1st	-
4	Electrical Power Systems	D Das	New age International	-	2016
5	Electric Power System	Kumar Rao	SCHAUM's outlines, McGraw-Hill	-	-

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Power System Analysis	Nagrath, Kothari, Modern	TMH	2nd	2015
2	Power System Analysis	Hadi Saadat	TMH	1st	2002
3	Electrical Power Systems	C. L. Wadava	New age	6th	2012
4	Electrical Power Systems	Ashfaq Husain	CBS	5th	2007

Useful link /Web Resources:

1. Prof D. P. Kothari, Power System Generation, transmission and Distribution, IIT Delhi, https://nptel.ac.in/courses/108102047.

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0ECEPCC253 AC MACHINES

Course Details:

Course Code and Course Title	0ECEPCC253 – AC Machines			
Semester	IV			
Prerequisites	DC Machines & Transformers, Network Analysis			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Explain construction, working and applications of synchronous and asynchronous machines to demonstrate clear understanding of their operation.	2
CO2	Solve numerical to determine AC machine parameters using machine data for performance evaluation.	3
CO3	Implement suitable speed control and starting methods for AC machines under different operating conditions for efficient operation.	3
CO4	Examine the performance of AC machines by using testing methods for performance assessment.	4

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Basic Concepts in A.C. Machines** Classification of A.C. Machines, principle of operation and constructional features of synchronous and induction machines, rotating MMF waves in A.C. Machines	6
Unit 2	**Armature windings** Introduction, ac machine windings, winding factors, the emf equation, harmonics in generated emf, causes of harmonics and their suppressions	5
Unit 3	**Synchronous Machines** Synchronous Machines, Construction, types, armature reaction, circuit model of synchronous machine, determination of synchronous reactance, phasor diagram, power angle characteristics, parallel operation of synchronous generators, synchronizing to infinite bus bars, two axis theory, synchronous motor operation, characteristic curves, synchronous condenser, dynamics.	7
Unit 4	**Three phase Induction motor** Principle of operation, construction, torque-slip characteristics, Types of induction motor, necessity of starters, types of starters speed control methods from rotor and stator sides, V/f method, braking methods, applications.	8
Unit 5	**Testing and Performance of Induction motors** Losses and efficiency, direct load test, No load and blocked rotor test, equivalent	7

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	circuit of 3 phase induction motor, power flow diagram, phasor diagram, performance by circle diagram crawling, cogging, induction motor as induction generator.	
Unit 6	**Fractional Kilowatt Motors** Introduction, single phase induction motors, double revolving field theory, circuit model of single-phase induction motor, determination of circuit parameters	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electric Machines	Ashfaq Husain, Haroon Ashfaq	Danpat Rai Publisher, New Delhi	3rd	2016
2	Principles of Electrical machines	V. K. Mehata, Rohit Mehata	S. Chand Publishers, New Delhi	2nd	2011
3	The performance and design of Alternating Current Machines	M. G. Say	CBS Publisher	3th	2004
4	Electrical Machines	Bhattacharya S. K.	McGraw Hill Education Private Limited, Chennai	4th	2014

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electrical Machinery	Bimbhra P. S	Khanna Publications, New Delhi	7th	2018
2	Electrical Machines	D. R. Kothari, I. J. Nagrath.	McGraw Hill Education Private Limited, Chennai	5th	2018
3	Electrical Machines	M.V. Deshpande	PHI Publication	5th	2011
4	Electrical Machines	Samarjit Ghosh	Pearson	2nd	2012
5	Electrical Machines	Abhijit Chakrabarti	McGraw Hill education private limited, Chennai	2nd	2013

Useful link /Web Resources:
1. Prof. Tapas Kumar Bhattacharya, Electrical Machines - II, IIT Kharagpur, https://nptel.ac.in/courses/108105131.
2. Prof. G. Sridhara Rao, Prof. P. Sasidhara Rao, Dr. Krishna Vasudevan, Electrical Machines II, IIT Madras, https://nptel.ac.in/courses/108106072.

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0ECEPCC254 COMPUTER ARCHITECTURE AND OPERATING SYSTEM

Course Details:

Course Code and Course Title	0ECEPCC254 – Computer Architecture and Operating System			
Semester	IV			
Prerequisites	---			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	Analyse the internal hardware structure of a computer and the functional distinction between Computer Architecture and Organization.	2
CO2	Evaluate the design and operation of the Control Unit and I/O organization, and the trade-offs between RISC and CISC configurations.	4
CO3	Examine Operating System mechanisms to resolve critical section problems and deadlocks.	4
CO4	Formulate memory management strategies by applying concepts of paging, segmentation, and virtual memory.	2

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Introduction** Concept of Computer architecture and organization. CPU internal structure, Functions of ALU, Control Unit, Registers. Data path and Control signals. Computer bus structure. Difference between architecture and organization Types of computer architectures and performance factor, RISC and CISC configuration.	6
Unit 2	**Control Unit and Input Output Organization** Definition & Functions of Control Unit, Types of Control Units, Control signals, Instruction Cycle, Control word, Role in CPU architecture, I/O organization its need, I/O devices classifications as Input, output, Storage devices, I/O interface, Modes of Data Transfer, I/O ports and Busses	7
Unit 3	**Operating Systems** Concept of OS, Types of OS, Functions of OS, Process management, Memory management, I/O device management, Security, Protection. Types of Operating Systems, Batch operating, Time sharing, Distributed, RTOS, Multiprocessing, Components of OS, Kernel, Shell, File system, Device drivers, System call	6
Unit 4	**Processes & CPU Scheduling** Need of CPU scheduling, Process states, Scheduling criteria, Types of CPU scheduling, Scheduling algorithms, Definition of Process scheduling, Functions of	7

	process scheduling, Types of Process schedulers, Inter process communications, Multiple process scheduling,	
Unit 5	**Process Synchronization and Dead Locks** Need of process synchronization, Critical Section Problem, Requirements, Synchronization tools, Dead lock Definition Reasons for Deadlocks, Methods for handling Deadlocks, Safe state, Dead lock Prevention Techniques Bankers algorithm, Deadlock detection algorithms, Recovery methods.	7
Unit 6	**Memory management** Introduction to memory management, Functions of memory managements, Types of Memory, Logical and Physical Address, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Page replacement algorithm, Thrashing, Swapping, Protection & sharing, Types of memory, Primary, Secondary, Cache, Virtual, Registers, Volatile, Nonvolatile, Memory characteristics.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Computer Organisation & Architecture	William Stallings	Pearson	10th	2016
2	Structured Computer Architecture	Andrew Tanenbaum	Pearson	6th	2013
3	Modern Operating Systems	Andrew Tanenbaum Herbert Bos	Pearson	5th	2022
4	Operating System	Williams Stallings	PHI	2nd	2002

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons, New York	10th	2011
2	Distributed operating System	Pradeep K Sinha	PHI	1st	1997
3	Operating System a design-oriented approach	Charles Crowely	Mcg raw hill	9th	2015
4	Operating system	D. M. Dhamdhere	Tata Mcg raw hill	2nd	2002
5	Computer Organisation & Design	David Patterson John Hennennessy	MK	5th	2019

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0ECEMDM255 EV ENERGY STORAGE AND CHARGING SYSTEMS

Course Details:

Course Code and Course Title	0ECEMDM255 – EV Energy Storage and Charging Systems			
Semester	IV			
Prerequisites	Fundamentals of Electric Vehicles			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Classify energy storage devices using performance characteristics, for EV applications.	2
CO2	Illustrate battery management and EV charging systems using suitable standards and configurations, for safe and efficient charging operation.	2
CO3	Determine battery performance parameters using battery characteristics and capacity estimation techniques, for evaluating EV batteries.	3
CO4	Compare charging infrastructure and emerging energy storage technologies using operational features, for identifying suitable EV charging solutions.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Fundamentals of Energy Storage Systems** Need for energy storage in electric vehicles; requirements of EV energy storage systems; classification of energy storage devices; comparison of batteries, fuel cells, flywheels and ultra-capacitors; energy density, power density, cycle life, depth of discharge, specific energy and specific power; selection criteria for EV applications.	6
Unit 2	**Battery Technologies for Electric Vehicles** Construction, working and characteristics of lead-acid batteries, nickel-metal hydride batteries and lithium-ion batteries; lithium-ion battery chemistries, LFP, NMC, NCA; battery charging and discharging characteristics; battery capacity estimation; factors affecting battery performance and life cycle.	7
Unit 3	**Battery Management Systems** Need and functions of battery management system (BMS); battery monitoring parameters; state of charge (SOC), state of health (SOH), state of power (SOP); cell balancing techniques; battery protection methods; thermal management of battery packs; safety considerations in EV batteries.	7
Unit 4	**EV Charging Systems and Standards** Classification of EV charging methods; AC charging and DC fast charging; conductive and wireless charging concepts; onboard and offboard chargers; charging levels and charging modes; charging standards and connectors, CCS, CHAdeMO, Bharat DC001, Type-2; charging time estimation and charging infrastructure basics.	7

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Unit 5	**Charging Infrastructure and Grid Integration** EV charging station architecture; components of charging stations; smart charging concept; grid impact of EV charging; load management techniques; vehicle-to-grid (V2G) and vehicle-to-home (V2H) concepts; renewable energy integration with EV charging stations.	6
Unit 6	**Emerging Energy Storage and Charging Technologies** Solid-state batteries; sodium-ion batteries; hydrogen fuel cells for EVs; battery swapping systems; ultra-fast charging technologies; AI-based battery monitoring concepts; second-life applications and recycling of EV batteries; future trends in EV energy storage and charging systems.	6
	Total Hours	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles	Mehrdad Ehsani, Yimin Gao, Sebastien Gay, Ali Emadi	CRC Press	3rd	2018
2	Electric Vehicle Technology Explained	James Larminie, John Lowry	Wiley	2nd	2012
3	Electric and Hybrid Vehicles	Tom Denton, Hayley Pells	Routledge	3rd	2024
4	Electric And Hybrid Vehicle	Nitesh Tiwari, Shekhar Yadav	S.K. Kataria & Sons	2nd	2024

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Electric Vehicle Propulsion Drives and Charging Systems	Kundan Kumar, Ambrish Devanshu, Sanjeet K. Dwivedi	CRC Press	1st	2024
2	Advanced Concepts and Technologies for Electric Vehicles	Akshay Kumar Rathore, Arun Kumar Verma	CRC Press	1st	2024
3	Electric Vehicle Charging Infrastructures and its Challenges	Ashutosh K. Giri, Madhusudan Singh	Springer Singapore	1st	2025
4	Battery Technologies for E-Mobility: Innovations, Applications, and Advanced Management Systems	Akash Samanta, Sheldon Williamson	River Publishers	1st	2025

Useful link /Web Resources:

1. Prof. Apurv Kumar Yadav, Charging Infrastructure, IIT Roorkee, https://nptel.ac.in/courses/108107715.
2. Gregory Plett, Introduction to battery-management systems, https://www.coursera.org/learn/battery-management-systems.

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0ECEOE256 SUSTAINABLE POWER GENERATION

Course Details:

Course Code and Course Title	0ECEOE256 – Sustainable Power Generation		
Semester	IV		
Prerequisites	---		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	-
Credit	2		
Evaluation Scheme	**ISE**		
	50 Marks		

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	Interpret the global energy scenario, renewable energy transition, and consumption trends related to sustainable power generation.	2
CO2	Illustrate the working principles, configurations, advantages, and limitations of solar photovoltaic power generation systems.	2
CO3	Examine the fundamentals of wind power generation for analysis of wind turbines and wind farm systems.	3
CO4	Demonstrate the operating principles and selection criteria of hydro and biomass power generation systems for sustainable energy applications.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Energy Scenario** Installed Capacity, Primary fuel, Fossil fuel import, Renewable transition, Global energy scenario, Primary supply, Consumption trends, Projections	6
Unit 2	**Solar Power Generation** Classification of renewable energy sources, Advantages, Solar Photovoltaic (PV) Power Generation: Fundamentals, design, standalone and grid-connected PV system analysis.	6
Unit 3	**Wind Power Generation** Potential of wind energy in India. Wind Power Generation: Wind turbine classification, components, and wind farm design. Advantages and Limitations of Wind power plants. Wind power and environment	6
Unit 4	**Hydro & Biomass Power Generation** Hydro Power Generation: Lay out & selection criteria for Hydro power plant, Small/mini/micro hydro plants, Components in Hydro power plant, Advantages and Limitations. Biomass Power Generation: Biomass energy sources, Conversion processes, Power generation & Working principles, Advantages and Limitations, Impact on environment	6
	Total Hours	**24**

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Renewable Energy Power of Sustainable future	Godfrey Boyle	Oxford	3rd	2012
2	Solar Photovoltaics	Chetansing Solanki	PHI	2nd	2013
3	Non-conventional Energy sources	G. D. Rai	Khanna Publications	-	2016
4	Renewable Energy Sources	John Twidell& Tony Weir	Routledge	-	2015

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Energy Technology Non-conventional, Renewable & conventional	S. Rao & Dr. B.B. Parulekar	Khanna publications	3rd	2003
2	Biomass for Renewable energy, Fuels & Chemicals	Donald L. Klass	Elseevier	-	2006
3	Renewable energy sources Their impact on Global warming & Pollutions	Tasbeem Abbasi, S. A. Abbasi	PHI	-	2013
4	Solar Energy	S. P. Sukhatme	Tata McGraw Hill	2nd	2006

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0ECEAEC257 SOFT SKILLS

Course Details:

Course Code and Course Title	0ECEAEC257 – Soft Skills		
Semester	IV		
Prerequisites	--		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	1		
Evaluation Scheme	**ISE**		
	25 marks		

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Develop professional self-presentation and non-verbal communication skills.	**3**
CO2	Demonstrate effective collaborative problem-solving and leadership in team settings.	**4**
CO3	Construct professional documents including resumes and formal emails.	**5**
CO4	Critically evaluate personal career goals and execute mock professional interactions.	**6**

Course Content

Unit No.	Contents
Unit 1	**Communication Skills & Confidence Building:** Topics: • Verbal communication (clarity, tone, articulation) • Non-verbal communication (body language, gestures, eye contact) • Active listening • Overcoming stage fear • Basic presentation skills Practical / Group Activities: • Self-Introduction Round (Recorded) • Pair Activity: Active Listening Drill • Role Play: Good vs Poor Communication • 1-Minute Video Speaking Task • Impromptu Speaking (Extempore) • Mirror Practice (confidence building)
Unit 2	**Teamwork, Leadership & Interpersonal Skills:** Topics: • Team dynamics • Conflict resolution • Leadership styles • Emotional Intelligence (EI basics) • Collaboration & trust building Practical / Group Activities:

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	• Marshmallow Tower Challenge (Team Building) • Blindfold Navigation Activity (Trust exercise) • Group Puzzle Solving Task • Conflict Role Play (Student vs Team disagreement) • Rotate Leader Activity (each student leads once) • Group Discussion (GD) Sessions
Unit 3	**Critical Thinking & Problem Solving:** Topics: • Logical reasoning • Decision-making frameworks • Creative thinking • Problem-solving techniques • Case study analysis Practical / Group Activities: • Case Study Discussion (Real-world engineering problem) • Mystery Problem Challenge (group deduction task) • Brainstorming Sessions (idea generation) • Lateral Thinking Puzzles Competition • Decision-Making Simulation (choose best solution scenario) • Mini Innovation Task (build simple solution prototype)
Unit 4	**Employability Skills & Professional Development:** Topics: • Resume writing • Interview skills • Group discussion techniques • Workplace etiquette • Time management • Goal setting Practical / Group Activities: • Resume Building Workshop • Mock Interviews (Panel + Recording) • Group Discussion (HR-style topics) • Time Management Game (task prioritization) • Goal Setting Exercise (SMART goals) • Professional Etiquette Role Play

Activities Planned:

Activities conducted in following areas

1. SWOT Analysis
2. Self-Development Plans
3. Demonstration of reading skills
4. Role playing
5. Group activity on poster/model presentation

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6. Group Discussion/ Debate on Current issues.

7. Identifying Role Models / motivational posters/audio/video

8. Writing of reports / resume or a mini presentation.

9. Visit to library to explore technical resources /mini projects.

10. Invited expert lectures by a doctor/industrialist/professional counselor.

11. Stress management activities/ visit to Gymnasium.

12. Mock Interview.

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Soft Skills: Enhancing Employability	M. S. Rao	I. K. International Publishing House	1	2010
2	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press	3	2024
3	Soft Skills for Managers	Dr. Kalyana Chakravarthi, Dr. Latha Chakravarthi	Bizantra Publications	1	2015

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	The 7 Habits of Highly Effective People	Stephen R. Covey	Simon & Schuster	30th Anniversary Edition	2019
2	How to Win Friends and Influence People	Dale Carnegie	Simon & Schuster	-	2009
3	Emotional Intelligence: Why It Can Matter More Than IQ	Daniel Goleman	Bantam Books	-	2005
4	Adam's Time Management	Marshall Cook	Viva Books	1	2001
5	Presentation Skills	Michael Hutton	ISTE Publications	1	2004

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0ECEVEC258 UNIVERSAL HUMAN VALUES

Course Details:

Course Code and Course Title	0ECEVEC258 – Universal Human Values		
Semester	IV		
Prerequisites	Student Induction Program (SIP)		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	-
Credit	2		
Evaluation Scheme	**ISE**		
	50 Marks		

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Develop the ability to self-explore and verify value-based living through natural acceptance having right understanding and harmonious relationships as foundational to resolving personal, familial, and societal problems sustainably.	**2**
CO2	Apply the understanding of respect as right evaluation to address societal conflicts and contribute to value-based education.	**3**
CO3	Recognize the interconnectedness of natural orders and propose responsible human participation to ensure mutual fulfilment in existence.	**3**
CO4	Apply value-based understanding to their domain expertise to propose sustainable solutions for societal and ecological mutual fulfilment.	**3**

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations,	6
Unit 2	**Understanding Human being as the Co-existence of the Self and the Body** Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Lecture, Understanding Harmony in the Self, Harmony of the Self with the Body Lecture, Programme to ensure self-regulation and Health	6
Unit 3	**Harmony in the Family – the Basic Unit of Human Interaction** 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in Society, Vision for the Universal Human Order	6
Unit 4	**Understanding Harmony in the Nature** Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.	6
	Total Hours	**24**

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
2	Teachers Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
3	Human Values	A.N. Tripathi	New Age Intl. Publishers, New Delhi	-	2004

Reference Book

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	-	1999
2	The Story of Stuff	Annie Leonard	Free Press Publishers	-	2010
3	The Story of My Experiments with Truth	Mohandas Karamchand Gandhi	Navjivan Publishing House	-	1948
4	Small is Beautiful	E. F Schumacher	Harper Collins Penguin	-	1993
5	Slow is Beautiful	Cecile Andrews	Penguin Random House	-	2023

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0ECEVSEC259 COMPUTATIONAL LAB

Preamble:

The Computational Lab provides practical exposure to modern computational and simulation tools used in electrical and computer engineering. The course enables students to apply software-based techniques for numerical computation, modeling, analysis, and simulation of engineering systems. Students perform experiments related to electrical circuits, converters, transmission lines, and electrical machines to understand system behavior under different operating conditions. The laboratory also develops skills in programming, visualization, result interpretation, and use of simulation tools, preparing students for advanced studies and engineering applications in power systems, control systems, and related domains.

Course Code and Course Title		0ECEVSEC259 – Computational Lab		
Semester		IV		
Prerequisites		Engineering Mathematics-III, Network Analysis		
Teaching Scheme (hours per week)		**Lecture**	**Tutorial**	**Practical**
		-	-	2
Credit		1		
Evaluation Scheme		**ISE**		
		25 Marks		
Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:				**BL**
CO1	Explain the basic features, graphical modelling environment, and engineering libraries/tools available in computational and simulation software.			2
CO2	Apply computational commands and simulation tools for matrix operations and analysis of electrical circuits.			3
CO3	Utilize electrical and power system components available in simulation libraries for developing computational models.			3
CO4	Analyse the performance of electrical and power system models using simulation techniques.			4

Minimum 10 experiments from following list should be conducted.

1. Explain the basic features and working environment of computational and simulation software.
2. Apply computational commands for matrix and array manipulation.
3. Explain the fundamentals of graphical modelling and simulation environment.
4. Discuss different electrical engineering libraries, toolboxes, or simulation modules available in the software.
5. Solve electrical circuits using computational and simulation tools.
6. Develop and analyse a three-phase RLC model using simulation software.

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7. Simulate AC to DC converter and observe output characteristics.
8. Observe active and reactive power measurement using simulation tools.
9. Explain the function and application of simulation analysis blocks/tools used in power system studies.
10. Develop simple power system simulation models using suitable software tools.
11. Analyse voltage regulation of a transmission line using simulation techniques.
12. Develop and analyse a transmission line model using computational software.
13. Develop and analyse a synchronous generator model using simulation software.

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0ECEPCL260 AC MACHINES LAB

Preamble:

The AC Machines Lab is designed to provide practical knowledge and hands-on experience with three-phase induction motors, synchronous machines, and alternators, which are widely used in industrial and power system applications. This laboratory complements theoretical learning by enabling students to perform experiments related to machine performance, characteristics, and control.

The course focuses on conducting various tests on induction motors to determine parameters such as efficiency, torque, power factor, and equivalent circuit parameters under different loading conditions. It also includes experiments on synchronous machines, such as obtaining V and inverted V curves, and evaluating the voltage regulation of alternators using standard methods.

Course Code and Course Title	0ECEPCL260 – AC Machines Lab		
Semester	IV		
Prerequisites	Basic Electrical and Electronics Engineering, DC Machines and Transformers, Network Analysis		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	1		
Evaluation Scheme	**ISE**	**ESE**	
	50 Marks	50 Marks	

	Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:	**BL**
CO1	Compute efficiency, power factor, and torque of three-Phase Induction Motor under different loading conditions using appropriate loading methods.	3
CO2	Construct V and inverted V curves of Three-Phase Synchronous Motor under various excitation conditions.	3
CO3	Compute voltage regulation of three-Phase Alternator by using different methods and compare the results.	3
CO4	Calculate different parameters of three-Phase Induction Motor by conducting open-circuit and short-circuit tests.	3

Minimum 10 experiments from following list should be conducted.

1. Testing of different starters of 3-phase induction motors.
2. Load test of 3-phase squirrel cage induction motor by direct loading method
3. Load test of 3-phase squirrel cage induction motor by indirect loading method.
4. Load test of 3-phase slip ring induction motor by direct loading method.
5. Load test of 3-phase slip ring induction motor by indirect loading method.

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6. Voltage regulation of 3-phase alternator by synchronous impedance method.
7 Voltage regulation of 3-phase alternator by MMF method.
8 Voltage regulation of 3-phase alternator by direct loading method.
9. To draw V and inverted V curve of 3-phase synchronous motor.
10. No load and blocked rotor test of 3-phase induction motor to find equivalent circuit parameters.
11. No load and blocked rotor test of 3-phase induction motor to draw circle diagram.
12. Speed control of slip ring induction motor by rotor resistance control method.

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0ECEPCL261 PYTHON PROGRAMMING LAB

Preamble:

The Python Programming Lab is designed to provide hands-on experience in developing efficient The Python Programming Lab provides hands-on experience in developing programs using the Python programming language. The course helps students build problem-solving skills through practical implementation of programming concepts. Students perform experiments on data types, lists, dictionaries, string manipulation, recursion, object-oriented programming, and file handling techniques. The laboratory also develops the ability to design efficient solutions, process data using built-in data structures, and implement programs with improved readability and efficiency. This course strengthens programming and logical thinking skills for applications in data analysis, automation, and software development.

Course Code and Course Title	0ECEPCL261 – Python Programming Lab		
Semester	IV		
Prerequisites	Programming for Problem Solving in C, Data Structure		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	1		
Evaluation Scheme	**ISE**	**ESE**	
	50 Marks	50 Marks	

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	Apply Python programming concepts including data types, lists, dictionaries, recursion, and string operations to develop solutions for computational problems.	3
CO2	Apply statements and loops in Python develop to solve the computational problems.	3
CO3	Develop user defined functions to solve the problems.	3
CO4	Implement Python programs using object-oriented programming and file handling techniques for data processing and real-world applications.	3

Minimum 8 experiments from following list should be conducted.

1. Calculate the area of triangle, rectangle, and circle using Python Programming Lab.
2. Apply Python lists to find the union of two lists.
3. Apply Python lists to determine the intersection of two lists.
4. Implement a program to remove the ith occurrence of a given word in a list with repeated elements.
5. Compute the occurrences of each word in a given string.

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6. Check the presence of a substring in a given string.
7. Apply Python concepts to map two lists into a dictionary.
8. Analyse the frequency of words in a string using dictionary data structures.
9. Create a dictionary with keys as first characters and values as corresponding words.
10. Apply recursion to determine the length of a list.
11. Apply object-oriented programming concepts to compute diameter, circumference, and volume of a sphere using a class.
12. Apply file handling techniques to read a file and capitalize the first letter of every word.
13. Apply file handling operations to perform read and write operations on files.
14. Count the characters in a string/sentence

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