

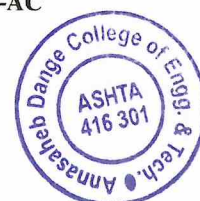
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering							
Course Information:								
Class, Semester	S.Y. B. Tech, Semester - III						Category	BS
Course Code, Course Title	3EEBS201, Applied Mathematics-III						Type	T1
Prerequisites	-							
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self-Study		Credits
	3	-		-		3		3
Examination Scheme (Marks)	Theory	MSE	TE	ESE	Practical	CIA	ESE	
		40	20	40		-	-	
Course Outcomes (COs) :								
Upon successful completion of this course, the student will be able to:								
CO1	Solve linear differential equations with constant coefficients for electrical systems.							
CO2	Compute Laplace transforms, inverse Laplace transforms, and Fourier transforms of functions using the properties of transforms.							
CO3	Calculate Z-transforms and inverse Z-transforms using properties and apply to difference equations.							
CO4	Determine gradient, divergence, curl of a vector field and line integrals using vector differential operators.							
CO5	Apply Fourier series to expand periodic functions considering discontinuities and change of interval.							
Syllabus:								
Module	Contents							Lecture Hours
I	Linear Differential Equations and Its Application Definitions, linear differential equations with constant coefficients, Complete solution, Operator D, Inverse operator, Rules for finding Complementary function and Particular integral, Method of variation of parameters, Applications of Linear Differential Equations to Electrical system.							8
II	Laplace Transform & Inverse Laplace transforms Introduction, Laplace transform of elementary functions. Properties of Laplace Transforms, Transforms of derivatives, Transforms of integrals, Multiplication by t^n , Division by t , Evaluation of integrals by Laplace Transforms. Laplace transform of Unit step function and unit impulse function Inverse Laplace transforms, Definition, Inverse Laplace transforms by Partial Fractions, convolution Theorem.							8
III	Z-Transforms Introduction, Definition, Properties, Z-transform of basic functions, Z-transform of some standard discrete functions, Evaluation of inverse Z-transform, Application to difference Equations.							7
IV	Vector Differential Calculus Introduction, Differentiation of vectors, Scalar and vector point functions - vector operator del, Del applied to scalar point functions - gradient, directional derivative, unit normal to the surface, Del applied to vector point functions - Divergence and curl, Irrotational and solenoidal vector field, Line integral.							7
V	Fourier Series Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Expansion of odd and even periodic functions, Half range series.							8
VI	Fourier Transform Fourier integrals, Fourier sine and cosine integral, complex form of Fourier integral, Fourier transform, Fourier sin transform, Fourier cosine transform, Finite Fourier sine and cosine transform.							7
Total Lecture Hours							45	
Text Books								
1. Dr. B. S. Grewal, Higher Engineering Mathematics, 44 th Khanna Publication, 2017								
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications, 2011								
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010.								


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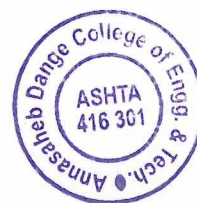


References:

1. N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press, 2010.
2. Erwin Kreyszig, Advance Engineering Mathematics”, Wiley India.
3. H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand, 2018.

Online Learning Resources

1. https://www.youtube.com/watch?v=n9XP6pljtw8&list=PLbRMhDVUMngfsMNuiGSQQuNwPevZukOY_ (Units: I, II, III and VI)
2. <https://www.youtube.com/watch?v=ZurvUcEPUFA> (Unit-V)
3. <https://www.youtube.com/playlist?list=PLbRMhDVUMngflrZCNOyPZwHUU1pP66vQW> (Unit-IV, Lecture No. 36 – 43)




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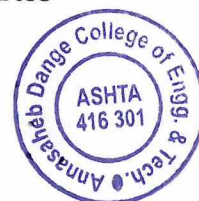
 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering						
Course Information:								
Class, Semester		S.Y. B.Tech, Semester - III					Category	PC
Course Code, Course Title		3EEPC202, Electrical Circuit Analysis					Type	LIT2
Prerequisites								
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self Study	Credits		
		3	-	2	3	4		
Examination Scheme (Marks)		Theory	MSE	TE	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Solve DC circuits with independent and dependent sources using nodal and mesh analysis by formulating KCL/KVL equations to obtain accurate currents and voltages.							
CO2	Utilize network theorems for DC and AC circuits and analyze sinusoidal steady-state response including resonance in RLC circuits to obtain equivalent circuits, impedance behavior, resonance conditions, and circuit responses.							
CO3	Determine transient response of RL, RC, and RLC circuits under step and source-free excitation given initial and final conditions, to obtain correct time-domain expressions and system behavior.							
CO4	Apply two-port network concepts using Z, Y, ABCD, and hybrid parameters for multi-port systems given network configurations, to determine correct network parameters and interconnections.							
CO5	Model electrical circuits using Laplace transform for dynamic systems to obtain correct s-domain representations and time-response solutions.							
Syllabus:								
Module		Contents						Lecture Hours
I		Methods of Analysis (DC Circuits) Dependent and Independent Sources, Nodal Analysis, Nodal Analysis with Voltage Sources, Mesh Analysis, Mesh Analysis with Current Sources, Nodal & Mesh Analysis by Inspection – Applications						8
II		Network Theorems (DC Circuits) Source Transformation, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem - Applications						7
III		Transient Analysis (Unit Step) Initial and Final Conditions of Network Elements, Source Free Response of RL, RC and RLC circuits, Step Response of RL, RC, and RLC Circuits - Applications						8
IV		Sinusoidal Steady State Analysis Sinusoid-phasor transformation, Impedance and Admittance, Source Transformation and Network Theorems (Superposition, Thevenin's, Norton's, Maximum Power Transfer) in AC circuits – Series and Parallel Resonance – Applications						8
V		Two-Port Networks Two-port network variables, Z parameters, Y parameters, Transmission parameters, Hybrid parameters, Relationships between Parameters, Conditions for reciprocity and symmetry, Interconnection of two-port networks – Applications						7
VI		Applications of the Laplace Transform Definition and Properties of the Laplace Transform, Inverse Laplace Transform, Initial and final value theorems, Application to integrodifferential equations, circuit element models in s-domain equivalents, transfer functions, State variable modeling – Applications.						7
Total Lecture Hours								45
List of Experiments with CO Mapping								
S.No		Title / Topic of the Experiment						CO Mapped
1.		Design, Simulation and Experimental Verification of an Equivalent Resistive Circuit for a Lighting System.						CO1


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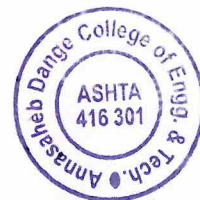

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2.	Simulation and Experimental Verification of Mesh and Nodal Methods of Analysis.	CO2		
3.	Design, Simulation and Experimental Verification of DC Output Voltage in a BJT Circuit using Mesh and Nodal Methods			
4.	Simulation and experimental verification of Superposition Theorem.			
5.	Simulation and Experimental Verification of Current in an Unbalanced Bridge Circuit using Thevenin's Theorem			
6.	Simulation and experimental verification of Maximum Power Transfer Theorem.			
7.	Simulation and experimental verification of Reciprocity Theorem.	CO3		
8.	Design, Simulation and Analysis of First-Order Transient Behavior in RC and RL Circuits			
9.	Design, Simulation and Analysis of Second-Order Transient Response in RLC Circuits.	CO2		
10.	Design, Simulation and Experimental Verification of Frequency Response in Series and Parallel Resonant Circuits			
11.	Computation, Simulation and Analysis of Two-Port Network Parameters (Z, Y, ABCD and Hybrid Parameters)	CO4		
12.	Simulation and Analysis of RLC Circuits using Laplace Transform and State-Space Modeling	CO5		
Total Practical Sessions		15	Total Practical Hours	30
Text Books				
1. Fundamentals of Electric Circuits – Charles K. Alexander, Matthew N. O. Sadiku, McGraw Hill, 7 th Edition, 2022.				
2. Engineering Circuit Analysis, William H. Hayt, Jack Kemmerly, Steven Durbin, McGraw Hill, 10 th Edition, 2024.				
3. Circuits & Networks: Analysis & Synthesis – A. Sudhakar and Shyammoan S. Palli, McGraw-Hill Co., 6 th Edition, 2025.				
4. Networks and Systems – Ashfaq Husain, Khanna Book Publishing Co. (P) Ltd., 2 nd Edition, 2019.				
Reference Books				
1. Network Analysis and Synthesis – Franklin F. Kuo, John Wiley and Sons, Second Edition, 2006.				
2. Networks and Systems – D. Roy Choudhary, New Age International Publishers, Second Edition, 2013.				
3. Network Analysis and Synthesis- C. L. Wadhwa, New Age International, 3rd Edition, 2018				
4. Network Analysis. E. Van Valkenburg, PHI Learning / Prentice Hall, Standard reprint edition, 2006				
Online Learning Resources				
1. NPTEL (SWAYAM) – Electrical Engineering Courses https://nptel.ac.in Provides free IIT lecture videos, assignments, and certification courses on Network Analysis(https://nptel.ac.in/courses/108105159), Introduction to Electrical Engineering and related subjects.				
2. MIT Open Courseware – Circuits and Electronics https://ocw.mit.edu Free lecture videos, notes, and assignments from MIT's undergraduate circuits course covering topics like KCL, KVL, superposition, and network analysis.				
3. Electrical4U – Electrical Engineering Tutorials https://www.electrical4u.com Provides free explanations and tutorials on electrical engineering topics such as circuit analysis, machines, and power systems.				
Experiments that may be performed through virtual labs:				
S.No	Experiment Name	Experiments Links		
1.	Verification of Network Theorems (Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem)	https://asnm-iitkgp.vlabs.ac.in/		




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Annasaheb Dange College of Engineering and Technology
 Ashta - 416301, Dist. : Sangli, Maharashtra
 (An Empowered Autonomous Institute)
 Department of Electrical Engineering

**Course Information:**

Class, Semester	S.Y. B.Tech, Semester - III				Category	PC
Course Code, Course Title	3EEPC203, Digital Electronics and Microcontrollers				Type	LIT1
Prerequisites	-					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits	
	3	-	2	3	4	
Examination Scheme (Marks)	Theory	MSE	TE	ESE	Practical	CIA
		40	20	40		50
						ESE
						50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Apply number systems, Boolean algebra and K-map techniques to simplify logic expressions for basic logic digital circuits.
CO2	Design combinational and sequential logic circuits using standard building blocks.
CO3	Explain different ADC and DAC techniques based on working principle and performance specifications.
CO4	Illustrate the architecture, memory organization, and instruction set of 8051 microcontrollers for embedded system development
CO5	Develop programs for interfacing peripherals and actuators using 8051 microcontrollers.

Syllabus:

Module	Contents	Lecture Hours
I	Number System, Logic Gates and Boolean Algebra Number systems - Decimal, Binary, Octal, Hexadecimal and its conversions, BCD code, Gray code, Logic gates, Boolean algebra, K- map and it's reduction techniques.	8
II	Combinational and Sequential Logic Circuit Design Half adder, Full adder, Magnitude comparator, Binary to Gray converter, Gray to Binary converter, Multiplexer, De-multiplexer, Latch, Flip flops: Edge-triggered S-R flip flop, D flip flop, J-K flip flop, T- flip flop, Counter- Mod n asynchronous counter, Shift Registers.	7
III	Data Converters Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.	7
IV	Microcontroller 8051 Introduction to microcontroller, comparison of microprocessor and microcontroller, features of microcontroller, block diagram, architecture of 8051, pin configuration of 8051, Addressing modes, instruction set, Memory Organisation.	7
V	Programming ports and timers Introduction to Assembly programming, Basic I/O programming, Development tools for 8051 programs, Programming Timers and counters Timer block diagram and function, Timer modes, Timer and Counter Programming	7
VI	Applications and Recent Trends LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing and sensor integration using 8051 Microcontroller.	9
Total Lecture Hours		45

List of Experiments with CO Mapping.

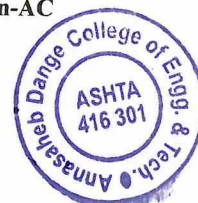
S.No	Title / Topic of the Experiment	CO Mapped
1	Identification and verification of truth table of all logic gates	1
2	Design of combinational logic circuit using SOP or POS equation.	2
3	Design of Half adder & Full adder.	2
4	Implementation and verification of 4-bit magnitude comparator using IC-7485.	2
5	Design of Combinational logic circuit using Multiplexer 74151 & Demultiplexer 74138.	2


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6	Design of mod n asynchronous counter.	2
7	Design of binary weighted resistor DAC.	3
8	Design of counter type ADC.	3
9	Assembly language programming of 8051 for arithmetic instructions.	4
10	Assembly language programming of 8051 for logical instructions.	4
11	DC Motor interfacing to 8051 Microcontroller	5
12	Stepper Motor interfacing to 8051 Microcontroller	5
Total Practical Sessions		15
Total Practical Hours		30
Text Books :		
1. A. Anand Kumar, Fundamentals of Digital Electronics, 4 th PHI, 2016 2. Mazidi, McKinlay, PIC Microcontroller and Embedded Systems 2 nd , Pearson Prentice Hall, 2021 3. V Udayshankara, M S Mallikarjuna Swamy, 8051 Microcontroller: Hardware, Software and Applications, 8 th McGraw- Hill Education India, 2014 4. Subrata Ghoshal, 8051 Microcontroller: Internal, Instructions, Programming & Interfacing 1 st Pearson Publication 2014.		
References:		
1. Morris Mano, Digital Design 4 th Pearson Education, Asia 2012 2. Anil Maini, Digital Electronics Principles & Applications, 2 nd Wiley, 2007. 3. M. A. Mazadi, J. G. Mazadi, The 8051 Microcontroller and Embedded Systems, 4 th Pearson Education, Asia 2008 4. Kenneth Ayala The 8051 Microcontroller Cengage Learning 3 rd Thomson Delmar Learning, 2007		
Online Learning Resources		
1. https://www.udemy.com/course/digital-electronics-and-circuits 2. https://en.wikipedia.org/wiki/Sequential_circuit 3. https://en.wikipedia.org/wiki/PIC_microcontroller 4. https://youtu.be/2-geyR_aM28?si=KeXaRedKHZJVN3UK		
Experiments that may be performed through virtual labs:		
S.No	Experiment Name	Experiments Links
1.	Identification and verification of truth table of all logic gates	Virtual Labs
2.	Design of Combinational logic circuit using Multiplexer 74151 & Demultiplexer 74138.	Virtual Labs




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Established: 1999

Annasaheb Dange College of Engineering and Technology
Ashta - 416301, Dist. :Sangli, Maharashtra
(An Empowered Autonomous Institute)
Department of Electrical Engineering

**Course Information:**

Class, Semester	S.Y. B.Tech, Semester - III				Category	PC
Course Code, Course Title	3EEPC204, Measurement and Instrumentation				Type	LIT1
Prerequisites	3EES105					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits	
	2	-	2	2	3	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		50
						50

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Apply principles of electrical measuring instruments to measure electrical parameters.
CO2	Explain principles of dynamometer wattmeter and induction energy meter to measure power and energy.
CO3	Use DC and AC bridges to accurately measure resistance, inductance, capacitance and frequency using suitable methods.
CO4	Illustrate the construction, working, and applications of digital measuring instruments, sensors & transducers for engineering measurements.
CO5	Examine the recording instruments and virtual instrumentation using LabVIEW to monitor, record, and analyze the parameters.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction to Electrical Measuring Instruments Need of Instruments, Classification, Characteristics (static and dynamics), Permanent Magnet Moving Coil (PMMC) instrument, Moving Iron type Instruments (MI), Errors in measurements, Calibration of Ammeter and Voltmeters, range extension using shunts and multipliers.	5
II	Measurement of Power and Energy Single phase dynamometer type wattmeter, active & reactive power measurement in three phase system for balanced and unbalanced load, Construction and working of Single phase induction type energy meter, Smart Meter	5
III	DC and AC Bridges Introduction, Measurement of low, medium and high resistance, Wheatstone Bridge, Kelvin's double bridge, ammeter voltmeter method, Types of AC Bridges, Condition for bridge balance, Maxwell's Inductance bridge, Maxwell's Inductance & Capacitance Bridge, Hay's bridge, Anderson's bridge, Schering Bridge, Wien Bridge.	6
IV	Digital Measuring Instruments Introduction to digital instruments, digital voltmeter, ammeter and Multimeter, Construction and working of CRO, measurement of voltage, current, period and frequency by CRO, Phase angle & frequency by Lissajous pattern, Construction and working of DSO, Power Analyzer.	5
V	Sensors and Transducers Sensors & transducers for common engineering measurements like temperature, pressure, displacement, Speed Sensors, Digital Optical Encoder.	5
VI	Recording Instruments and Virtual Instrumentation Classification of recorder, Strip chart recorder, X-Y Recorder, Application of recorders, Architecture of Virtual Instrument, Role of Software in Virtual Instrumentation, Introduction and applications of LabVIEW.	4
Total Lecture Hours		30

List of Experiments with CO Mapping

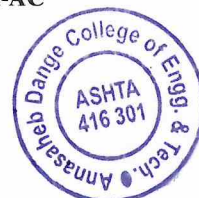
Sr. No	Title / Topic of the Experiment	CO Mapped
1	Identification of Electrical Measuring Instruments.	1
2	Calibration of Ammeters and Voltmeters.	1

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3	Measurement of active power in three phase circuit by using two wattmeter method.	2
4	Measurement of reactive power in three phase circuit by using two wattmeter method.	2
5	Calibration of single-phase induction type energy meter.	2
6	Measurement of resistance using Wheatstone's / Kelvin's double bridge.	3
7	Measurement of Inductance, Capacitance using AC Bridges	3
8	Measurement of voltage, current, time period and frequency using CRO/DSO.	4
9	Displacement measurement using Linear Variable Differential Transducer.	4
10	Measurement of weights by using Strain Gauge.	4
11	Water Level Detector using Lab VIEW.	5
12	Temperature Conversion system using LAB VIEW.	5
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. A.K. Sawhney, A course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai & Co. Nineteenth Edition, 2014.
2. J.B. Gupta, A course in Electronics and Electrical Measurements and Instrumentation, S.K. Kataria & Sons, Eighth Edition, 2012.
3. H.S. Kalsi, Electronic Instrumentation, Tata Mc Graw Hill, Third Edition, 2012.
4. U.A. Bakshi, V.A. Bakshi, Electrical Measurement and Instrumentation, Technical Publication, Third Edition, 2015
5. Dr. R.S. Sedha, Electronic Measurements and Instrumentation, S. Chand & Company pvt. Ltd., First Edition, 2013.

References:

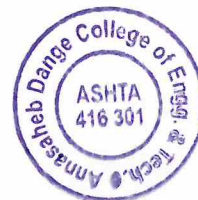
1. E.W. Golding, F.C. Widdies, Electrical Measurements and Measuring Instruments, Reem Publications, Third Edition, 2011.
2. Arun K. Ghosh, Introduction to Measurements and Instrumentation, PHI Publication, Fourth Edition, 2012.
3. R.S. Sirohi Radhakrishnan, Electrical Measurement and Instrumentation, New Age Publication, Third Edition, 2010.
4. B.K.C. Nakra, K. Chaudhari, Instrumentation Measurement and Analysis, Tata Mc Graw Hill, Second Edition, 2009.

Online Learning Resources

1. <https://www.electrical4u.com/electrical-engineering-articles/electrical measurement/>
2. https://en.wikipedia.org/wiki/energy_meter
3. https://en.wikipedia.org/wiki/Electric_transducer

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Measurement of unknown Resistance by using Wheatstone Bridge with Virtual Instrumentation Lab	https://elms-iitr.vlabs.ac.in/exp/wheatstone-bridge/simulation.html



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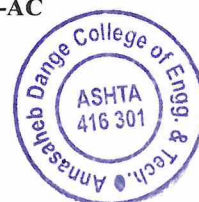
 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:										
Class, Semester		S.Y. B.Tech, Semester - III						Category	VSEC	
Course Code, Course Title		3EEVS205, Python Programming						Type	LIT2	
Prerequisites		-								
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study		Credits	
		1	-		2		1		2	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE		
			-	50	-		50	-		
Course Outcomes (COs) :										
Upon successful completion of this course, the student will be able to:										
CO1	Use Python fundamentals including variables, data types, operators, and basic input/output to solve simple computational problems correctly.									
CO2	Apply control statements, loops, and Python collections (lists, tuples, dictionaries, sets) to develop logical and numerical programs effectively.									
CO3	Develop Python programs for basic text processing and data logging using string handling and file operations accurately.									
CO4	Implement simple class-based programs with appropriate exception handling to model engineering systems for real-world problems.									
CO5	Apply Python modules, NumPy arrays, and Matplotlib to perform basic scientific computing and generate line graphs or signal plots for engineering data visualization.									
Syllabus:										
Module		Contents							Lecture Hours	
I		Introduction to Python & Setup Introduction to Python, Features of Python, Installation of Python & IDE, Writing and Executing Basic Input and Output Python Program							2	
II		Variables, Data Types & Operators Variables and Naming Rules, Fundamental Data Types, Operators: Arithmetic, Relational, Logical, Assignment, Introduction to Collections: Lists, Tuples, Dictionaries (basics)							3	
III		Control Statements & Logical Programs Conditional Statements: if, if-else, if-elif-else, Looping Statements: for loop, while loop, Loop control: break, continue, Basic Logical Programs							3	
IV		Strings & File Handling String handling (basic operations), String formatting, File handling, Simple data logging							2	
V		Introduction to OOP & Exception Handling Concept of Class and Object: Constructor, Instance variables and methods, Exception Handling: try, except, finally							2	
VI		Introduction to Python Modules and Basic Scientific Computing Introduction to Modules, NumPy (basic array operations only), Matplotlib (basic plotting): Line graph, Signal plotting.							3	
Total Lecture Hours									15	
List of Experiments with CO Mapping										
S.No		Title / Topic of the Experiment							CO Mapped	
1		Installation and Introduction to Python with Basic Data Types							1	
2		Program to Demonstrate Arithmetic, Logical and Bitwise Operators in Python							1	
3		Program to Implement Control Statements using Python Collections							2	
4		Program to Perform Various Operations on Lists in Python							2	
5		Program to Perform Various Operations on Tuples in Python							2	
6		Program to Perform Various Operations on Dictionaries in Python							2	
7		Program to Perform Various Operations on Sets in Python							2	
8		Program to Develop and Use a User-Defined Module in Python							3	

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9	Program to Implement Basic Object-Oriented Programming Concepts in Python	3
10	Program to Demonstrate Exception Handling in Python	4
11	Introduction to Python Modules and Basic NumPy Operations	5
12	Program to Plot Line Graphs and Electrical Signals using Matplotlib	5
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. Allen B. Downey, Think Python: How to Think like a Computer Scientist, Updated for Python 3, 2nd O'Reilly Media, Publishers, 2015.
2. Jeeva Jose and Sojan Lal, Introduction to computing and Problem Solving with Python, 1st, Khanna Book Publishing Co. (P) Ltd, 2016
3. Lubanovic Bil, Introducing Python Modern Computing in Simple Packages, 1st O'reilly, 2014
4. Y. Daniel Liang, Introduction to programming using Python, Pearson, 1st 2012.

References:

1. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
2. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press, 2017.
3. John V Guttag, Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press, 2013.
4. Mark Lutz, "Learn Python", 5th Edition, O'reilly Media, Inc, June, 2013.

Online Learning Resources

1. <https://nptel.ac.in/courses/106106182/>
2. <https://www.python.org>
3. <http://greenteapress.com/wp/thinkpython/>
4. <https://www.geeksforgeeks.org/python-programming-language/>

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Constructor and Inheritance using Virtual Lab	https://python-iitk.vlabs.ac.in/exp/constructors-and-inheritance/theory.html
2.	File operations using Virtual Lab	https://python-iitk.vlabs.ac.in/exp/file-operators/




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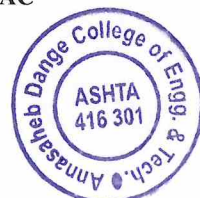
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering						
Course Information:							
Class, Semester	SY. B. Tech, Semester - III					Category	HS
Course Code, Course Title	3EEHS206, Universal Human Values					Type	T2
Prerequisites	-						
Teaching Scheme (per week)	Lecture	Tutorial		Practical	Self Study	Credits	
	2	-		-	2	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:							
CO1	Explain the concept, significance, and need of Universal Human Values and their role in achieving harmony in personal, social, and professional life.						
CO2	Apply the principles of harmony, social responsibility, and environmental sustainability in day-to-day life and professional situations.						
CO3	Classify ethical issues in engineering, society, and emerging technologies using ethical principles and professional guidelines.						
CO4	Demonstrate value-based behaviour and ethical decision-making for personal growth and professional practice through self-reflection and case-based situations.						
Syllabus:							
Module	Contents						Lecture Hours
I	Evolution and Need of Universal Human Values Meaning and concept of Universal Human Values, Historical evolution of value systems, Impact of Industrial Revolution on society and lifestyle, Consequences of World War II and global conflicts, Emergence of global value frameworks, Role of United Nations and UNESCO, Introduction of UHV in Indian education system by AICTE, Present-day challenges: stress, lack of purpose, environmental issues						05
II	Understanding the Human Being Human being as a combination of self and body, Distinction between self (consciousness) and body (physical entity), Needs of self vs needs of body, Happiness vs physical pleasure, Harmony in the self (thoughts, feelings, actions), Self-exploration and self-awareness						05
III	Harmony in Relationships Meaning and importance of relationships, Values in relationships (Trust, Respect, Affection, Care, Guidance, Reverence, Love), Mutual fulfillment in relationships, Role of family in value development, Interpersonal conflicts and resolution, Relationship in professional environment						05
IV	Harmony in Society and Nature Individual → Family → Society → Nation → World, Concept of undivided society, Social harmony and responsibility, Coexistence in nature, Human-nature relationship, Environmental degradation and its causes, Sustainable living and resource utilization, Local and global environmental issues						05
V	Universal Human Values in Engineering and Technology Professional ethics in engineering, Role of engineers in society, Guidelines by IEEE, Ethical issues in modern technology, Role of institutions like OpenAI, Core Framework to Assess Values: Self-Reflection Model, Value-Action Gap Model, Emotional Intelligence (EQ) Framework (The Nine Values (Bhavas) Assessment Model)						05
VI	Application of UHV in Personal and Professional Life Self-reflection and personal development, Value-based decision making, Goal setting with values, Fulfilling Basic Human Aspirations, Application of UHV in career and workplace, Development of holistic and responsible lifestyle, Core Framework to Assess Values: Emotional Intelligence (EQ) Framework, (Human-AI Value Alignment) Ikigai Model						05
Total Lecture Hours						30	
Text Books							

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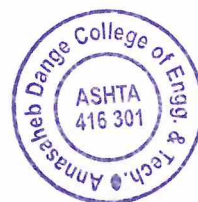
1. Human Values and Professional Ethics: R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010
2. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013
3. Understanding Human Being, Nature and Existence Comprehensively: UHV Team, UHV, 2022.
4. Life 3.0, Max Tegmark, Knopf, 2017

References:

1. AICTE Universal Human Values Course Material, 2017 onwards
2. IEEE Code of Ethics
3. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013

Online Learning Resources

1. TED Talks on ethics, happiness, human behavior
2. NPTEL Courses on UHV and Engineering Ethics
3. MIT: AI Ethics lectures (Open Courseware)



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**Course Information:**

Class, Semester	SY. B. Tech, Semester –III				Category	HS
Course Code, Course Title	3EEHS207, Indian Constitution				Type	T2
Prerequisites	-					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	1	-	-	1	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	50	-		-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Describe the evolution and salient features of the Indian Constitution using the Government of India Acts of 1935 and 1947.
CO2	Illustrate the philosophy of the Indian Constitution using the Preamble, Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy
CO3	Explain the constitutional amendment process, principles of the Basic Structure, and emergency provisions under the Indian Constitution
CO4	Summarize the structure and functioning of the Union and State Governments using the parliamentary and legislative systems.

Syllabus:

Module	Contents	Lecture Hours
I	Constitution: Basic Structure & Making of Constitution Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.	4
II	Fundamental Rights & Fundamental Duties Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles-Definition and Meaning, 42 nd Constitutional Amendment Act, List and Importance of Fundamental Duties.	6
III	Amendments of Constitution and Emergency Provisions Meaning and need of Constitutional Amendments, Procedure of Amendment under Article 368, Types of Amendments, Important Constitutional Amendments (42 nd , 44 th , 73 rd , 74 th , 86 th and 101 st Amendments), Basic Structure Doctrine. Emergency Provisions – Meaning and Objectives, National Emergency (Article 352), State Emergency/President's Rule (Article 356), Financial Emergency (Article 360), Effects of Emergency on Fundamental Rights and Centre-State Relations, Safeguards introduced by 44 th Constitutional Amendment.	3
IV	Government of The Union and States President of India – Election and Powers, Prime Minister of India - Election and Powers, Lok Sabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	2
Total Lecture Hours		15

Text Books

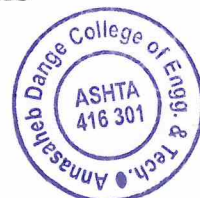
1. M. Laxmikanth, Indian Polity, 7th Edition, McGraw Hill Publications Delhi, 2023.
2. P. M. Bakshi, The Constitution of India, 19th Edition, Lexis Nexis, 2023.
3. Durga Das Basu, Introduction to the Constitution of India, 26th Edition, Lexis Nexis, 2022.
4. M. Laxmikanth, Governance in India, 3rd Edition, McGraw Hill Publications Delhi, 2021.
5. J. N. Pandey, The Constitutional Law of India, 59th Edition, Allahabad: Central Law Agency, 2022.

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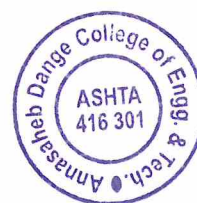


References:

1. V. N. Shukla, Constitution of India, 14th Edition, EBC, 2022.
2. V. N. Tripathi, Constitution of India, 9th Edition, Premier Publishing Company, 2021.
3. M. V. Pylee, India's Constitution, 18th Edition, S. Chand Publications, New Delhi, 2020.

Online Learning Resources

1. <https://legislative.gov.in/constitution-of-india/>
2. https://onlinecourses.nptel.ac.in/noc23_lw03/preview




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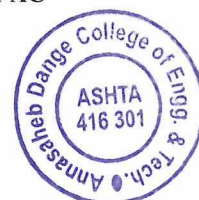
 Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering			
Established: 1999			
Course Information:			
Class, Semester	S.Y.B. Tech, Semester - IV		Category
Course Code, Course Title	3EEHS208, Environmental Studies		HS
Prerequisites	-		Type
Teaching Scheme (per week)	Lecture	Tutorial	Credits
	2	--	2
Examination Scheme (Marks)	Theory	MSE	ESE
		50	-
Course Outcomes (COs):			
Upon successful completion of this course, the student will be able to:			
CO1	Explain environmental systems, population dynamics, natural resources, and sustainability concepts.		
CO2	Explain the Sustainable Development Goals (SDGs) and their significance in engineering for sustainable development.		
CO3	Apply pollution concepts to identify sources, impacts, and suitable control measures for air, water, soil, and noise pollution.		
CO4	Apply principles of climate change mitigation and adaptation, renewable energy, waste management, and environmental governance to recommend sustainable engineering practices.		
Syllabus:			
Module	Contents		Lecture Hours
I	Environmental Systems, Population, and Resource Use Components of environment and earth systems, Population growth, urbanization, and industrial development, Natural resources: water, energy, land, minerals, Resource depletion, carrying capacity, and environmental stress, Human-environment interactions and sustainability challenges		5
II	Sustainable Development Goals (SDGs) and Engineering Responsibility Evolution of sustainable development concept, Overview of 17 Sustainable Development Goals and key targets, Interlinkages among SDGs (water-energy-food-climate nexus), SDGs relevant to engineering disciplines, Role of engineers in achieving SDGs		5
III	Pollution Science and Environmental Quality Air pollution: sources, types, impacts, and control overview, Water pollution: indicators, standards, reuse and recycling, Soil pollution: contamination sources and remediation concepts, Noise pollution: sources, measurement, impacts, and mitigation.		5
IV	Climate Change – Science, Mitigation, and Adaptation Greenhouse effect and climate change science, Evidence of climate change and observed impacts, Mitigation strategies: technology, energy transition, efficiency, Adaptation strategies: climate-resilient infrastructure and planning, Role of engineers in climate action.		5
V	Renewable Energy and Sustainable Technologies Overview of renewable energy technologies, Solar energy (PV and thermal systems), Wind energy systems, Hydropower, geothermal, ocean energy, Bioenergy and waste-to-energy, Comparative assessment of renewable technologies.		5
VI	Waste Management, and Environmental Governance Solid waste management and E-waste management, Life Cycle Assessment (LCA): concept and applications, Environmental policies and legislation (India and global overview), Environmental Impact Assessment (EIA), Ethics and professional responsibility of engineers		5
Total Lecture Hours			30
Text Books:			
1. Singh, J. S., Singh, S. P., Gupta, S. R., and Singh, R. Ecology, Environmental Science and Conservation. 2nd Edition. S. Chand Publishing, 2025. 2. Bharucha, E. Environmental Studies for Undergraduate Courses. 4th Edition. Universities Press (India) Pvt. Ltd. 2025. 3. Cunningham, W.P., & Cunningham, M.A., Environmental Science: A Global Concern, 15th Edition, McGraw-Hill Education, New Delhi, 2020. 4. Rathoure, V.C., Fundamentals of Environmental Studies, 2nd Edition, Tata McGraw-Hill Education, New Delhi, 2019			

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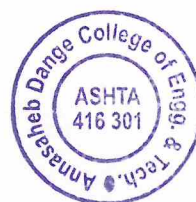
5. Singh, J.S., & Singh, S.P., Environmental Science: An Integrated Approach, 5th Edition, Jones & Bartlett Learning, 2019
6. Kaushik, A., & Kaushik, C.P., Perspectives in Environmental Studies, 5th Edition, New Age International Publishers, New Delhi, 2018. Cunningham, W.P., & Cunningham, M.A., Environmental Science: A Global Concern, 15th Edition, McGraw-Hill Education, New Delhi, 2020.

References:

1. Trivedi, R.K., & Goel, P.K., An Introduction to Environmental Biology, 1st Edition, University Book House, Jaipur, 2018.
2. Odum, E.P., Fundamentals of Ecology, 5th Edition, Cengage Learning, 2017.
3. Dash, M.C., Fundamentals of Ecology, 4th Edition, McGraw-Hill Education, New Delhi, 2016.

Online Learning Resources

1. <https://www.youtube.com/watch?v=MtpxOdtS9KU&list=PL3qvHcrYGy1u2egw2tipHWODV6eIVC2Gg>
2. <https://niti.gov.in/divisions/division/sustainable-development-goal>
3. <https://sdgs.un.org/goals>
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_de04



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 Department of Electrical Engineering

**Course Information:**

Class, Semester	S. Y. B. Tech. Semester –III			Category	HS
Course Code, Course Title	3EEHS209, Psychology			Type	T2
Prerequisites	----				
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits
	1	-	-	1	1
Examination Scheme (Marks)	Theory	MSE	TA	ESE	ESE
		-	50	-	
			Practical	CIA	
				-	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Explain the fundamental concepts of decision making, emotional intelligence, emotional regulation, and procrastination in everyday personal, academic, and professional contexts.
CO2	Differentiate between effective and ineffective thinking patterns, emotional responses, decision-making approaches, and behavioural strategies using psychological principles.
CO3	Apply appropriate psychological principles and decision-making strategies to improve self-management, interpersonal effectiveness, and productivity in real-life situations.
CO4	Evaluate the influence of cognitive biases, emotions, attention, and behavioural habits on decision making and personal effectiveness, and select appropriate corrective strategies.

Syllabus:

Module	Contents	Lecture Hours
I	Decision Making - Decision Making in Everyday Life - Why Smart People Make Poor Decisions - How Our Brain Makes Decisions (System 1 & System 2) - Cognitive Biases in Real Life - Decision-Making Frameworks - Thinking Tools	5
II	Understanding Emotional Intelligence - Understanding emotions and importance - EI vs IQ and 5 Domains of EI - Emotional Intelligence and Personality	3
III	Emotional Regulation & Interpersonal Skills - Impulse control (self-regulation) - Handling criticism (self-management) - Empathy and altruism (social awareness) - Assertiveness (relationship management)	3
IV	Procrastination - Introduction and definition of procrastination - Why do we procrastinate - Time management myths - Techniques to beat procrastination	4
Total Lecture Hours		15

Reference Books

1. "Thinking, Fast and Slow", Daniel Kahneman, Penguin Books, 2011
2. Emotional Intelligence: Why It Can Matter More Than IQ", Daniel Goleman, Bantam Books, 1995
3. "Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones", James Clear, Avery, 2018
4. "Deep Work: Rules for Focused Success in a Distracted World", Cal Newport, Grand Central Publishing, 2016
5. "The Power of Habit: Why We Do What We Do in Life and Business", Charles Duhigg, Random House, 2012
6. "Nudge: Improving Decisions About Health, Wealth, and Happiness", Richard H. Thaler & Cass R. Sunstein, Penguin Books, 2008
7. "The 7 Habits of Highly Effective People", Stephen R. Covey, Free Press, 1989

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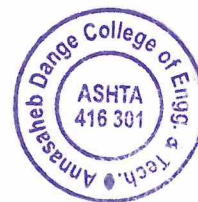
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NPTEL and Online Resources

Youtube Channel:

- 1) <https://www.youtube.com/watch?v=O2y1QGCIzMw>
- 2) <https://www.youtube.com/watch?v=33d61cpRfog>
- 3) <https://www.youtube.com/watch?v=b6FpfGiENPo>
- 4) <https://www.youtube.com/watch?v=YLhGgef7SvA>
- 5) <https://www.youtube.com/watch?v=TOFjyi0tg5w>



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 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. :Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering					
Course Information:							
Class, Semester		S. Y. B. Tech. Semester – III				Category	MA
Course Code, Course Title		3EEMA210, Aptitude and Reasoning -I				Type	T2
Prerequisites		-					
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits	
		2	-	-	2	-	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA
			-	50	-		ESE
							-
							-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Apply quantitative aptitude concepts such as HCF & LCM, Vedic Mathematics, Ages, Percentage, Profit & Loss to solve numerical and real-time problem-solving tasks efficiently.						
CO2	Analyze and solve logical reasoning problems based on Number Series, Alphabet Series, Coding-Decoding, Cubes & Dice by applying systematic analytical approaches.						
CO3	Develop professional and career readiness skills through SWOT Analysis, understanding of Engineering Ecosystem, effective email writing, and essay writing techniques.						
CO4	Demonstrate logical thinking, decision-making ability, and personality development skills to enhance employability and professional effectiveness.						
Syllabus:							
Module	Contents						Lecture Hours
I	HCF & LCM Vedic Math						5
II	Number Series, Alphabet Series (Quant) Percentage						5
III	Profit & Loss Coding-Decoding						5
IV	Cubes & Dice SWOT Analysis						5
V	Introduction to Engineering Ecosystem Ages						5
VI	Email writing, Essay writing Logical Thinking Basics						5
Total Lecture Hours						30	
Text Books							
1. R.S. Agarwal S Chand, Quantitative Aptitude 2019							
2. R.S. Agarwal S Chand, Verbal & Non-verbal Reasoning 2010							
3. P.C. Wren S Chand, Wren & Martin (Verbal, Grammar) 2017							
Reference Books							
1. Face Wiley APTIPEDIA (Quantitative, Logical, Verbal Aptitude) 2017							
2. P.A. Anand Maestro Wiley (Quantitative Aptitude) 2015							
3. Arun Sharma (Verbal Ability) Meenakshi Upadhyay McGraw Hill 2020							




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Department of Electrical Engineering

**Course Information:**

Class, Semester	SY. B.Tech, Semester - III				Category	BS
Course Code, Course Title	3EEBS211, Matrix Algebra, Calculus and probability				Type	T1
Prerequisites						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self Study	Credits	
	3	-	-	3	3	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		ESE
						-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Apply the concept of partial differentiation to compute partial derivatives, Jacobian and determine maxima and minima of function of two variables
CO2	Apply Techniques of integral calculus to compute definite and indefinite integrals using substitution, integration by parts, and partial fractions, and evaluate double and triple integrals
CO3	Compute probabilities using Binomial, Poisson and Normal distribution.
CO4	Solve first order differential equations and apply them to electrical circuit models such as RL, RC and RLC circuits.
CO5	Solve system of linear equation using matrices and apply the rouche- Capelli theorem to determine consistency of solution and compute eigen values and eigen vectors of matrices

Syllabus:

Module	Contents	Lecture Hours
I	Partial Differentiation and Its Applications: Function of two or more variables, Partial derivatives, Change of variables, Euler's theorem, Jacobin, Maxima and minima of functions of two variables.	8
II	Integral calculus: Definite and Indefinite integral, integration by substitution, Integration by parts, integration by using partial fraction, improper integrals, Double Integrals, Triple integral	8
III	Probability Distribution: Random variable, Binomial Distribution, Poisson Distribution, Normal Distribution.	7
IV	Ordinary Differential Equation (First order and First degree): Linear differential equation, Equation reducible to linear differential equation, Exact differential equation, Equation reducible to exact differential equation, Applications: RC, RL, RCL circuit analysis	8
V	System of linear Equation: Rank of matrix using Echelon form, Rouché-Capelli Theorem, Homogeneous system of linear equation, Non-homogeneous system of linear equation, Applications to electrical circuits.	7
VI	Eigen Value and Eigen vectors: Definition of vectors in R^n , Linear Dependence and Independence of Vectors, Characteristic Equation of Matrix, Cayley - Hamilton theorem (statement only), Eigen Values and Properties, Eigen Vectors and Properties.	7
Total Lecture Hours		45

Text Books

1. Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2018
2. H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand, 2018.
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications, 2011
2. S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10th Edition, Sultan Chand and Sons Publisher, 2000.
3. Seymour Lipschutz, Marc Lars Lipson, Linear Algebra, 4th Edition, McGraw Hill, 2009.

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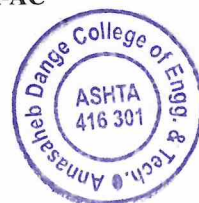
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:									
Class, Semester		S.Y. B.Tech, Semester - IV					Category	PC	
Course Code, Course Title		3EEPC212, Electromagnetic Fields					Type	T1	
Prerequisites		3EEBS102, 3EEES105, 3EEBS201							
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self Study	Credits		
		2	1		-	3	3		
Examination Scheme (Marks)		Theory	MSE	TE	ESE	Practical	CIA	ESE	
			40	20	40		-	-	
Course Outcomes (COs) :									
Upon successful completion of this course, the student will be able to:									
CO1	Solve electromagnetic field problems using appropriate coordinate systems using vector algebra and coordinate transformations with correct formulation.								
CO2	Determine electric field and potential for point, line, and surface charge distributions using Coulomb's and Gauss's laws with accurate evaluation.								
CO3	Examine electric field behavior in conductors and dielectrics using boundary conditions and capacitance concepts with appropriate interpretation.								
CO4	Determine magnetic field intensity for standard current-carrying configurations using Biot-Savart and Ampere's laws with systematic approach.								
CO5	Interpret time-varying electromagnetic fields using Maxwell's equations in integral and differential forms with logical representation.								
CO6	Determine electromagnetic wave propagation and power flow in different media using wave equations and Poynting vector with clear understanding.								
Syllabus:									
Module		Contents						Lecture Hours	
I		Vector Analysis and Coordinate Systems Review of Vector Algebra, Coordinate Systems and Transformation - Cartesian, Cylindrical and Spherical Coordinates, Vector Calculus - Differential Length, Area and Volume Elements, Line, Surface, and Volume Integrals, Gradient, Divergence and Curl, Divergence Theorem and Stokes Theorem.						5	
II		Electrostatics Coulomb's law and Electric Field Intensity, Electric Fields due to point and continuous charge distribution, Electric Field due to finite charge, circular disc and infinite sheet of charge, Electric Flux Density, Gauss's law and its applications, Electric potential and potential gradient, Electric Dipole, Equipotential Surfaces, Energy Density in Electrostatic Field.						5	
III		Conductors and Dielectrics Current and Current density, Continuity Equation, Ohm's Law in Point Form, Properties of Conductors and Dielectrics, Polarization in dielectrics, Capacitance - Capacitance of parallel plate capacitor with single and two dielectric, co-axial cable and two wire transmission line, Boundary Conditions for Electric Fields - Poisson's and Laplace's equations.						5	
IV		Magnetostatics Biot-Savart law, Magnetic Flux Density, and Magnetic Field Intensity of infinite and finite long straight conductor, circular loop, solenoid and toroid, Ampere's circuital law, and its applications, Lorentz Force, Magnetic Torque and Moment, Magnetic Boundary Conditions, Inductance of Solenoid and Toroid – Energy Stored in magnetic fields- Magnetic Boundary Conditions.						5	
V		Maxwell's Equations Faraday's Law, Transformer and Motional EMFs, Conduction and Displacement Current, Maxwell's equations in point and integral form, Time-Harmonic Maxwell's Equations.						5	
VI		Electromagnetic Waves Wave equation for electromagnetic fields, Plane wave propagation in free space, dielectrics and Good Conductors, Skin Effect Poynting Vector and Power Flow, Reflection and transmission of electromagnetic waves.						5	
Total Lecture Hours								30	


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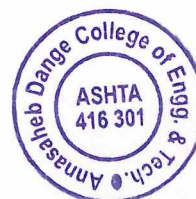

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Tutorial Topics	
1.	Vector transformation between Cartesian, cylindrical, and spherical coordinate systems
2.	Evaluation of gradient, divergence, curl and verification of vector identities
3.	Electric field due to point, line, and surface charge distributions
4.	Applications of Gauss's law for symmetric charge distribution
5.	Electric potential, potential gradient, and dipole field calculations
6.	Capacitance calculation of parallel plate capacitors with single and multiple dielectrics
7.	Capacitance of coaxial cable and two-wire transmission line
8.	Boundary conditions and solutions of Poisson's and Laplace's equations
9.	Magnetic field using Biot-Savart law for straight conductor and circular loop
10.	Applications of Ampere's circuital law
11.	Inductance calculation and energy stored in magnetic fields
12.	Problems on Different methods of emf generation
13.	Maxwell's equations in integral and differential forms
14.	Plane wave propagation in free space and dielectric media
15.	Poynting vector, power flow, reflection and transmission of EM waves
Total Tutorial Hours: 30	
Text Books	
1.	Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, McGraw-Hill Education, 9th Edition.
2.	Elements of Electromagnetics – Matthew N. O. Sadiku, Oxford University Press, 7th Edition.
3.	Field and Wave Electromagnetics – David K. Cheng, Pearson Education, 2nd Edition.
4.	Introduction to Electrodynamics – David J. Griffiths, Cambridge University Press, 5th Edition.
References:	
1.	Electromagnetic Waves and Radiating Systems – Edward C. Jordan and Keith G. Balmain, Prentice Hall of India, 2nd Edition.
2.	Electromagnetic Field Theory Fundamentals – Bhag Singh Guru and Hüseyin R. Hiziroglu, Cambridge University Press, 2nd Edition.
3.	Electromagnetics – Joseph A. Edminister and Mahmood Nahvi, Schaum's Outline Series, McGraw-Hill Education.
4.	Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International, 5 th Edition, 2010.
Online Learning Resources	
1.	NPTEL – Electromagnetic Fields related Courses (IIT) - https://nptel.ac.in
2.	MIT Open Course Ware – Electromagnetics - https://ocw.mit.edu
3.	Electrical4U – Electromagnetic Field Theory Articles - https://www.electrical4u.com



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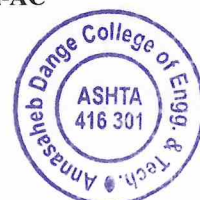
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 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:										
Class, Semester		S.Y. B.Tech, Semester - IV						Category	PC	
Course Code, Course Title		3EEPC213, DC Machines and Transformers						Type	LIT1	
Prerequisites		3EEES105								
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self Study	Credits				
		3	-	2	3	4				
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE		
			40	20	40		50	50		
Course Outcomes (COs) :										
Upon successful completion of this course, the student will be able to:										
CO1	Explain the construction, working principles and performance characteristics of DC Machines and BLDC motors.									
CO2	Interpret the characteristics and control methods of various DC Machines in view of industrial load requirements.									
CO3	Describe the construction, operation and performance parameters of single-phase transformers and distribution transformers.									
CO4	Examine different connection methods, vector groups and operational characteristics of three-phase transformers.									
CO5	Conduct tests on DC machines and transformers as per standard testing procedures for industrial applications.									
Syllabus:										
Module		Contents							Lecture Hours	
I		DC Generators Construction and working principle, types, EMF equation, armature windings, armature reaction, commutation, Demagnetizing and cross magnetizing ampere turns, characteristics of DC generators, losses and efficiency.							7	
II		DC Motors Working principle, back-emf, torque equation, types of motors, characteristics of shunt, series and compound motors, speed control methods, types of starters, losses and efficiency, testing of DC motors, electric braking of DC motors, Applications							8	
III		Single Phase Transformer Construction of core & windings, Principle of operation, transformation ratio, classifications, EMF equation, Phasor diagrams of transformer on No-load and Load, Equivalent circuit of transformer, Voltage regulation, Polarity test, Voltage ratio test, load test, OC & SC tests, Sumner's test, losses and efficiency, Condition for maximum efficiency, All day efficiency, parallel operation.							8	
IV		Three Phase Transformers Construction and working of three-phase transformer, Three-phase Transformer Connections, special connections, Parallel Operation of Three-phase Transformers, Tap-changers on Transformers and types, Cooling of Transformers, Power Transformer and its Auxiliaries							8	
V		Distribution and Industrial Transformers Distribution Transformers: construction and features of distribution transformers, Auto-transformer, Saving of Copper in an Auto-transformer, advantages disadvantages and applications Industrial Applications: Transformers for power plants and substations, Transformers for renewable energy systems and EV charging infrastructure.							6	
VI		Transformer Testing and Advanced Machines Advanced Transformer Testing (Industry Practice): Insulation resistance test, Oil testing – Dielectric strength (BDV test), Testing Standards for Transformer. Construction and Principle of operation of BLDC Machine, Types of drone motors, Energy efficient Motors.							8	
Total Lecture Hours								45		

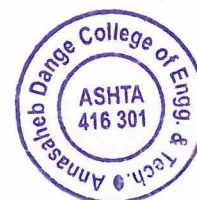

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List of Experiments with CO Mapping		
S.No	Title / Topic of the Experiment	CO Mapped
1	Determination of OCC & Load characteristics of DC Generator	1
2	Speed control of DC Motor by armature and flux control method	2
3	Load test on DC Series Motor	2
4	Load test on DC Shunt Motor	2
5	Swinburne's Test on DC Shunt motor	2
6	OC SC test on single phase transformer	3
7	Load test on single phase transformer	3
8	Load Test on three phase Transformer	4
9	Transformer Turns ratio Test	3
10	To Study different connections of the Three Phase Transformer	4
11	Parallel operation of Transformers	3
12	Insulation Resistance Test of Distribution Transformer using Megger	5
Total Practical Sessions		15
Total Practical Hours		30
Text Books		
1. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013. 2. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010 3. B L Theraja, "A Textbook of Electrical Technology" - Volume II, S Chand 4. V.K.Mehta and Rohit Mehta, "Principle of Electrical Machines", S Chand, 2009		
References:		
1. Sahdev S. K. "Electrical Machines", Cambridge University Press, 2018 2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011. 3. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010. 4. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.		
Online Learning Resources		
1. NPTEL (SWAYAM) – Electrical Engineering Courses https://nptel.ac.in Provides free IIT lecture videos, assignments, and certification courses on circuit theory, electrical networks, and related subjects. 2. Electrical4U – Electrical Engineering Tutorials https://www.electrical4u.com Provides free explanations and tutorials on electrical engineering topics such as circuit analysis, machines, and power systems. 3. Khan Academy – Electrical Engineering https://www.khanacademy.org/science/electrical-engineering		
Experiments that may be performed through virtual labs:		
S.No	Experiment Name	Experiments Links
1.	To Study the Speed Control of Separately Excited DC Motor	https://em-coep.vlabs.ac.in/exp/speed-control-dc-motor/




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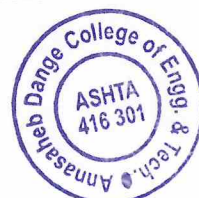

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 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:										
Class, Semester		S.Y. B.Tech, Semester – IV						Category	PC	
Course Code, Course Title		3EEPC214, Signals and Systems						Type	LIT1	
Prerequisites		-								
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study		Credits	
		3	-		2		3		4	
Examination Scheme (Marks)		Theory	MSE	TE	ESE	Practical	CIA	ESE		
			40	20	40		50	50		
Course Outcomes (COs) :										
Upon successful completion of this course, the student will be able to:										
CO1	Explain the fundamental concepts of signals and systems, system modelling, and the sampling theorem.									
CO2	Analyze Linear Time Invariant (LTI) systems using convolution techniques and correlation between signals.									
CO3	Apply the Laplace Transform to analyze continuous-time systems									
CO4	Analyze discrete-time systems using the z-transform and system realization methods.									
CO5	Analyze signals in the frequency domain using Fourier Series & Transform and FFT algorithms.									
Syllabus:										
Module		Contents							Lecture Hours	
I		Introduction to Signals & Systems Elementary Continuous-Time and Discrete-Time Signals, Operation on Continuous Signals and Discrete Signals, Classification of Signals, Classification of Systems, System Modelling, Sampling Theorem, Applications of signals and systems							8	
II		Discrete-Time and Continuous- time LTI Systems Convolution sum: Linear Convolution (Graphical Method, Matrix Method) and Circular Convolution (Concentric Circle Method, Matrix Multiplication Method), Convolution Integral, Correlation of signals: Auto Correlation and Cross Correlation.							8	
III		System Analysis using Laplace Transform Introduction to Laplace, Transfer Function, Poles & Zeros, s-Plane, Unilateral and Bilateral Laplace Transform, Inverse Laplace Transform, Analysis of Electrical Network using Laplace.							7	
IV		System Analysis using z-Transform Introduction to z-Transform, z-Transform: Right hand, Left hand and Two sided sequence, Inverse z-Transform: Long division, Partial Fraction Method, System Realization: Direct Form-I and Direct Form-II.							7	
V		Fourier Analysis of Continuous-Time Signals Introduction to Fourier Series, Trigonometric Fourier Series, Exponential Fourier Series, Introduction to Fourier Transform, Fourier Spectrum, Fourier Transform.							7	
VI		Fourier Analysis of Discrete-Time Signals Introduction, Discrete-Time Fourier Transform (DFT), Inverse Discrete-Time Fourier Transform (IDFT), Fast Fourier Transform (FFT): Decimation-in-time Algorithm (DIT), Decimation-in-frequency Algorithm (DIF)							8	
								Total Lecture Hours		45
List of Experiments with CO Mapping										
Sr.No		Title / Topic of the Experiment							CO Mapped	
1		Generation of elementary continuous and discrete time signals							CO1	
2		Performs various operations on signals and sequences such as addition, multiplication, scaling, shifting, folding.							CO1	
3		Compute linear and circular convolution.							CO2	
4		Determine auto-correlation and cross-correlation between two signals.							CO2	
5		Determine system response of a continuous-time LTI system using Laplace transform and inverse Laplace transform.							CO3	
6		Plot pole-zero map of a system.							CO3	


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7	Determine discrete system response using z-transform	CO4
8	Determine discrete system response using inverse z-transform	CO4
9	Compute the Fourier Transform of a signal using FFT	CO5
10	Compute the inverse Fourier Transform of a signal using FFT	CO5
11	Plot the magnitude spectrum and phase spectrum of a signal using the Fourier Transform.	CO5
12	Verification of sampling and reconstruction of a signal for different sampling frequencies	CO1
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. Haykin, S. and Van Veen, B., 2007. Signals and systems. John Wiley & Sons.
2. Lathi B. P., "Linear Systems and Signals", Oxford University Press, 2nd edition, 2009
3. Michael J. Robert, "Introduction to Signals and Systems", TMH, Second ed., 2003
4. Tarun Kumar Rawat "Signals and Systems", Oxford University Press, first edition 2010

References:

1. Alan V Oppenheim, Alan S Willsky, "Signals and systems" PHI, Second ed. 2009
2. Shaila Dinkar Apte "Signals and Systems: Principles and Applications", Cambridge University Press.
3. R.Babu, "Signals and systems", Scitech Publications Pvt. Ltd, 4th edition, 2011

Online Learning Resources

1. NPTEL (Swayam - IIT Courses): Offers courses "Principles of Signals and Systems"
2. Coursera (EPFL & Univ. of Colorado Boulder): Offers specialized courses like "Digital Signal Processing"

Experiments that may be performed through virtual labs:

S.No	Experiment Name	Experiments Links
1.	Verification of sampling and reconstruction of a signal for different sampling frequencies	https://dsp-iitkgp.vlabs.ac.in/exp/sampling-theorem/simulation.html



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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering							
Course Information:								
Class, Semester		S.Y. B.Tech, Semester - IV					Category	PE
Course Code, Course Title		3EEPE215, PE- I, Architectures of Electric and Hybrid Vehicles					Type	T1
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study	Credits
		3	-		-		3	3
Examination Scheme (Marks)		Theory	MSE	TE	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs) :								
Upon successful completion of this course, the student will be able to:								
CO1	Identify the interconnections of vehicle components in various classes of vehicles for optimizing performance							
CO2	Estimate different forces challenging the dynamics and performance of vehicles to design powertrain							
CO3	Interpret the architectures of electric and hybrid vehicles for understanding the power flow sequence in powertrain components.							
CO4	Compare the single speed and multi-speed mechanical transmission systems for different operating modes							
CO5	Analyze the energy management strategies and charger topologies with power quality standards.							
Syllabus:								
Module	Contents							Lecture Hours
I	Introduction to Electric and Hybrid Vehicles Classification of electric vehicles: Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), Plug-in Hybrid Electric Vehicles (PHEV), Fuel Cell Electric Vehicles (FCEV), Basic components of EVs: Energy storage system, Electric propulsion system, Power electronics interface, Auxiliary subsystems, Comparison of EVs with conventional vehicles.							7
II	Vehicle Dynamics and Performance Requirements Environmental impact and emission reduction, Evolution of electric mobility and electrified transportation, Fundamentals of vehicle mechanics, Road load forces: rolling resistance, aerodynamic drag, gradient resistance, Acceleration and traction forces, Vehicle motion equations, Power and energy requirements for EV propulsion, Drive cycles and energy consumption, Performance parameters: Acceleration, Maximum speed, Gradeability, Range estimation.							9
III	Architectures of Electric Vehicles Basic EV powertrain architecture, Electric drivetrain configurations, Centralized and distributed drive systems, Single motor and multi-motor architectures, Battery electric vehicle architecture, Power flow in EV powertrain, Battery integration in vehicle chassis, System integration: mechanical, electrical and control architectures.							7
IV	Hybrid Electric Vehicle Architectures Concept of hybridization and hybridization factor, Series hybrid architecture: Structure and working, Power flow analysis, Parallel hybrid architecture - Configuration and operation, Series-parallel hybrid architecture: Power split device, Operating modes, Advanced hybrid architectures: Plug-in hybrid electric vehicles, Range extended electric vehicles, Complex hybrid configurations							8
V	EV and HEV Powertrain Components Overview of EV and HEV Powertrain, Requirements of Traction Motors, Types of Electric Motors Used in EVs and HEVs, Transmission and Drivetrain Components: Role of transmission in EV powertrain, Gear reduction systems, Single-speed transmission systems, Multi-speed transmissions, Differential mechanisms, Electric axle (E-axle) systems, Direct drive and in-wheel motor configurations							7
VI	Energy Management, Charging Systems and Future Trends Energy management strategies in EVs and HEVs, Rule-based control strategies, Optimization-based control, Vehicle supervisory control, EV charging technologies: AC charging, DC fast charging, Wireless charging, Grid integration and Vehicle-to-Grid (V2G), Future trends in electric mobility and smart transportation.							7
Total Lecture Hours							45	


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Text Books

1. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, 3rd Edition, CRC Press, 2021.
2. Ali Emadi, Advanced Electric Drive Vehicles, 1st, CRC Press, 2015.
3. Chris Mi & M. Abul Masrur, Hybrid Electric Vehicles: Principles and Applications, 1st, Wiley, 2018
4. Nil Patel, A.K. Bhoi, S. Padmanaban, Electric Vehicles: Modern Technologies and Trends, Springer, 2020.

References:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, First, Wiley, 2016.
2. Mehrdad Ehsani, Yimin Gao, Modern Electric, Hybrid Electric and fuel cell vehicles, First, CRC Press, 2009.
3. C.C Chan, K.T Chau, Modern Electric Vehicle Technology, Oxford University Press Inc., NY, First, 2001
4. Mi Chris; Zhang Yi, Automotive power transmission systems, First, Willey, 2018

Online Learning Resources

1. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou26_ec04
2. https://diyguru.org/ev-vehicle-architecture-manual/?utm_source=chatgpt.com
3. https://courses.diyguru.org/unit/ev-architecture-and-design/?utm_source=chatgpt.com
4. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed83




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Annasaheb Dange College of Engineering and Technology
Ashta - 416301, Dist.: Sangli, Maharashtra
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Department of Electrical Engineering

**Course Information:**

Class, Semester	S.Y. B. Tech, Semester - IV				Category	PE
Course Code, Course Title	3EEPE216, PE- I, Utilization of Electrical Energy				Type	T1
Prerequisites	3EES105					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	3	-	-	3	3	
Examination Scheme (Marks)	Theory	MSE	TE	ESE	Practical	CIA
		40	20	40		ESE
						-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Select appropriate techniques for designing indoor & outdoor lighting schemes.
CO2	Describe the principles and methods of electric heating and electric welding used in industrial applications.
CO3	Interpret the principles of refrigeration and air-conditioning systems to enhance the performance of fans and compressors.
CO4	Discuss electric traction supply systems, lighting schemes and train performance parameters at various modes of operation.
CO5	Illustrate the utilization of electrical energy in electric vehicles, electrolytic and electrometallurgical processes.

Syllabus:

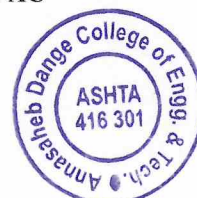
Module	Contents	Lecture Hours
I	Illumination Engineering Nature of light, Visibility spectrum curve, photometry, Terms used in illumination, Laws of illumination, Compact fluorescent lamps (CFL), Light Emitting Diode based lamps, Discharge lamps: mercury vapor lamps, sodium vapor lamps and neon lamps, Principles of light control, Types and design of lighting schemes factory lighting, sports lighting, street lighting, Illumination system design for residential, commercial and industrial categories.	8
II	Electric Heating Advantages of Electric Heating, Modes of heat transfer, Classification of electrical heating methods, Resistance heating, Arc furnaces, Induction heating, Dielectric Heating, High Frequency Eddy current heating.	7
III	Electric Welding Advantages of electric welding, Welding method, Principles of resistance welding, types, Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method of and their applications.	7
IV	Refrigeration and Air Conditioning Refrigeration system –Types of refrigerants Domestic refrigerator, Water coolers, Air conditioning systems, Air conditioning cycle, Classification of air conditioning, systems, Central system, Unitary systems, Fan, compressor performance evaluation, compressor capacity assessment, Energy saving on fans and compressor, Chillers -Air, water Cooled Chillers	8
V	Electric Traction Review of existing electric traction systems in India, Advantages of electrical traction, Different systems of electric tractions, comparison of AC and DC systems, Mechanics of train movement time curves for different services tractive effort, specific power and specific energy consumption, Schemes and traction Motor speed control, effect of varying acceleration and braking, retardation, adhesive weight, braking retardation and coefficient of adhesion. Requirement of train lighting, systems of train lighting, Lighting by using 25kV AC supply.	9
VI	Utilization of Electrical Energy in Electric Vehicles Charging technologies of electric vehicles/hybrid electric vehicles. Charging infrastructure. Utilization of Electrical Energy in electro-metallurgy and electro-plating.	6
Total Lecture Hours		45


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Textbooks	
1.	J. B. Gupta, Utilization of Electric power and Electric Traction, 10th S. K. Kataria and Sons, 2022
2.	H. Partab, Art and Science of Utilization of Electrical Energy, Dhanpat Rai & Sons, New Delhi, 2015
3.	M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A Course in Electrical Power, Dhanpat Rai & Sons, New Delhi, 9th Edition (1987).
4.	E. Openshaw Taylor Utilization of Electric Energy, Orient Blackswan / Universities Press (India), SI Units Edition – 2009.
References:	
1.	C. L. Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International (P) Ltd., New Delhi, 4th Multicolor Edition (2018).
2.	Hancock N N, Electric Power Utilization, Wheeler Publication, 2nd Edition (1964).
3.	N. V. Suryanarayana, Utilization of Electrical Power including Electric Drives and Electric Traction, New Age International (P) Limited, New Delhi, 2017.
Online Learning Resources	
1.	https://nptel.ac.in/courses/108/105/108105060/
2.	https://vemu.org/uploads/lecture_notes/16_02_2021_1067241445.pdf
3.	https://vardhaman.org/wp-content/uploads/2021/03/Utilization-of-Electrical-Energy.pdf
4.	https://l1nq.com/cpil4
5.	https://l1nq.com/j63Q5




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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:									
Class, Semester		S.Y. B.Tech, Semester – IV					Category	PE	
Course Code, Course Title		3EEPE217, PE- I, Mathematical Modeling of Dynamic Systems					Type	T1	
Prerequisites		-							
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self Study	Credits
		3		-		-		3	3
Examination Scheme (Marks)		Theory		MSE	TE	ESE	Practical	CIA	ESE
				40	20	40		-	-
Course Outcomes (COs) : Upon successful completion of this course, the student will be able to:									
CO1	Explain the concepts of mathematical modelling, types of models and simulation technique.								
CO2	Apply mathematical methods such as transfer function, state-space representation, linearization, Lagrangian and Hamiltonian approaches for modelling dynamic systems.								
CO3	Develop mathematical models of mechanical, thermal, hydraulic and pneumatic systems using fundamental principles.								
CO4	Analyze electrical circuits and electrical machines under various operating conditions using mathematical models								
CO5	Apply transfer function-based and bond graph modelling techniques to represent and analyze complex engineering systems.								
Syllabus:									
Module		Contents						Lecture Hours	
I		Introduction to Modelling Concept of modelling and types of models, need and significance of modelling in engineering systems, introduction to simulation and simulation tools.						7	
II		Mathematical Methods for Modelling State space approach, transfer function approach, modelling techniques such as linearization, Lagrangian method and Hamiltonian method, modelling using first principles.						8	
III		Mathematical Modelling of Mechanical Systems Basics of heat transfer, mathematical modelling of thermal systems, pneumatic systems and hydraulic systems, modelling of mechanical components like gear trains, chain drives and levers.						8	
IV		Mathematical Modelling of Electrical Systems Fundamentals of electrical system modelling, mathematical modelling of RLC circuits, modelling of electrical machines such as DC machines, AC machines and permanent magnet motors, system analysis for various input conditions						8	
V		Transfer Function Based Mathematical Model of Various Systems Mathematical modelling of quadruple tank system, quadrotor system, magnetic levitation system, simple pendulum and inverted pendulum, introduction to other practical systems as per requirement.						7	
VI		Bond Graphs Modelling Introduction to bond graph theory, generation of system equations, procedure for drawing bond graph models, bond graph modelling of mechanical and electrical systems						7	
Total Lecture Hours								45	
Text Books									
1. K. Ogata, System Dynamics, Pearson Education, 4th Edition, 2004. 2. M. Gopal, Modern Control Systems Theory, Wiley Eastern Ltd., 2nd Edition, 1993. 3. E. O. Doebelin, System Modeling and Response, John Wiley & Sons, 1980. 4. Kamalanand K., Jawahar P. Mannar, Mathematical Modelling of Systems And Analysis, PHI Learning, 2019									
References									
1. Desai, U. B. and Lalwani, D., <i>Identification Techniques</i> , Tata McGraw-Hill, 1977. 2. Kulakowski B. T., Gardner J. F., Shearer J. L., <i>Dynamic Modeling and Control of Engineering Systems</i> , Cambridge University Press, 2012. 3. Goldstein, H., <i>Classical Mechanics</i> , Addison-Wesley.									


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Online Learning Resources

1. NPTEL Course on “Modelling and Simulation of Dynamic Systems”
https://onlinecourses.nptel.ac.in/noc21_me25/preview


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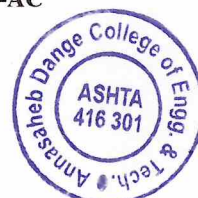
 Established: 1999		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:										
Class, Semester		S.Y. B.Tech, Semester - IV						Category	PE	
Course Code, Course Title		3EEPE218, PE- I, Energy Economics						Type	T1	
Prerequisites		-								
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study		Credits	
		3	-		-		3		3	
Examination Scheme (Marks)		Theory	MSE	TA	ESE		Practical	CIA	ESE	
			40	20	40			-	-	
Course Outcomes (COs) :										
Upon successful completion of this course, the student will be able to:										
CO1	Recognize energy resources, energy economics and energy demand–supply pattern in global scenario.									
CO2	Describe the availability, depletion and cost aspects of conventional and renewable energy resources.									
CO3	Determine the cost components and economic performance of different power generation systems									
CO4	Interpret electricity tariff structures and energy market policies.									
CO5	Examine the economic feasibility of energy projects using project evaluation techniques and energy conservation measures.									
Syllabus:										
Module		Contents							Lecture Hours	
I		Introduction to Energy Economics Concept of energy economics, relationship between energy and economic development, energy demand and supply, energy resources classification, global and Indian energy scenario, energy consumption patterns.							8	
II		Energy Resources and Cost Aspects Conventional energy sources (coal, oil, natural gas, hydro), renewable energy sources (solar, wind, biomass), resource availability and depletion, cost comparison of different energy resources, levelized cost of energy (LCOE).							8	
III		Economics of Power Generation Cost components of power plants, capital cost, operation and maintenance cost, fuel cost, depreciation, fixed and variable costs, economic comparison of thermal, hydro, nuclear, and renewable power plants.							7	
IV		Electricity Pricing and Tariff Structures Principles of electricity pricing, tariff structures (flat rate, block rate, two-part tariff, three-part tariff, power factor tariff, time-of-day tariff), smart pricing mechanisms.							8	
V		Energy Markets and Policies Power sector reforms, deregulation and restructuring of electricity markets, energy trading, role of regulatory bodies in India, overview of electricity act and energy policies.							7	
VI		Economic Evaluation of Energy Projects Project evaluation techniques – Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, Cost–Benefit Analysis, economic feasibility of renewable energy projects, energy conservation economics.							7	
Total Lecture Hours								45		
Text Books										
1. Subhes C. Bhattacharyya, Energy Economics: Concepts, Issues, Markets and Governance, 2nd Edition, Springer, 2019.										
2. Barney L. Capehart, Wayne C. Turner, William J. Kennedy, Guide to Energy Management, 8th Edition, CRC Press / Taylor & Francis Group, 2016.										
3. S. P. Sukhatme, J. K. Nayak, Energy Systems Analysis and Management, 4th Edition, McGraw Hill Education (India) Pvt. Ltd., 2017.										
4. John Twidell, Tony Weir, Renewable Energy Resources, 3rd Edition, Routledge / Taylor & Francis Group, 2015.										
References										
1. Paul Stevens, Energy Economics, 1st Edition, Edward Elgar Publishing Ltd., 2000.										

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2. Surinder Kumar, Energy Economics and Policy, 1st Edition, Oxford University Press, 2012.
3. R. P. Saini, Renewable Energy Sources and Applications, 1st Edition, Wiley India Pvt. Ltd., 2011.
4. Godfrey Boyle, Renewable Energy: Power for a Sustainable Future, 3rd Edition, Oxford University Press, 2012.
5. Subhes C. Bhattacharyya, Energy Economics: Principles, Applications and Case Studies, 1st Edition, Springer, 2011.

Online Learning Resources

1. NPTEL Courses on Energy Economics and Energy Management
2. International Energy Agency (IEA) reports and publications
3. Ministry of Power, Government of India – Energy statistics and policy documents
4. Bureau of Energy Efficiency (BEE) learning resources




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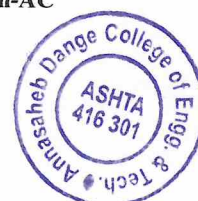

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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of ElectricalEngineering						
Course Information:							
Class, Semester	S.Y. B. Tech, Semester - IV					Category	PE
Course Code, Course Title	3EEPE219, PE- I, Introduction to Embedded Systems					Type	T1
Prerequisites	3EEPC115, 3EEPC203						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study		Credits	
	3	-	-	3		3	
Examination Scheme (Marks)	Theory	MSE	TE	ESE	Practical	CIA	ESE
		40	20	40		-	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Interpret basic concepts and classify embedded systems based on their characteristics and applications.						
CO2	Describe the architecture and features of microcontrollers, interfacing concepts and the role of sensors and actuators in embedded systems.						
CO3	Explain memory organization, memory types, and basic interfacing concepts used in embedded systems.						
CO4	Use Embedded C programming and design tools to develop embedded applications.						
CO5	Apply embedded system architectures and communication protocols for industrial automation and IoT applications.						
Syllabus:							
Module	Contents						Lecture Hours
I	Overview of Embedded Systems Block diagram of embedded system with hardware components. Harvard and Von-Neumann architecture. RISC and CISC processors. Characteristics of embedded system: Processor, power, memory, operating system, reliability, performance, power consumption, NRE cost, unit cost, size, flexibility, time-to-prototype, time-to-market, maintainability, correctness and safety. Classification of Embedded System: Small scale, medium scale, sophisticated, stand-alone, reactive/real time (soft and hard real time).						9
II	Embedded System Hardware Microprocessor vs microcontroller: architecture and comparison, general architecture of microcontroller including CPU, ALU, registers and buses, functional blocks of microcontroller, overview of 8051, AVR and ARM microcontrollers (architecture and features – conceptual), input/output ports and interfacing concepts, sensors and actuators: classification, working principles and applications						7
III	Memory Organization and Interfacing Types of memory: RAM, ROM, EEPROM and Flash memory, memory organization and mapping in embedded systems, basic addressing concepts, interfacing fundamentals: input and output interfacing, digital and analog signals, basic interfacing diagrams such as LED, switch and sensor						7
IV	Embedded Software and Design Flow Embedded system design flow and development cycle, role of firmware in embedded systems, basics of Embedded C (data types and operators – overview), algorithm development for simple embedded tasks, flowchart design for applications such as LED blinking and motor control, introduction to development tools: IDE, compiler, simulator and debugger (conceptual)						7
V	Communication Protocols in Embedded Systems Need and importance of communication in embedded systems, serial and parallel communication techniques, UART protocol: block diagram and working, I2C protocol: concept and applications, SPI protocol: concept and applications, comparison of communication protocols, application-based communication examples such as sensor interfacing and device communication						7
VI	Embedded System Applications and Case Studies Embedded systems in electrical engineering applications, industrial automation systems and relay control, smart meters and energy monitoring systems, introduction to Internet of Things (IoT): basic concepts and architecture, case studies of embedded systems including block diagram, working principle and applications						8
Total Lecture Hours						45	

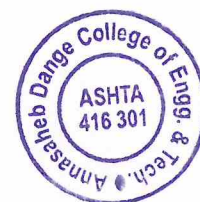

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Text Books
1. Raj Kamal, Embedded Systems Architecture, Programming and Design, Tata McGraw Hill, 2008
2. David E. Simon, An Embedded Software Primer, Pearson Education, 1999
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems, Pearson Education, 2007
4. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Elsevier, 2006
References
1. Jack G. Ganssle, Embedded Systems Design, Newnes, 2008
2. Arnold S. Berger, Embedded Systems Design: An Introduction to Processes, Tools and Techniques, CMP Books, 2002
3. Peter Marwedel, Embedded System Design, Springer, 2011 Lyla B. Das, Embedded Systems: An Integrated Approach, Pearson Education, 2013
Online Learning Resources
1. Coursera, Introduction to Embedded Systems Software and Development Environments, Available at: https://www.coursera.org
2. edX, Embedded Systems and IoT Courses, Available at: https://www.edx.org
3. MIT Open Course Ware, Embedded Systems and Computer Engineering Resources, Available at: https://ocw.mit.edu




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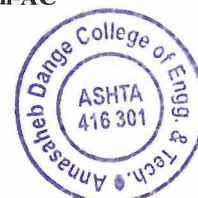
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering							
Course Information:								
Class, Semester		S.Y. B.Tech, Semester - IV					Category	MM
Course Code, Course Title		3EESE220, Fundamentals of Electric Vehicles					Type	LIT2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self-Study	Credits
		3	-		2		3	4
Examination Scheme (Marks)		Theory	MSE	TE	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs) :								
Upon successful completion of this course, the student will be able to:								
CO1	Identify the interconnections of vehicle components in various classes of vehicles for optimizing performance							
CO2	Estimate different forces challenging the dynamics and performance of vehicles to design powertrain							
CO3	Interpret the architectures of electric and hybrid vehicles for understanding the power flow sequence in powertrain components.							
CO4	Compare the single speed and multi-speed mechanical transmission systems for different operating modes							
CO5	Analyze EV powertrain components and electric propulsion motors for adoptability to electric and hybrid electric vehicles.							
Syllabus:								
Module		Contents						Lecture Hours
I		Introduction to Electric and Hybrid Vehicles Classification of electric vehicles: Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), Plug-in Hybrid Electric Vehicles (PHEV), Fuel Cell Electric Vehicles (FCEV), Basic components of EVs: Energy storage system, Electric propulsion system, Power electronics interface, Auxiliary subsystems, Comparison of EVs with conventional vehicles.						7
II		Vehicle Dynamics and Performance Requirements Environmental impact and emission reduction, Fundamentals of vehicle mechanics, Road load forces: rolling resistance, aerodynamic drag, gradient resistance, Acceleration and traction forces, Vehicle motion equations, Power and energy requirements for EV propulsion, Performance parameters: Acceleration, Maximum speed, Gradeability, Range estimation.						9
III		Electric Vehicles Basic EV powertrain architecture, Electric drivetrain configurations, Single motor and multi-motor architectures, Battery electric vehicle architecture, Power flow in EV powertrain, Battery integration in vehicle chassis, System integration: mechanical, electrical and control architectures.						7
IV		Hybrid Electric Vehicle Architectures Concept of hybridization and hybridization factor, Series hybrid architecture: Structure and working, Parallel hybrid architecture - Configuration and operation, Series-parallel hybrid architecture: Power split device, Operating modes, Advanced hybrid architectures: Plug-in hybrid electric vehicles, Range extended electric vehicles						8
V		Vehicle Powertrain Components Overview of EV and HEV Powertrain, Requirements of Traction Motors, Types of electric motors used in EVs and HEVs, Transmission and Drivetrain Components: Role of transmission in EV powertrain, Gear reduction systems, Single-speed transmission systems, Multi-speed transmissions, Differential mechanisms, Electric axle (E-axle) systems, Direct drive and in-wheel motor configurations.						7
VI		Electric vehicle propulsion Motors Constructional features, working and Speed control characteristics: DC motors, Induction motors, permanent magnet synchronous motor, Brushless DC motor, Switched reluctance motor, comparison of motors for EV performance						7
Total Lecture Hours								45


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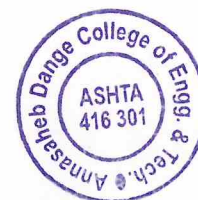

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List of Experiments with CO Mapping			
S. No	Title / Topic of the Experiment	CO Mapped	
1	Drawing of electrical wiring diagram of two-wheeler EV and identification of components with specification	1	
2	Power and speed measurement of two-wheeler electric vehicle power train	1	
3	Battery range estimation for two-wheeler electric vehicle with speed-load variation	2	
4	Electrical wiring diagram of four-wheeler EV and identification of components with specification	2	
5	Power and speed measurement of four-wheeler electric vehicle power train	3	
6	Battery range estimation for four-wheeler electric vehicle with speed-load variation	3	
7	Electrical wiring diagram of three-wheeler EV and identification of components with specification	4	
8	Battery range estimation for three-wheeler electric vehicle with speed-load variation	4	
9	Simulation of DC motor for electric vehicle acceleration, steady state and braking performance	5	
10	Simulation of Induction motor for electric vehicle acceleration, steady state and braking performance	5	
11	Simulation of Permanent magnet synchronous motor for electric vehicle acceleration, steady state and braking performance	5	
12	Simulation of BLDC motor for electric vehicle acceleration, steady state and braking performance	5	
Total Practical Sessions		15	Total Practical Hours 30
Minimum ten experiments should be performed from the above list			
Text Books			
1. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, 3rd Edition, CRC Press, 2021. 2. Ali Emadi, Advanced Electric Drive Vehicles, 1st, CRC Press, 2015. 3. Chris Mi & M. Abul Masrur, Hybrid Electric Vehicles: Principles and Applications, 1st, Wiley, 2018 4. Nil Patel, A.K. Bhoi, S. Padmanaban, Electric Vehicles: Modern Technologies and Trends, Springer, 2020.			
References:			
1. James Larminie, John Lowry, Electric Vehicle Technology Explained, First, Wiley, 2016. 2. Mehrdad Ehsani, Yimin Gao, Modern Electric, Hybrid Electric and fuel cell vehicles, First, CRC Press, 2009. 3. C.C Chan, K.T Chau, Modern Electric Vehicle Technology, Oxford University Press Inc., NY, First, 2001 4. Mi Chris; Zhang Yi, Automotive power transmission systems, First, Willey, 2018			
Online Learning Resources			
1. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou26_ec04 2. https://diyguru.org/ev-vehicle-architecture-manual/?utm_source=chatgpt.com 3. https://courses.diyguru.org/unit/ev-architecture-and-design/?utm_source=chatgpt.com 4. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed83			




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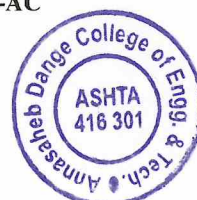
 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering							
Course Information:								
Class, Semester		S.Y. B.Tech, Semester - IV				Category	SM	
Course Code, Course Title		3EERE221, Solar and Wind Energy				Type	LIT2	
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self Study	Credits		
		3	-	2	3	4		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs) :								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the global and Indian energy scenario and the significance of renewable energy along with relevant policies and initiatives.							
CO2	Describe solar radiation concepts, solar geometry and methods of measurement and estimation.							
CO3	Compute the performance of solar photovoltaic systems using solar cell characteristics, PV configurations and basic power conditioning techniques.							
CO4	Apply principles of solar thermal and wind energy systems to determine their operation, performance and suitability for different applications.							
CO5	Determine the configuration and operation of hybrid solar-wind systems, including energy storage and grid integration aspects, for practical applications.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Introduction to Renewable Energy Energy scenario: Global and Indian perspective, Conventional vs non-conventional energy sources, Classification of renewable energy sources, Advantages and limitations of renewable energy, Energy policies and initiatives in India						8	
II	Solar Radiation and Measurement Solar radiation fundamentals, Solar geometry: Zenith angle, declination, hour angle, Solar radiation measurement instruments, Estimation of solar radiation, Factors affecting solar energy availability						8	
III	Solar Photovoltaic Systems Principle of photovoltaic effect, Solar cell characteristics and equivalent circuit, Types of solar cells (Mono, Poly, Thin film), PV modules, arrays, and systems, MPPT techniques and power conditioning						7	
IV	Solar Thermal Systems Solar collectors: Flat plate and concentrating collectors, Solar water heating systems, Solar thermal power generation, Applications: Solar drying, cooking, desalination						7	
V	Wind Energy Conversion Systems Wind energy fundamentals, Wind characteristics and site selection, Wind turbines: Types and components, Power extraction from wind, Betz limit and performance analysis, Induction Generator and Synchronous Generator in Wind System						8	
VI	Hybrid Systems and Applications Solar-wind hybrid systems, Energy storage systems (Battery, Hydrogen), Grid integration of renewable energy, Smart grid concepts, Case studies and practical applications						7	
						Total Lecture Hours		45
List of Experiments with CO Mapping								
S. No	Title / Topic of the Experiment						CO Mapped	
1	Study of Global and Indian Renewable Energy Scenario						1	
2	Solar Radiation Analysis using Simulation						2	
3	Modeling of Solar PV Cell Characteristics						3	

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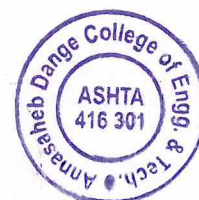
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4	Simulation of PV Module and Array	3
5	MPPT Techniques Simulation	3
6	Performance Analysis of Grid-Connected PV System	3
7	Simulation of Solar Thermal System	2
8	Wind Speed Data Analysis and Site Assessment	4
9	Modeling of Wind Turbine Characteristics	4
10	Simulation of Wind Energy Conversion System	4
11	Verification of Betz Limit	4
12	Design of Standalone Solar PV System	5
13	Design of Solar-Wind Hybrid System	5
14	Energy Storage System Simulation	5
15	Grid Integration of Renewable Energy System	5
Total Practical Sessions		15
Total Practical Hours		30
Minimum ten experiments should be performed from the above list		
Text Books		
1. B. H. Khan, Non-Conventional Energy Resources, 3rd Edition, McGraw Hill Education, 2017. 2. G. D. Rai, Non-Conventional Energy Sources, 5th Edition, Khanna Publishers, 2011. 3. S. P. Sukhatme and J. K. Nayak, Solar Energy: Principles of Thermal Collection and Storage, 4th Edition, McGraw Hill Education, 2017. 4. Chetan Singh Solanki, Solar Photovoltaics: Fundamentals, Technologies and Applications, 3rd Edition, PHI Learning, 2015.		
References		
1. John Twidell and Tony Weir, Renewable Energy Resources, 3rd Edition, Routledge (Taylor & Francis), 2015. 2. T. Ackermann, Wind Power in Power Systems, 2nd Edition, Wiley, 2012. 3. Mukund R. Patel, Wind and Solar Power Systems: Design, Analysis and Operation, 2nd Edition, CRC Press, 2005. 4. H. P. Garg and J. Prakash, Solar Energy: Fundamentals and Applications, 1st Edition, Tata McGraw Hill, 2000.		
Online Learning Resources		
1. Online platforms such as NPTEL and SWAYAM provide structured courses on solar and wind energy. Links: https://nptel.ac.in/courses , https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr25_ed119 2. International MOOCs like Coursera and edX offer certification courses covering PV system design, wind energy, and renewable technologies. Link: https://www.coursera.org/learn/solar-energy-system-design 3. Advanced learning and practical exposure can be achieved using simulation tools such as MATLAB and hybrid system concepts (e.g., HOMER), along with NPTEL courses like solar energy engineering covering PV and thermal systems. Link: https://onlinecourses.nptel.ac.in/noc20_ph14/preview		




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 Established: 1983		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering						
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV					Category	HS
Course Code, Course Title		3EEHS224, Foreign Language - German					Type	T2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical		Self Study	Credits
		02	-		-		02	02
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain basic German vocabulary, grammar, pronunciation, and common expressions used in everyday communication.							
CO2	Apply basic German language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.							
CO3	Apply appropriate German vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.							
CO4	Prepare simple written texts such as emails, messages, and short paragraphs in German using appropriate vocabulary and grammatical structures.							
Syllabus:								
Module	Contents							Lecture Hours
1	Introduction to German Language ● Introduction to German language and culture ● German alphabets ● Pronunciation and phonetics ● Greetings and farewells ● Classroom expressions ● Basic vocabulary							10
2	Self-Introduction and Basic Communication ● Personal pronouns ● Verbs Haben and Sein ● Verb conjugation ● Introducing oneself and others ● Numbers (0-1000) ● Days of the week ● Basic sentence structure ● W-Fragen (Question Words)							10
3	Countries, Languages and Daily Communication ● Countries and nationalities ● Languages ● Asking and answering simple questions ● Yes/No questions ● Articles (Definite and Indefinite) ● Simple conversations							10
IN TERM SECTION								
4	Friends, Family and Hobbies ● Talking about friends and colleagues ● Family members ● Hobbies and interests ● Daily routine ● Possessive articles ● Describing people							10



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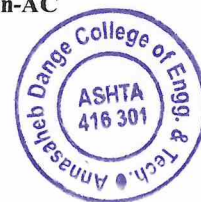
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5	Time, Dates and Appointments - Days, months and seasons - Telling time - Dates and birthdays - Making appointments - Invitations - Apologizing - Modal verbs	10
6	Work and Workplace Communication - Occupations and professions - Workplace vocabulary - Talking about studies and work - Telephone conversations - Job advertisements - Expressing opinions about jobs	10
7	City, Transport and Directions - Places in a city - Means of transport - Asking for and giving directions - Enquiring information - Imperative forms - Negation - Definite and indefinite articles	10
Self Study Section		
8	Food, Shopping and Restaurants - Food and beverages - Shopping conversations - Ordering food - Paying bills - Akkusativ case - Verbs with Akkusativ - Restaurant communication	10
9	Home, Communication and Writing Skills - Describing home and surroundings - Understanding advertisements - Likes and dislikes - Letters and emails - Understanding texts - Dativ case - Dativ prepositions - Wechselpräpositionen	10
10	Social Life, Past Events and Fashion - Planning activities with friends - Event information and radio announcements - Separable verbs - Personal pronouns - Präteritum of Haben and Sein - Perfekt tense and Partizip II - Conjunctions (und, oder, aber) - Clothes and fashion - Demonstrative and interrogative articles - Verbs with Dativ	10
Total Lecture Hours		100
Text Books		



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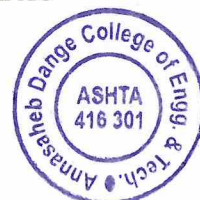
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Reference Books

- | |
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| <ol style="list-style-type: none">1. Fit fürs Goethe -Zertifikat A1 Start Deutsch 1 Hübner |
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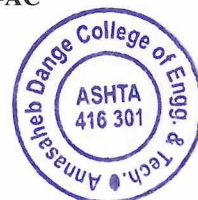

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 Established: 1983		Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering								
Course Information:										
Class, Semester		S. Y. B. Tech. Semester - IV						Category	HS	
Course Code, Course Title		3EEHS225, Foreign Language - Japanese						Type	T2	
Prerequisites		-								
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self Study		Credits
		02		-		-		02		02
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA		ESE	
			-	50	-		-		-	
Course Outcomes (COs):										
Upon successful completion of this course, the student will be able to:										
CO1	Explain basic German vocabulary, grammar, pronunciation, and common expressions used in everyday communication.									
CO2	Apply basic German language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.									
CO3	Apply appropriate German vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.									
CO4	Prepare simple written texts such as emails, messages, and short paragraphs in German using appropriate vocabulary and grammatical structures.									
Syllabus:										
Module		Contents							Lecture Hours	
1		Introduction to Japanese Language and Culture ● Overview of Japanese language and culture ● Japanese writing systems: Hiragana, Katakana, Kanji ● Basic pronunciation and phonetics ● Greetings according to time of day ● Classroom and workplace expressions ● Asking for repetition and clarification ● Basic etiquette and manners							10	
2		Self-Introduction and Personal Information ● Introducing oneself and others ● Name, nationality, occupation, and residence ● Family members ● Languages spoken ● Basic sentence patterns ● Introduction to Hiragana writing practice							10	
3		Hiragana and Katakana Mastery ● Complete Hiragana characters ● Complete Katakana characters ● Reading and writing practice ● Simple words and phrases ● Listening and pronunciation exercises ● Everyday vocabulary development							10	
		MODULE 2 - IN-TERM								
4		Food and Dining ● Food and beverage vocabulary ● Expressing likes and dislikes ● Reading simple menus ● Ordering food and drinks ● Restaurant conversations ● Japanese dining etiquette							10	


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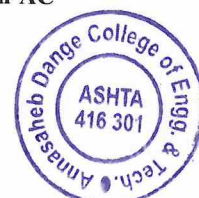

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5	Home, Family and Surroundings - Describing houses and rooms - Household objects and furniture - Family relationships - Location expressions - Counting objects and people - Describing surroundings	10
6	Daily Life and Time Expressions - Telling time - Days, dates, and months - Daily routines - Operating hours and schedules - Borrowing and lending items - Making simple appointments	10
7	Hobbies, Interests and Social Interaction - Hobbies and leisure activities - Sports, movies, music, manga, and anime - Inviting friends - Accepting and declining invitations - Expressing preferences and interests - Social conversations	10
MODULE 3 - SELF STUDY		
8	Transportation and Navigation - Public transportation vocabulary - Trains, buses, stations, and landmarks - Asking for directions - Giving simple directions - Understanding signs and notices - Travel-related conversations	10
9	Shopping and Everyday Transactions - Shopping vocabulary - Asking for products and prices - Quantities and measurements - Locating items in stores - Purchasing goods - Customer-service interactions	10
10	Holidays, Experiences and Future Plans - Talking about past weekend activities - Introduction to simple past tense - Expressing wishes and desires - Travel plans and future intentions - Introduction to frequently used Kanji - Course review and consolidation - Speaking role-plays and presentations - Reading and writing assessment	10
Total Lecture Hours		100
Text Books		
1. Irodori: Japanese for life in Japan (A1), The Japan Foundation, 2020		
Reference Books		
2. Marugoto Starter (A1) Katsudoo + Rikai (2 Books set) https://amzn.in/d/07fApBbW 3. Genki: An Integrated Course in Elementary Japanese Vol. 1 [3rd Edition] https://amzn.in/d/0gXGM2Ef 4. Minna no Nihongo 1-1&1-2 Main Textbook elementary +Translation & Grammatical with downloadable CDs. https://amzn.in/d/0dyQ9ips		


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - IV					Category	RM
Course Code, Course Title		3EERM225, Research Methodology					Type	L2
Prerequisites								
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		00	00	02	00	01		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			00	00	00		50	00
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Utilize fundamental concepts of research, research problems, literature sources, and research methodologies for engineering applications under given research scenarios.							
CO2	Apply appropriate research design, sampling techniques, and data collection methods to conduct systematic research studies under given problem statements.							
CO3	Analyze research data using qualitative, quantitative, statistical, and hypothesis testing techniques under given research scenarios.							
CO4	Develop a technical research article with ethical publication practices, appropriate referencing standards, and quality research guidelines.							
Syllabus:								
Module	Contents							Lecture Hours
I	Research Fundamentals Meaning and objectives of research, Significance of research, Types of research, Research process, Criteria of Good Research, Importance of Research in Engineering							4
II	Research Problem & Literature Review Meaning of Research Problem, Identification & Formulation of research Problem, Techniques for defining Research Problem, Literature Sources: Journals, Conferences, Patents, Use of Digital Libraries, Literature Review techniques and gap identification.							5
III	Research Design & Methodology Need & Features of Good Research Design, Types of Research Design: Exploratory, Descriptive, Experimental, Sampling Techniques. Data Collection: Types of Data: Primary, Secondary, Methods of Data Collection: Survey, Questionnaire, Interview, Observation, Experimentation							6
IV	Data Analysis & Testing of Hypothesis Types of data: Qualitative and Quantitative, Basic statistical tools: Mean, Median, Standard Deviation, Data representation: Tables, Graphs, Charts, Introduction to analysis tools, Interpretation of results, Hypothesis, Basic concepts concerning testing of hypothesis, Procedure for hypothesis testing, Flow diagram of hypothesis testing, Test of hypothesis, Hypothesis testing of Means, Hypothesis testing for differences between Means.							5
V	Report Writing Introduction Technical Report Writing and tools (Latex), Significance of report writing, Steps in writing report, Types of reports, Layout and structure of reports, Documentation and Referencing Styles, Presentation Tools & Techniques: Zotero & Mendeley.							4
VI	Research Journals and Publication Ethics Research Journals, Types of Journals, Research Publication Process, Journal Indexing: Meaning and Importance of Journal Indexing, Benefits of Indexed Journals, Major Indexing Databases, (Scopus, Web of Science, Google Scholar, SCI, ESCI, and PubMed), Journal Metrics and Quality Indicators: Impact Factor, h-index, i10-index, CiteScore, SNIP and SJR, Types of Publications, Ethics in Research Publication: Plagiarism and Similarity Index (Turnitin Software), Copyright and Authorship, Duplicate Publication, Clone, Predatory, and Fake Journals, Researcher Profiles and Identifier (ORCID, Researcher ID)							6
Total Lecture Hours							30	



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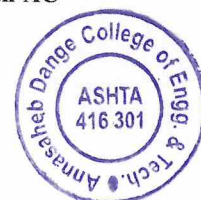


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Text Books
1. Research Methodology–Methods and Techniques by C. R. Kothari, Second Edition, New Age International Publishers 2. Dr. Santosh M Nejekar, Dr. Harish Bendigeri “Research Methodology and Intellectual Property Rights”, ISBN 978-93-5987-928-4, Edition: 2023-24
Reference Books
1. Research Methodology Concept and cases By Deepak Chawala and Neena Sondhi 2. Research Methodology: Step by step guide for beginners, Ranjeet Kumar, 5 th Edition, SAGE Publications 3. How to Write and Publish a Scientific Paper, Robert A. Day, Barbara Gastel, 8 th Edition: 8th Edition, Cambridge University Press
NPTEL and Online Resources
1. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed28 2. https://onlinecourses.swayam2.ac.in/e-learning/course/nou26_ge46

ISE Activities

1. Conduct a literature review in the selected domain, identify the research gap, and submit a Literature Review Report.
2. Prepare and submit a Technical Article on the chosen topic based on the literature review.




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Annasaheb Dange College of Engineering and Technology
Ashta - 416301, Dist. : Sangli, Maharashtra
(An Empowered Autonomous Institute)
Department of Electrical Engineering

**Course Information:**

Class, Semester	S. Y. B. Tech. Semester - IV				Category	EL
Course Code, Course Title	3EEEL227, Innovation and Product Development				Type	L2
Prerequisites	-					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	2	-	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		00	00	00		50
						ESE
						-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Identify innovative product ideas by observing real-world problems and user needs using creativity and design thinking tools.
CO2	Apply design thinking techniques to generate and refine innovative solutions for identified engineering or societal problems based on user requirements.
CO3	Construct functional prototypes and estimate preliminary production costs using appropriate materials, manufacturing methods, and engineering tools.
CO4	Analyze prototype performance and production feasibility by interpreting testing results, cost data, and scalability requirements.
CO5	Evaluate intellectual property opportunities, commercialization potential, and production planning based on technical feasibility, market requirements, and economic considerations.
CO6	Develop a comprehensive entrepreneurial proposal integrating intellectual property protection, commercialization strategy, and production planning for an innovative product.

Syllabus:

The Innovation Prototype course is designed to provide students with experiential learning in innovation, prototyping, product development, and commercialization. The course focuses on identifying real-world problems and transforming innovative ideas into functional prototypes/models/products through systematic design and development processes.

Students will learn techniques for validating innovative concepts, assessing feasibility and utility, selecting suitable materials, along with design thinking approach and developing prototypes/models/products through iterative improvement and performance testing. The course also emphasizes expert reviews, prototype assessment, cost estimation, pricing strategies, and preliminary production planning for scalability.

Further, students will gain exposure to Intellectual Property Rights (IPR), commercialization processes, and startup development, enabling them to prepare draft proposals for patenting, commercialization, or entrepreneurial ventures based on their innovative solutions.

INNOVATION PROTOTYPE ACTIVITY PLAN

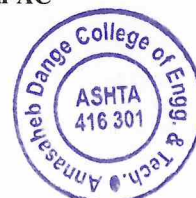
Sr. No	Innovation Prototype Course Activities	Planned Week
01	Introduction to Innovation and Prototyping	Week 1
02	Revising Design Thinking Approach	Week 2
03	Identifying Innovative Problems (Students & Faculty)	Week 3
04	Validating Innovation: Assessing Utility of a Proposed Concept	Week 4
05	Review No. 1 – by Guides - Innovativeness Assessment - (Final Idea Presentation)	Week 5
06	Planning and Designing the Prototype	Week 6
07	Choosing and Testing Materials for the Prototype	Week 7
08	Building the working Prototype / Model/ Product	Week 8
09	Improving working Prototype / Model/ Product	Week 9
10	Testing the Prototype / Model/ Product Performance	Week 10
11	Review No. 2 – by Expert Panel - Prototype/Model/Product Assessment along with poster	Week 11
12	Estimating Costs & Formulating a Pricing Strategy for Product	Week 12
13	Creating a Preliminary Production Plan for Scaling the Prototype	Week 13
14	Formulating IPR or Commercialization or Start up	Week 14
15	Review No. 3 – Submission of Draft Copy for IPR or Commercialization or Start up	Week 15


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. :Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering				
Course Information:					
Class, Semester	S. Y. B. Tech. Semester – IV		Category	MA	
Course Code, Course Title	3EEMA228, Aptitude and Reasoning-II		Type	T2	
Prerequisites					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits
	2	-	-	2	-
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical
		-	50	-	
Course Outcomes (COs):					
Upon successful completion of this course, the student will be able to:					
CO1	Apply quantitative aptitude concepts such as Partnership, Average, and Syllogism to solve numerical and logical problems effectively.				
CO2	Analyze and solve reasoning-based problems involving Seating Arrangements, Puzzles, and Direction Sense using systematic problem-solving approaches.				
CO3	Demonstrate professional communication and employability skills through presentation skills, grooming, body language, group discussions, and interview techniques for effective participation in hiring processes.				
CO4	Develop career readiness skills by preparing professional resumes, optimizing LinkedIn profiles, and applying networking strategies such as cold calling for internship and job opportunities.				
Syllabus:					
Module	Contents				Lecture Hours
I	Partnership Average				5
II	Seating Arrangements Puzzles				5
III	Syllogism Direction				5
IV	Presentation Skills Grooming & Body Language				5
V	Resume Writing LinkedIn Cold Calling				5
VI	Group Discussion Interview				5
Total Lecture Hours					30
Text Books					
1. R.S. Agarwal S Chand Quantitative Aptitude, 2019 2. R.S. Agarwal S Chand Verbal & Non-verbal Reasoning, 2010 3. P.C. Wren S Chand Wren & Martin (Verbal, Grammar), 2017					
Reference Books					
1. Face Wiley, APTIPEDIA (Quantitative, Logical, Verbal Aptitude) 2017 2. P.A. Anand Maestro Wiley (Quantitative Aptitude) 2015 3. Meenakshi Upadhyay Arun Sharma (Verbal Ability) McGraw Hill 2020					




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 Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Electrical Engineering			
Course Information:			
Class, Semester	S.Y. B.Tech, Semester - IV		Category
Course Code, Course Title	3EEHS114, Communication Skills		HS
Prerequisites	-		Type
Teaching Scheme (per week)	Lecture	Tutorial	Credits
	-	-	2
Examination Scheme (Marks)	Theory	MSE	ESE
		50	-
Course Outcomes (COs) :			
Upon successful completion of this course, the student will be able to:			
CO1	Demonstrate effective Listening, Speaking, Reading and Writing (LSRW) skills for academic and professional communication.		
CO2	Create a professional portfolio, résumé, and career plan using appropriate digital tools.		
CO3	Compose professional correspondence including emails and job applications using standard formats.		
CO4	Present information effectively using MS-Powerpoint and AI-enabled communication tools.		
CO5	Demonstrate interpersonal communication skills during group discussions and mock interviews.		
List of Experiments with CO Mapping			
S.No	Title / Topic of the Experiment		CO Mapped
1	Self - Introduction		CO1
2	SWOT Analysis		CO1
3	Basics of English Pronunciation		CO1
4	Rapid Review of Grammar		CO1
5	Diagnosing Listening and Speaking Skills		CO1
6	Diagnosing Reading and Writing Skills		CO1
7	Presenting my career choices		CO1,CO2
8	Preparing Portfolio		CO1,CO2
9	Describing Technical Charts, Image, and Processes		CO1,CO4
10	Using Language Learning Apps and Tools		CO1,CO4
11	Effective Presentation Skills		CO1,CO4
12	Job Application and Resume Writing		CO1,CO3
13	Email Writing		CO1,CO3
14	Group Discussion		CO1,CO5
15	Mock Interview		CO1,CO2,CO5
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1. The Professional: Defining the New Standard of Excellence at Work Subroto Bagchi Penguin Books India Pvt. Ltd. Revised Edition, 2011. 2. Cambridge Guide to IELTS. Pauline Cullen, Amanda French, Cambridge University Press, Reprint, 2017. 3. A Practical Course in Effective English Speaking Skills. J. K. Gangal, PHI Learning Pvt. Ltd, New Delhi, Print, 2012 4. English For Engineers. Dr. Shyamaji Dubey, Dr. Manish Kumar. Vikas Publication House Pvt. Ltd. New Delhi, 2020. 5. Personality Development and Soft Skills. Barun K. Mitra, Oxford University Press, New Delhi, 7 th impression, 2012.			
References:			
1. High-school English Grammar and Composition. Wren and Martin, S. Chand and Co., New Delhi, 1st edition, 2015. 2. The Ace of Soft Skills. Ajai Chowdry, Bala Balchandran, Pearson Publication, Delhi, 8th edition, 2017. 3. Effective Technical Communication. M. Ashraf Rizvi, McGraw Hill Education, Chennai, 2nd edition, 2017. 4. Business Communication. Hory Sankar Mukerjee, Oxford University Press, New Delhi, 2nd edition, 2013. 5. Communicative English for Engineers and Professionals. Nitin Bhatnagar, Mamta Bhatnagar, Pearson Publication, Delhi, 1st edition, 2013.			
Online Learning Resources			
1. Software: Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly). 2. Online Platform Coursera (for basic English courses), Duolingo, BBC Learning English.			

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