



Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering and Research, Ravet

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

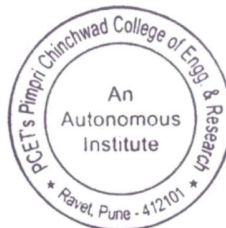
Curriculum Structure and Syllabus

First Year B. Tech.
Academic Year 2026–2027

Mechanical Engineering



Effective from Academic Year: 2026-27



Department of Applied Sciences and Humanities
Pimpri Chinchwad College of Engineering and Research, Ravet

Department of Applied Sciences and Humanities, PCCOER, Ravet

F.Y. B. Tech. Mechanical Engineering Syllabus Structure

Semester - I

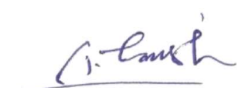
Course Code	Course	Type	Total Credits	Credit Scheme			Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks				Total
				L	T	P	L	T	P	FA	SA	CA	PE	
BSC-101-ASH	Engineering Mathematics I	BSC	3	2	1		2	1		50	50	25		125
BSC-102-ASH	Engineering Physics	BSC	4	3		1	3		2	50	50	25		125
ESC-101-ASH	Programming in C	ESC	2	2			2			50	50			100
ESC-102-ASH	Programming in C Laboratory	ESC	1			1			2				25	25
ESC-104-ASH	Engineering Mechanics and Applications	ESC	3	2		1	2		2	50	50	25		125
ESC-105-ASH	Basics of Electrical and Electronics Engg.	ESC	2	2			2			50	50			100
ESC-106-ASH	Basics of Electrical and Electronics Engg. Lab.	ESC	1			1			2				25	25
VSE-102-ASH	Manufacturing Practices and Workshop Lab.	VSE	2	1		1	1		2			50		50
CCC-101-ASH	Life Skills-I	CCC	2	1		1	1		2			25		25
AEC-101-ASH	Communication Skills	AEC	2	1		1	1		2			50		50
Total			22	14	1	7	14	1	14	250	250	200	50	750

Semester - II

Course Code	Course	Type	Total Credits	Credit Scheme			Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks				Total
				L	T	P	L	T	P	FA	SA	CA	PE	
BSC-151-ASH	Engineering Mathematics II	BSC	3	2	1		2	1		50	50	25		125
BSC-103-ASH	Engineering Chemistry	BSC	4	3		1	3		2	50	50	25		125
ESC-151-ASH	Python Programming	ESC	2	2			2			50	50			100
ESC-152-ASH	Python Programming Laboratory	ESC	1			1			2				25	25
ESC-103-ASH	Engineering Graphics and Applications	ESC	3	2		1	2		2	50	50	25		125
PCC-101-MECH	Engineering Thermodynamics	PCC	3	2		1	2		2	50	50	25		125
VSE-101-ASH	Design Thinking and Idea Lab	VSE	2	1		1	1		2			50		50
CCC-151-ASH	Life Skills-II	CCC	2	1		1	1		2			25		25
IKS-101-ASH	Indian Knowledge System	IKS	2	2			2					50		50
Total			22	15	1	6	15	1	12	250	250	225	25	750


Chairman
BoS, Applied Science & Humanities
PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412 101




Chairman, Academic Council
PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412 101

List of Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
ASH	Applied Sciences and Humanities	BSC	Basic Science Course
ESC	Engineering Science Course	PCC	Professional Core Course
VSE	Value-Added/Skill Enhancement Course	CCC	Co-curricular Course
AEC	Ability Enhancement Course	IKS	Indian Knowledge System
FA	Formative Assessment	SA	Summative Assessment
CA/ TW	Continuous Assessment/ Term Work (Rubrics-Based)	PE	Practical End-Semester Exam
L	Lecture	T	Tutorial
P	Practical	MECH	Mechanical

Semester-I

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412101

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern)

Semester: I

Course Code: BSC-101-ASH

Name of Course: Engineering Mathematics I

Total Credits: 03			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	1	–	2	1	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Asgmt.	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

1. To learn matrices and linear algebra — solving linear systems, linear dependence, eigenvalues/eigenvectors, Cayley-Hamilton theorem, and matrix diagonalization.
2. To study infinite series, tests of convergence, Taylor's-Maclaurin's series, and full/half range Fourier series with their engineering applications.
3. To understand derivatives of multivariable functions, Euler's theorem, extreme values, and Jacobians for implicit functions and functional dependence.

Course Outcomes

On completion of this course, the students will be able to:

BSC-101.1 Apply fundamental concepts of matrices and linear algebra to solve systems of linear equations, check linear dependence and independence.

BSC-101.2 Apply Eigen values, Eigen vectors and use it to diagonalize a Matrix which is applicable to Engineering problems.

BSC-101.3 Analyze infinite series for convergence and expand functions using Taylor's and Maclaurin's series for approximation in engineering problems.

BSC-101.4 Analyze the function to obtain the Fourier series representation and harmonic components of periodic functions useful in Engineering applications.

BSC-101.5 Apply the derivatives of multivariable functions useful in finding extreme values of a function, and apply the concept of Jacobian to find partial derivatives of implicit function and to check functional dependence.

Course Content

Unit I: Linear Algebra: Matrices, System of linear Equation (05 Hours)

Rank of a Matrix, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations.

Unit II: Linear Algebra: Eigen Values and Eigen Vectors, Diagonalization (05 Hours)

Eigen Values and Eigen Vectors of Symmetric and Non symmetric Matrices, Cayley Hamilton Theorem, Diagonalization of a matrix, Application to problems in Engineering.

Unit III: Single Variable Calculus (06 Hours)

Infinite Series: Infinite Sequence, Infinite Series and test for convergence of series. Expansion of Function: Taylor's Theorem, Maclaurin's Theorem.

Unit IV: Fourier Series (07 Hours)

Fourier series: Full range and Half range Fourier series expansion of periodic function with standard and arbitrary period, Harmonic analysis examples on engineering applications.

Unit V: Function of Several Variables and its Applications (07 Hour)

Partial derivative: Introduction to functions of several variables partial derivatives, Euler's Theorem on homogeneous functions, Partial derivatives of composite functions. Applications: Jacobian and its applications, maxima and minima of function of two variables.

Tutorial

List of Tutorials

1. Examples on system of Linear Equations, linear independence and dependence.
2. Examples on Eigen Values and Eigen Vectors, Diagonalization.
3. Introduction to MATLAB Use of MATLAB to solve system of Linear Equations and to find Eigen values and Eigen Vectors.
4. Examples on convergence of Infinite Series.
5. Examples on Taylor's Theorem and Maclaurin's Theorem.
6. Use MATLAB to solve examples on convergence of infinite series and Taylor's and Maclaurin's Theorem.
7. Examples on Full Range and Half range expansion.
8. Examples on Harmonic Analysis.
9. Use of MATLAB to find Fourier coefficient.
10. Examples on Euler's Theorem and composite functions.
11. Examples on Jacobian, Maxima Minima.
12. Use of MATLAB to find extreme values of a function.
13. Report on recent trends and research in Mathematics.

Term Work Guidelines

- Minimum three batches per division (max 25 students per batch).
- Includes class assignments, participation, and group activities.

Learning Resources

Textbooks:

1. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers.

Reference Books:

1. P. N. Wartikar and J. N. Wartikar, *Applied Mathematics (Vol. I & II)*, Vidyarthi Griha Prakashan, Pune.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley Eastern Ltd.
3. Peter V. O'Neil, *Advanced Engineering Mathematics*, Thomson Learning.
4. Ron Larson and David C. Falvo, *Elementary Linear Algebra*, Houghton Mifflin Harcourt Publishing.
5. Gilbert Strang, *Linear Algebra and Its Applications*, Wellesley-Cambridge Press.
6. Ian N. Sneddon, *Elements of Partial Differential Equations*, Dover Publications.
7. Amos Gilat, *MATLAB – An Introduction with Applications*, John Wiley & Sons.

e-Resources

1. <https://archive.nptel.ac.in/courses/111/105/111105121/>
2. <https://archive.nptel.ac.in/courses/111/105/111105134/>

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Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/II

Course Code: BSC-102-ASH

Name of Course: Engineering Physics

Total Credits: 04			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
3	-	1	3	-	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

Abbreviations Used

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CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. Build a conceptual understanding of Wave optics, Photonics, Semiconductor Physics and Quantum Mechanics.
2. Explore new advances in modern physics areas of Superconductivity, Nanophysics and Ul-trasonics.
3. Develop awareness about importance of physics in engineering applications.

Course Outcomes

On completion of this course, the students will be able to:

- BSC-102.1** Explore the principles of interference and polarization, in engineering applications of anti-reflection coating and liquid crystal display.
- BSC-102.2** Illustrate the basics of lasers and optical fibers applied in applications of Holography, communication, industrial and medical field.
- BSC-102.3** Apply the principles of quantum mechanics, in modern applications of scanning tunneling microscope and quantum computation.
- BSC-102.4** Apply the theory of semiconductors and ultrasonics; in Solar Cell and flaw detection applications.
- BSC-102.5** Apply the basics of superconductivity and nanotechnology; in the field of space, defense, medical field and scientific research.

Course Content

Unit I: Wave Optics (09 Hours)

Basics of Interference, Thin Film Interference, Fringes in Wedge shaped thin film, Applications – Anti Reflection Coating, Optical Flatness Basics of Polarisation, PPL, CPL, EPL, Malus Law, Double refraction, Huygen's theory, Calcite crystal, Applications – Liquid Crystal Display, Antenna Radiation and RADAR

Unit II: Lasers and Optical Fiber (09 Hours)

Basics of Lasers and its mechanisms, characteristics of laser, Gas laser - CO₂ Laser, Applications of lasers – Holography, IT, Medical, Material Processing.

Basics of Optical Fiber, Critical Angle, Acceptance Angle, Acceptance Cone, Numerical Aperture Types of optical fiber- step index and graded index, Single Mode and Multimode, Qualitative discussion on Attenuation and losses in optical fiber, Applications of Optical fibers in communication, networking, etc.

Unit III: Quantum Mechanics (09 Hours)

Difference between classical and quantum mechanics, Debroglie hypothesis, Properties of Matter waves, Wave function and its physical significance, Schroedinger equation, Time independent and time dependent, Particle in rigid box or infinite potential well, Tunneling and scanning tunneling microscope (application), Basics of Quantum Computation, Applications of Quantum computation.

Unit IV: Semiconductor (09 Hours)

Conductivity of a semiconductor, Band theory of solids, Classification of solids on the basis of band theory, Fermi energy and Fermi Dirac Distribution function, Fermi level of intrinsic and extrinsic semiconductor, Hall effect and its applications, Hall Sensors and applications, Solar Cell and Photovoltaic effect, IV characteristics of solar cell, Applications of solar cells, Ultrasonics: Characteristics of ultrasonic waves, Generation of ultrasonic waves by piezoelectric effect; Engineering applications - thickness measurement, flaw detection.

Unit V: Superconductivity and Nanotechnology (09 Hours)

Superconductivity: Superconductivity: Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, critical

current, Type I and II superconductors, Josephson effect, Applications of superconductors, SQUIDS, MRI, Maglev trains, **Nanotechnology**: Definition of nanotechnology, Quantum confinement effect, surface-to-volume ratio, Synthesis and properties of nanomaterials, optical, electrical, mechanical, magnetic, GMR effect, Applications of Nanotechnology.

List of Experiments

Experiment No.	Title
01	To determine the radius of curvature of a plano-convex lens using Newton's Rings.
02	To determine the wavelength of light using a diffraction grating.
03	To determine the number of lines per cm on a diffraction grating using a Laser.
04	To determine the compressibility of liquid using an ultrasonic interferometer.
05	To study the I–V characteristics of a solar cell and calculate its fill factor.
06	To study and verify the law of Malus.
07	To determine the energy band gap of a semiconductor.
08	To calculate the numerical aperture of an optical fiber.
09	Ultrasonic cleansing.
10	Recent trends in Physics.

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Department: Applied Sciences and Humanities (2025 Pattern) Semester: I
Course Code: ESC-101-ASH Name of Course: Programming in "C"

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	–	2	–	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Puzzle	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

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Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To understand how C programs are structured and how input/output operations work.
2. To demonstrate program execution using control flow.
3. To use concepts of strings and user-defined functions with appropriate parameters and return types.
4. To demonstrate the concepts of array and structure to organize and process data
5. To explain the concepts of pointers and file handling in C programming.

Course Outcomes

On completion of this course, the students will be able to:

ESC-101.1 Understand the basic concepts of C programming.

ESC-101.2 Use control flow statements to solve problems .

ESC-101.3 Apply user-defined functions and concepts of strings to solve problems.

ESC-101.4 Apply the concepts of array and structure in C programming.

ESC-101.5 Use the concepts of pointers and perform file handling operations in C programs.

Course Content

Unit I: Fundamentals of C Programming (06 Hours)

Introduction to C Programming - History, Features, and Structure of a C Program, Input and Output Operations. Representation of Algorithm, Flowchart/Pseudocode, Variables, Character set, Constants, Tokens in C, Data Types and Operators.

Unit II: Control Structures (06 Hours)

Conditional Statements - if, if-else, switch-case, Nested if statements. Loops and Iteration - for, while, do-while, Loop Control Statements -break, continue, nested loops.

Unit III: Functions and Strings (06 Hours)

Introduction to Functions - Function declaration, definition, and calling. Return values and function parameter passing, call by Value, call by Reference and Recursive functions, Strings – Fundamentals, Input/output of Strings, String Handling Functions (string.h library), String Manipulation (User-defined Logic).

Unit IV: Arrays and Structures (06 Hours)

Arrays-Types of arrays, Initialization of One Dimensional Array, Two Dimensional Arrays. Structures -Defining and using structures, accessing structure members, Arrays of Structures. Union – Fundamentals, Difference between Structure vs Union.

Unit V:Pointers and File Handling (06 Hour)

Introduction to Pointers, Pointer Arithmetic, Dynamic Memory Allocation. File-Working with files: opening file, closing, reading and writing to files, file modes.

Learning Recourses

Textbooks:

Programming in ANSI C E. Balagurusamy's Tata McGraw-Hill, 19

Reference Books:

1. Yashavant Kanetkar, "Let us C", BPB Publication, Twentyth Edition, 2024.
2. Herbert Schildt, "C: The Complete Reference", Tata McGraw-Hill, Fourth Edition, 2017.

Learning Resources

Text Books

1. *Engineering Physics*, Avadhanulu, Kshirsagar & Murthy, S. Chand Publications
2. *Engineering Physics*, Gaur & Gupta, Dhanpat Rai Publications

Reference Books

1. *Lasers and Non Linear Optics*, Laud, New Age International Publishers
2. *Nanotechnology Principles and Practice*, S.K. Kulkarni, Springer Publications
3. *Quantum Mechanics*, David Griffiths, Pearson Publications
4. *Quantum Computation and Quantum Information*, Nielsen and Chuang, Cambridge Publications
5. *Fundamentals of Optics*, Jenkins and White, McGraw Hill Publications
6. *Introduction to Superconductivity*, Tinkham, Dover Publications
7. *Semiconductor Physics and Devices*, Neamen, McGraw Hill Publishers

e-Resources

1. [NPTEL: Engineering Physics – IIT Bombay](#)
2. [NPTEL: Nanotechnology – IIT Madras](#)
3. [NPTEL: Quantum Mechanics for Engineers](#)
4. [NPTEL: Quantum Computing](#)
5. [MIT OCW: Quantum Physics I – Spring 2016](#)
6. [MIT OCW: Physics for Solid-State Applications – Spring 2003](#)

3. “Modern C, Third Edition” by Jens Gustedt, Third Edition, Publication Year: 2023, Publisher: Manning Publications, ISBN-13: 978-1617298978.
4. “Principles of Programming Languages” by Bruce J. MacLennan, First Edition, Publication Year: 2023, Publisher: Johns Hopkins University.

e-Resources:

1. <https://www.udemy.com/course/c-programming-for-beginners/>
2. <https://www.programiz.com/c-programming>
3. <https://www.w3schools.com/c/>
4. <https://www.labspoint.com/cprogramming/index.htm>
5. <https://www.codecademy.com/learn/learn-c>
6. <https://www.geeksforgeeks.org/c-programming-language/>
7. <https://www.coursera.org/learn/c-programming>
8. <https://www.hackerrank.com/>

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Department: Applied Sciences and Humanities (2025 Pattern) Semester: I
Course Code: ESC-102-ASH Name of Course: Programming in C Lab.

Total Credits: 01			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
-	-	1	-	-	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	-	25	25

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Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To understand the fundamentals of C programming, including syntax, basic data types, operators, and input/output operations.
2. To use decision control and loop control structures to solve basic and intermediate computational problems.
3. To explain arrays and functions for modular programming and efficient problem-solving.
4. To introduce file handling, pointers, structures, and dynamic memory allocation for handling tasks.

Course Outcomes

On completion of this course, the students will be able to:

ESC 102.1 Apply basic C constructs (variables, constants, operators) to write programs.

ESC 102.2 Apply control flow statements to solve logical problems

ESC 102.3 Apply functions and string handling for modular programming.

ESC 102.4 Implement arrays and structures for data organization.

ESC 102.5 Apply pointers and file handling for memory and data management.

ESC 102.6 Integrate C concepts to design capstone-level applications.

Programming in“C” Laboratory

The experiment set has been designed in a graded sequence of cognitive complexity, commencing with foundational programming constructs such as input/output handling and arithmetic expression evaluation, and culminating in advanced concepts including dynamic memory management and recursive function implementation. This structured progression fosters a holistic understanding of core C programming principles among first-year engineering students.

List of Experiments:

1. Study Laboratory orientation, setup of the development environment, registration on HackerRank, and execution of the first C program.
2. Implement C programs using Constants and Variables.
3. Implementation of Operators in C.
4. Write C programs to demonstrate the use of control structures such as if, if-else, nested if, switch, for, while, and do-while by solving different real-world problems.
5. Write C programs to understand and implement the concepts of user-defined functions and string manipulation.
6. Implementation of One-Dimensional and Two-Dimensional Arrays in C.
7. Implement C programs using structures to represent real-world entities such as students, employees, books, and products.
8. Implement C programs using pointers to perform various operations.
9. Implement C programs using file handling concepts.
10. Identify a problem relevant to your engineering branch and implement an efficient C program to solve it, incorporating suitable control structures, functions, and data structures.
11. Capstone Programming Exercise (Miniproject).

Sample Discipline-Specific Programs

Branch	Simple Problem Statement
Civil Engineering	Write a C program to calculate the volume of concrete required for a rectangular column, given its length, breadth, and height.
	Write a C program to calculate the quantity of bricks required for building a wall of given dimensions.
	Write a C program to calculate the factor of safety of a structure given ultimate load and working load.
Mechanical Engineering	Write a C program to determine the maximum and minimum values of stress, strain, and elongation.
	Write a C program to calculate the efficiency of a heat engine given input and output work.
	Write a C program to determine the shear stress and strain in a material given load, area, and original length.
	Write a C program to compute the power transmitted by a shaft given torque and rotational speed (RPM).
Electronics and Telecommunication Engineering	Write a C program to convert a given decimal number to binary, octal, and hexadecimal values.
	Write a C program to calculate the resultant resistance of resistors connected in series and parallel.
	Write a C program to compare the frequency of a signal given its time period.
Computer Engineering	Write a C program to find the maximum and minimum number in an array.
	Write a C program to calculate factorial using two-dimensional array.
	Write a C program to implement simple multiplication using two-dimensional array.
	Write a C program to implement simple student database using structure (roll no., name, marks) and display topper.
Information Technology (IT)	Write a C program to implement a simple login system validating username and password using string.
	Write a C program using file handling to store and retrieve student records from a text file.

e-Resources:

1. Resource: <https://engineerstutor.com/category/c-programing/>

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Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/ II
Course Code: ESC-104-ASH Name of Course: Engineering Mechanics and Applications

Total Credits: 03			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	1	2	–	2

Examination Scheme

FA						SA	CA/TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	OBT	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	–	125

Abbreviations Used

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Attd.	Attendance	UT	Unit Test
OBT	Open Book Test	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

The primary objectives of this course are to:

1. Foster the ability to approach engineering problems through logical reasoning and systematic analysis, enabling students to apply fundamental principles effectively in problem-solving.
2. Establish a strong conceptual foundation in the principles of engineering mechanics, which is essential for analyzing and addressing real-world engineering challenges with confidence and clarity.

Course Outcomes

On completion of this course, the students will be able to:

CO No.	Course Outcome	Bloom's Level
ESC104.1	Resolve forces and determine the resultant, line of action, and equivalent force-couple system of coplanar force systems.	L3 (Apply)
ESC104.2	Draw free body diagrams and determine contact reactions, support reactions, and internal forces using the conditions of equilibrium.	L3 (Apply)
ESC104.3	Assess dry friction systems under equilibrium conditions and determine the forces and nature of truss members using the method of joints and method of sections.	L4 (Analyze)
ESC104.4	Determine the motion parameters of particles undergoing rectilinear motion (constant and variable acceleration) and curvilinear motion (projectile motion and normal-tangential coordinates).	L3 (Apply)
ESC104.5	Determine the forces acting on particles in motion and the corresponding motion parameters using Newton's second law, work-energy principle, impulse-momentum principle, and coefficient of restitution for direct central impact.	L3 (Apply)

Course Content

Unit I: Fundamentals of Mechanics (06 Hours)

Fundamentals of mechanics - Definition, classification, particle, rigid body, Newton's laws, principle of transmissibility of force, vector addition and multiplication, composition and resolution, Moment, couple, and force-couple.

Unit II: Equilibrium (06 Hours)

Equilibrium - Free Body Diagram, Basics and Conditions of equilibrium, types of loads, types of supports, types of beams, Equilibrium of concurrent coplanar force system, Equilibrium of non-concurrent coplanar force system.

Unit III: Applications of Static Equilibrium (06 Hours)

Definition and types of trusses, assumptions of truss analysis, method of joint of analysis of determinate trusses, method of section of analysis of determinate trusses, Theory of friction, Applications of friction - Flat Belt friction and Ladder friction.

Unit IV: Kinematics of particles (06 Hours)

Kinematics of Particles Basics of kinematics Displacement, velocity and acceleration, rectilinear motion and curvilinear motion of particle with variable acceleration, rectilinear motion with constant acceleration, rectilinear motion under gravity, Projectile motion, Normal and tangential coordinate system for kinematics.

Unit V: Kinetics of Particles (06 Hour)

Kinetics of Particles Application of Newton's second law in rectilinear and curvilinear motion, Basic concept of Work, energy, power, Work Energy Principle and its application, Theory of direct central impact and coefficient of restitution, Theory of Impulse momentum principle and its applications, Numerical based on impulse momentum equation and Coefficient of restitution.

Engineering Mechanics Laboratory

Part A: Experiment

1. Verification of law of polygon
2. Support reactions of simply supported beam.
3. Study of belt friction apparatus
4. Study of curvilinear motion
5. Coefficient of Restitution

Part B: Assignment on each unit: minimum four example on each unit (Unsolved numerical from reference books given in syllabus)

Part C: Mini Project with model/ software program based on principle of Mechanics.

Learning Resources

Textbooks:

1. R. S. Khurmi, *Engineering Mechanics*, S. Chand Publishing, Latest Edition.
2. S. S. Bhavikatti, *Engineering Mechanics*, New Age International Publishers, Latest Edition.
3. A. K. Tayal, *Engineering Mechanics: Statics and Dynamics*, Umesh Publications, Latest Edition.
4. Rajashekharappa, *Engineering Mechanics*, Sapna Book House, Latest Edition.
5. Ferdinand L. Singer, *Engineering Mechanics*, 3rd Edition, Harper and Row.
6. R. C. Hibbeler, *Engineering Mechanics: Statics and Dynamics*, Pearson Education, Latest Edition.

Reference Books:

1. S. Timoshenko and D.H. Young, *Engineering Mechanics*, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2. F. P. Beer and E. R. Johnston, *Vector Mechanics for Engineers: Statics*, Tata McGraw Hill.
3. F. P. Beer and E. R. Johnston, *Vector Mechanics for Engineers: Dynamics*, Tata McGraw Hill.
4. J. L. Meriam and L. G. Kraige, *Engineering Mechanics – Statics and Dynamics*, John Wiley and Sons.

e-Resources

<https://archive.nptel.ac.in/courses/112/106/112106180/>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/II
Course Code: ESC-105-ASH Name of Course: Basic Electrical and Electronics Engineering

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	–	2	–	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	-	-	100

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To make the learner understand the operating principle and applications of PN junction diode, special purpose diodes and MOSFET.
2. To make the learners understand the functioning of OP-AMP and the concepts of basic logic design.

3. To impart the fundamental knowledge of electrical engineering to all the students of various disciplines and give comprehensive idea about AC and D C circuit analysis, Various laws , principle and theorems associated with electrical systems
4. To provide knowledge of Transformers, working principles and applications of basic electric machines .

Course Outcomes

On completion of this course, the students will be able to;

ESC-105.1 : Understand the working of P-N Junction diode, special purpose diode, transistor, its comparison and applications

ESC-105.2: Understand the concepts of OP-AMP, its applications and various logic gates.

ESC-105.3: Apply Kirchhoff's Laws, Superposition theorem and network simplification techniques for DC circuit analysis.

ESC-105.4: Calculate AC quantities using equations, waveforms, and phasor diagrams and to determine voltage, current, and power of the given single-phase circuits.

ESC-105.5: Understand the working principle of 1-Phase Transformer, Motors (DC, Induction) and their practical applications.

Course Content

Unit I: Semiconductor Devices Applications (06 Hours)

Introduction to Basic Electronics Electrical Engineering P-N Junction Diode: Intrinsic and extrinsic semiconductors, Introduction to P-N Junction Diode, Diode biasing, V-I characteristics; Half Wave Rectifier and Bridge rectifier; Special Diodes: LED, Photodiode, Solar cell; Zener as a Voltage Regulator. Application of semiconductors in engineering. Introduction of Transistors: Types of Transistors, N channel EMOSFET: construction, types, operation, MOSFET current equation and V-I Characteristics. MOSFET as an amplifier and switch.

Unit II: Integrated Circuits Digital Logic Design (06 Hours)

OP-AMP: Block Diagram, Symbol, Pin Configuration, Characteristics of Ideal Op-amp, Virtual Ground Concept, Inverting Non Inverting Op-amp. Number Systems: Introduction of Binary, BCD, Octal, Decimal, Hexadecimal; their conversion Binary addition. Logic Gates: AND, OR, NOT, XOR, XNOR. Universal Gates: NAND, NOR. Boolean Algebra, De-Morgan's theorem

Unit III: DC Circuits (06 Hours)

"Classification of electrical networks, simplifications of networks using series-parallel combinations and star delta transformation technique, Kirchhoff's Laws and their applications for network solutions using loop analysis, Superposition theorem, Thevenin's theorem

Unit IV: AC Fundamentals AC series circuits (06 Hours)

AC Fundamentals: Mathematical and graphical Representation of single-phase sinusoidal voltages and currents, their Concept of cycle, period, frequency, instantaneous, peak, average and RMS. values, peak factor and form factor. Concept of Phase difference, lagging, leading in

phase quantities and their phasor representation. Rectangular and polar representation of phasor. AC series circuits: Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, Series R-L, R-C and R-L-C circuits, concept of impedance, power factor, phasor diagrams, Voltage, current and power waveforms. Concept of active, reactive and apparent power.

Unit V: Introduction to Electric Machines (06 Hour)

Single Phase Transformer: Construction, working principle, EMF equation, transformation ratio, rating, types, losses, regulation and efficiency at different loading conditions, (Numericals on Efficiency) Electrical Motors :a) D.C. Motors: Construction, working principle, types, voltage equation, characteristics and Applications. b) Three Phase Induction Motor: Working principle using rotating magnetic field theory, types and applications. c) Single Phase Induction Motor: Construction, working principle of single phase Induction motor. Applications of split phase, capacitor start and capacitor run motors.

Learning Resources

Reference Books

1. Digital Fundamentals by Thomas. L. Floyd, 11th Edition, Pearson
2. C. L. Wadhwa, “Basic Electrical Engineering”, New Age International (P) Limited 5th edition 2024
3. S.K Bhattacharya, “Electrical Machines”, McGraw Hill Education, 2nd edition, 2008.

Text Books

1. Electronics Devices by Thomas. L. Floyd, 9th Edition, Pearson
2. Modern Digital Electronics by R. P. Jain, 4th Edition, Tata McGraw Hill
3. B.L. Theraja, A. K. Theraja, “ABC of Electrical Engineering”, S Chand Publications, 2012
4. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill Education, 2nd edition, 2019.

e-Resources

- (a) <https://www.pearson.com/en-us/subject-catalog/p/electronic-devices-electron-flow-version/P200000001048>
- (b) <https://www.schandpublishing.com/books/tech-professional/electrical-engineering-electronics/abc-electrical-engineering/9788121939096/>

MOOC / NPTEL/YouTube Links:

- i. <https://nptel.ac.in/courses/117103063>
- ii. <https://nptel.ac.in/courses/117103064>
- iii. <https://nptel.ac.in/courses/108105112>

Learning Resources

Reference Books

- (a) Thomas L. Floyd, *Digital Fundamentals*, 11th Edition, Pearson.
- (b) C. L. Wadhwa, *Basic Electrical Engineering*, New Age International (P) Limited, 5th Edition, 2024.
- (c) S. K. Bhattacharya, *Electrical Machines*, McGraw Hill Education, 2nd Edition, 2008.

Text Books

- (a) Thomas L. Floyd, *Electronics Devices*, 9th Edition, Pearson.
- (b) R. P. Jain, *Modern Digital Electronics*, 4th Edition, Tata McGraw Hill.
- (c) B. L. Theraja, A. K. Theraja, *ABC of Electrical Engineering*, S Chand Publications, 2012.
- (d) D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill Education, 2nd Edition, 2019.

e-Resources

- (a) <https://de-iitr.vlabs.ac.in>
- (b) <https://be-iitkgp.vlabs.ac.in>
- (c) <https://www.schandpublishing.com/books/tech-professional/electrical-engineering-electronics/abc-electrical-engineering/9788121939096/>

MOOC / NPTEL / YouTube Links

- (a) <https://nptel.ac.in/courses/108105112>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/ II
Course Code: ESC-106-ASH Name of Course: Basic Electrical and Electronics
Engg. Lab.

Total Credits: 01			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
-	-	1	-	-	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	-	25	25

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To make the learner understand the operating principle and applications of PN junction diode, special purpose diodes and MOSFET.
2. To make the learners understand the functioning of OP-AMP and the concepts of basic logic design.

3. To impart the fundamental knowledge of electrical engineering to all the students of various disciplines and give comprehensive idea about AC and D C circuit analysis, Various laws, principle and theorems associated with electrical systems.
4. To provide knowledge of Transformers, working principles and applications of basic electric machines .

Course Outcomes

On completion of this course, the students will be able to:

ESC-106.1 : Understand the working of P-N Junction diode, special purpose diode, transistor, its comparison and applications.

ESC-106.2: Understand the concepts of OP-AMP, its applications and various logic gates.

ESC-106.3: Apply Kirchhoff's Laws, Superposition theorem and network simplification techniques for DC circuit analysis.

ESC-106.4: Calculate AC quantities using equations, waveforms, and phasor diagrams and to determine voltage, current, and power of the given single-phase circuits.

ESC-106.5: Understand the working principle of 1-Phase Transformer, Motors (DC, Induction) and their practical applications.

Course Content

List of Experiment

1. Study of basic Electronics components and measuring instruments.
2. Implementation of Half wave and Full wave Bridge Rectifier
3. Design inverting and non-inverting amplifier using op-amp (Study the data sheet of typical Op-Amp741)
4. Add on: Test and verify the truth tables of: Basic and Universal Gates (Study the datasheet of respective ICs), Half Full Adder.
5. To study safety precautions while working on electrical systems, handling of various equipment's such as rheostat, multi-meter, ammeters, voltmeters, wattmeter's etc.
6. To verify Kirchhoff's laws experimentally
7. To verify Superposition theorem experimentally
8. To determine efficiency and regulation of transformer by using direct loading test experimentally
9. Study of cut view section of single phase/ three phase Induction motor.
10. To study of LT Electricity bills

Learning Resources

Reference Books

- (a) Thomas L. Floyd, *Digital Fundamentals*, 11th Edition, Pearson.
- (b) C. L. Wadhwa, *Basic Electrical Engineering*, New Age International (P) Limited, 5th Edition, 2024.
- (c) S. K. Bhattacharya, *Electrical Machines*, McGraw Hill Education, 2nd Edition, 2008.

Text Books

- (a) Thomas L. Floyd, *Electronics Devices*, 9th Edition, Pearson.
- (b) R. P. Jain, *Modern Digital Electronics*, 4th Edition, Tata McGraw Hill.
- (c) B. L. Theraja, A. K. Theraja, *ABC of Electrical Engineering*, S Chand Publications, 2012.
- (d) D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill Education, 2nd Edition, 2019.

e-Resources

- (a) <https://de-iitr.vlabs.ac.in>
- (b) <https://be-iitkgp.vlabs.ac.in>
- (c) <https://www.schandpublishing.com/books/tech-professional/electrical-engineering-electronics/abc-electrical-engineering/9788121939096/>

MOOC / NPTEL / YouTube Links

- (a) <https://nptel.ac.in/courses/108105112>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/ II
Course Code: VSE-102-ASH Name of Course: Manufacturing Practices and
Workshop Laboratory

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
1	–	1	1	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	50	-	50

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To acquire the basic knowledge of Machine Tools.
2. To inculcate the basics of various manufacturing processes.
3. To impart practical aspects of Machine Tools and Manufacturing processes used in industrial applications.
4. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop.

Course Outcomes

On completion of this course, the students will be able to:

- VSE102.1** Explain the principles and working of basic manufacturing processes such as welding, cutting, machining, fitting, and sheet metal operations.
- VSE102.2** Apply appropriate manufacturing techniques to fabricate simple engineering components.
- VSE102.3** Analyze the impact of material selection and process parameters on manufacturing efficiency and product quality.
- VSE101.4** Create a functional prototype using suitable manufacturing tools and processes while ensuring safety and quality standards.
- VSE102.5** Describe the applications, advantages and operation of advanced computerized machine tools in modern manufacturing.
- VSE102.6** Apply 3D Printing Technology including setup, operation, and post-processing to print simple mechanical component.

Course Content

Unit I: Fundamentals of Manufacturing Practices (03 Hours)

Definition, importance of Manufacturing practices and applications. Principles and working of basic manufacturing processes such as welding, cutting, machining, fitting, and sheet metal operations. Selection of appropriate manufacturing techniques to fabricate simple engineering components.

Unit II: Plant Layouts and Safety Guidelines (04 Hours)

Introduction and Definition of Plant Layout, Types of plant layouts, Examples of different industries/plant with the arrangements of machines/equipment's with specific application. Importance of safety rules and guidelines in Workshop/Industries, List of safety devices, equipments, etc., Different types potential hazards present in Workshop/industries, handlings of hazards.

Unit III: Introduction CNC and VMC Machines (03 Hours)

Introduction, components, construction and operation of advance machine tool such as CNC turn / mill, VMC, plasma arc machining, Laser cutting, CNC wood router etc., Important applications and benefits of advanced machine tools with respect to traditional machines.

Unit IV: Introduction to Programming Languages and Additive Manufacturing (03 Hours)

Introduction, importance and types of programming languages, Examples on programming sequence with respect to operations performed to develop component using any suitable programming language.

Additive Manufacturing (AM): Introduction, types of AM processes, print using 3D printer including pre and post processes, applications of AM.

Unit V: Introduction to Inspection and Calibration (02 Hour)

Inspection of component manufactured practical by using various measuring instruments such as Vernier Caliper, Micrometer, Height Gauge etc.

List of Laboratory Experiments / Assignments

(Minimum six experiments/assignments to be performed)

Sr. No.	Title of Experiments / Assignments
01	Draw a typical layout of workshop with arrangement of equipment considering a specific application.
02	Identify and explain safety-related considerations: 1. Potential hazards present in workshop 2. General workshop safety rules and guidelines 3. List various safety devices used in workshop <i>Note: Photo evidences of above are expected in the report.</i>
03	Develop any mechanical component using the tools available in the workshop, which includes any five of the following operations: 1. Cutting 2. Shearing 3. Bending 4. Welding 5. Riveting 6. Filing 7. Drilling <i>Note: Product must be usable for the Institute or domestic purpose. Also write a sequence of operations in the report along with production time.</i>
04	Demonstration (construction and operation) of any one advanced machine tool such as CNC turn/mill, VMC, plasma arc machining, laser cutting, CNC wood router, etc.
05	Development / Fabrication of utility component by using suitable joining process like Welding / Soldering/ Brazing.
06	Create simple 3D models using CAD software and print using a 3D printer, including pre- and post-processing. <i>(Component manufactured should be related to the specific branch)</i>
07	Inspection of component manufactured during preceding practical using various measuring instruments such as Vernier Caliper, Micrometer, Height Gauge, etc.

Important Note:

1. Minimum Six Experiments/Assignments to be performed – out of these Experiments/Assignments no. 1 and 2, 3 and 5 are compulsory, Any two Experiments/Assignments from 4,6 and 7.
2. Above experiments to be performed in group of four to five students.
3. There should not be any repetition of layout/ jobs/ programs and models.
4. For Experiment No. 1 and 2 students supposed to visit nearby workshop or industry.
5. For Experiment No. 3 and Experiment No. 5 students supposed to prepare useful parts/product.
6. For Experiment No. 6 students will have hands on sessions.

Learning Resources

Text Books:

1. H. S. Bawa, “*Workshop Practice*”, Tata McGraw Hill Education (Publisher).
2. S. K. Hajra Choudhary, Nirjhar Roy, “*Element of Workshop Technology: Vol. 1 and 2*”, Media Promoters and Publishers Pvt. Ltd., 15th Edition, 2012.

Reference Books:

1. Mikell P. Groover, “*Introduction to Manufacturing Processes*”, Wiley Publications.
2. John, K.C., “*Mechanical Workshop Practice*”, Prentice Hall Publication, New Delhi.
3. Chua Chee Kai, Leong Kah Fai, “*3D Printing and Additive Manufacturing: Principles & Applications*”, 4th Edition, World Scientific, 2015.
4. M. P. Groover, “*Automation, Production System & Computer Integrated Manufacturing*”, Pearson India, 2nd Edition, 2007.

e-Resources (MOOC / NPTEL / YouTube Links):

1. NPTEL Course on *Fundamentals of Additive Manufacturing Technologies* by Prof. Sajan Kapil, IIT Guwahati. https://onlinecourses.nptel.ac.in/noc21_me115/preview
2. NPTEL Course on *Fundamentals of Industrial Safety* by Prof. Thomas, IIT Madras. <https://www.youtube.com/watch?v=3VReVbsmjKI>
3. NPTEL Course on *Computer Numeric Control of Machine Tools and Processes* by Prof. A. Roy Chaudhary, IIT Kharagpur. https://www.youtube.com/watch?v=ImtSsDLgAaI&list=PLSGws_74K01KX9YtVZACp0oFYy6oaJIC

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/II

Course Code: CCC-101-ASH

Name of Course: Life Skills-I

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
1	–	1	1	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	25	-	25

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. The course will create awareness about the value of life skills, life-long learning, selfassessment, goal setting, etc.
2. The course, through experiential learning, will introduce the learners to healthy and happy lifestyle.

Course Outcomes

On completion of this course, the students will be able to:

CCC101.1 Understand the meaning of Yoga, Pranayam and Meditation and their significance in improving longevity and quality of life.

CCC101.2 Apply Yoga, Pranayam and Meditation in improving physical, mental and emotional health

CCC101.3 Apply the knowledge of various nutrients like carbohydrates, proteins, fats, vitamins, minerals, fiber and water to make a healthy dietary plan

CCC101.4 Experience and apply various attributes of happiness including diet, human relations, hobbies, empathy, team-work to design an ecosystem of wellbeing for themselves.

Course Content Laboratory

Week I: Introduction to Life Skills

Practical: Introduction to Life Skills, Self-Assessment and Goal Setting, Importance of life skills in personal and professional contexts, Techniques for setting SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound), Personality development.

Activity: Self-Awareness - Know your personality, Develop your Self-Esteem, Johari Window, SWOT, Setting goals for yourself (SMART).

Assignment: Make your SWOT Analysis chart. Creating a personal development plan.

Week II: Time Management

Practical: Discussion/Expert session on Importance of Time-Management in Engineering, Techniques of Time Management.

Assignment (Plan-do stage): Students to write an ideal daily routine schedule for the whole week, including week-ends and against each day, to enter their actually performed activities for the week.

Week III: Time Management

Practical: Prioritization Matrix Activity, Time Tracking Exercise, Plan-Do-Check-Act (P-D-C-A) cycle, Interaction with senior meritorious students about Time Management.

Assignment (Check-act stage): Students to apply PDCA while continuing to enter weekly activities in the daily routine schedule and to enlist their findings, regarding time being wasted earlier and the improvements there-upon.

Week IV: Yoga & Meditation

Practical: Meaning of Yoga. Kinds of Yoga. Introduction to Ashtaang Yoga. History of Yoga. Importance of Yama (five kinds), Niyama (five kinds), Aasan, Pranayam, Pratyahar, Dhyana, Dharana, Samadhi and their meaning in modern context.

Assignment: Write a real life example of how do you use the five kinds of Yama and five kinds of Niyama in your life.

Week V: Suryanamaskar and Yoga Postures

Practical Examination:

- 1-. Perform one complete Suryanamaskar correctly with proper sequence and breathing.
- 2-. Perform any 3 Supine postures.
- 3-. Perform any 3 Prone postures with correct technique and alignment.

Assignment: Submit a brief record mentioning the name, steps and benefits of each posture practiced.

Week VI: Yoga for Health Well-being

Practice of selected asanas, Pranayama, relaxation and meditation techniques for physical and mental well-being.

Assignment: Practice selected Asanas, Pranayama, Relaxation and Meditation techniques for improving physical and mental well-being. Maintain a brief record of the techniques practiced and their benefits. Write a short reflection on how regular Yoga practice helps in health, stress management and overall well-being.

Week VII: Integrated Yoga

Practical: Demonstration and practice of Suryanamaskar, selected supine and prone postures, Pranayama, relaxation and meditation; correction of posture, breathing and technique.

Assignment: practice and Focus on the correct posture, breathing, alignment and proper technique during each practice. Write a brief reflection on the benefits and personal learning gained through integrated yoga practice.

Week VIII: Health and Well-being, Art craft

Practical: a) Health and Well-being Practical: Introduction to Health and Well-being, Definition of health; Physical, mental and emotional well-being. Activities: Cooking workshop on healthy snacks / Fireless Cooking Competition And Group discussions on personal health experiences / Guest Lecture on Health and Wellness b) Art and Craft Practical: Preparation of lanterns and decoration of Diyas. Activities: Making of Sky lanterns and decoration of Diyas in college, during Diwali festival.

Learning Recourses

Reference Books:

1. *Ashatanga YOGA of Patanjali* by Prashant S. Iyengar.
2. *Emotional Intelligence: Why It Can Matter More Than IQ* by Daniel Goleman.
3. *Eat to Live: The Amazing Nutrient-Rich Program for Fast and Sustained Weight Loss* by Joel Fuhrman.
4. *The Complete Guide to Yoga: The Unabridged Guide to 500 Asanas* by Paul Jerard.
5. *Mindfulness Meditation for Beginners: How to Begin a New Life by Learning to Focus on the Present* by Jon Kabat-Zinn.

e-Resources

1. *Mindfulness-Based Stress Reduction (MBSR)* – Online Course by the University of Massachusetts Medical School.
2. *Nutritional Guidelines* – Available on the [Dietary Guidelines for Americans](#) website.
3. *Work Smarter, Not Harder: Time Management for Personal & Professional Productivity* – Available on [Coursera](#).
4. *Coursera Platform* – www.coursera.org offers diverse online courses on life skills provided by universities and experts worldwide.
5. *National Endowment for Financial Education (NEFE)* – Visit www.nefe.org for financial education resources.

Pimpri Chinchwad Education Trust's
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Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/II

Course Code: AEC-101-ASH

Name of Course: Communication Skills

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
1	–	1	1	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	50	-	50

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To enhance engineering students' English language and communication skills.
2. To develop the usage of receptive and productive skills in the English language.
3. To build confidence in using the English language in real-life situations.
4. To improve proficiency in technical and professional communication.

Course Outcomes

AEC-101.1: Apply the English language effectively to articulate and speak in real-life situations.

AEC-101.2: Analyse technical documents, research papers, and business communications to interpret, read, write, and present them with clarity.

AEC-101.3: Communicate confidently in Professional and Technical settings.

AEC-101.4: Use simple English words and basic grammar correctly in everyday conversations.

AEC-101.5: Collaborate and communicate effectively in team-based projects and real-life professional scenarios.

Course Content

Unit I: Fundamentals of Communication (02 Hours)

Definition, importance, and process of communication. Types: Verbal & Non-Verbal Communication, Interpersonal and Cross-cultural Communication, Barriers and strategies to overcome them.

Unit II: Vocabulary and English Grammar for Engineers (04 Hours)

Vocabulary: Word Formation, Root words, Prefixes and Suffixes, Synonyms, Antonyms, Abbreviations.

Functional Grammar: Verb Tense, Irregular verbs, Conjunctions, Pronouns, Adjectives and Adverbs, Prepositions, Articles, Sentence structure, Subject-Verb agreement.

Unit III: Listening and Speaking Skills (04 Hours)

Active listening, barriers, and strategies. TED Talks, podcasts, Apollo 13, Google's Project Aristotle.

Speaking: Pronunciation, Intonation, Stress, Conversations, Group Discussions, Workplace Communication, Public speaking, Non-verbal cues, AI tools.

Unit IV: Reading and Writing Skills (02 Hours)

Reading: Skimming, Scanning, Speed Reading, AI tools, Buffett and Rowling case studies.

Writing: Emails, Letters, Reports, Clauses, Punctuation, LinkedIn profiles, Grammarly.

Unit V: English for Placements, IELTS, TOEFL and Others (01 Hour)

Overview, scoring and preparation strategies for IELTS, TOEFL, GRE Verbal, PTE.

Practical and Term Work

List of Practicals

1. Active Listening and Effective Note-Taking.
2. Small Talk – Conversation Practice.
3. Editorial Reading and Analysis.
4. Phonetics & Pronunciation Drills.
5. Public Speaking – Pitch, Extempore, Presentations.
6. Storytelling & Expressive Communication.
7. Email and Letter Writing.
8. Listening & Comprehension Practice.
9. Technical Writing and Documentation.
10. IELTS/TOEFL Orientation.
11. Final Skill Assessment.

Term Work Guidelines

- Minimum three batches per division (max 25 students per batch).
- Includes class assignments, participation, and group activities.

Reference Books

1. Norman Lewis, *Word Power Made Easy*, Goyal Publishers.
2. David F. Beer, *Writing and Speaking in the Technology Professions*, Wiley-IEEE Press, 2nd Ed.
3. Dale Carnegie, *The Art of Public Speaking*, Simon & Schuster.
4. William Zinsser, *On Writing Well*, HarperCollins.
5. Meenakshi Raman & S. Sharma, *Technical Communication*, Oxford University Press.

e-Resources

1. <https://www.merriam-webster.com>
2. <https://www.vocabulary.com>
3. <https://owl.purdue.edu>
4. <https://learnenglish.britishcouncil.org/grammar>
5. <https://www.ted.com>
6. <https://www.bbc.co.uk/learningenglish>
7. <https://www.spotify.com>
8. <https://www.duolingo.com>
9. <https://www.gutenberg.org>
10. <https://www.newsela.com>
11. <https://www.grammarly.com>

Semester-II

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: II
Course Code: BSC-151-ASH Name of Course: Engineering Mathematics II

Total Credits: 03			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	1	–	2	1	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Asgmt.	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

This course aims to acquaint students with

1. Mathematical modeling of physical systems through differential equations.
2. Advanced integration techniques using reduction formulae, Beta-Gamma functions, and differentiation under the integral sign.
3. Curve tracing and concepts essential for evaluating multiple integrals used in finding area and volume.
4. Statistical measures, curve fitting, and correlation-regression analysis for data interpretation

Course Outcomes

On completion of this course, the students will be able to:

- BSC-151.1** Apply the effective mathematical tools for solving first order ordinary differential equation and use them to Model physical systems.
- BSC-151.2** Apply advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, and Differentiation under integral sign to solve Integrations.
- BSC-151.3** Analyze the curve for a given equation in Cartesian, Polar form and Rose curve using their salient features, and determine the length of curves through rectification.
- BSC-151.4** Apply integration techniques to solve multiple integrals and their applications.
- BSC-151.5** Compute measures of central tendency, dispersion, and moments, assess skewness and kurtosis of data, fit curves to given data, and analyze correlation and regression between variables.

Course Content

Unit I: Differential Equations of first order and its applications (06 Hours)

Solution of first Order exact differential Equations. Equations reducible to exact form. Linear differential equations. Applications of Differential equations to Orthogonal Trajectories, Newton's Law of Cooling, Electrical Circuits.

Unit II: Integral Calculus (06 Hours)

Advance Techniques to solve integrations as Reduction Formulae for powers of sine and cosine, Beta and Gamma functions for exponential and product of polynomials, Differentiation Under Integral Sign Rule I and Rule II.

Unit III: Curve Tracing (06 Hours)

Tracing of Curves- Salient features to trace curve of Cartesian form of Explicit function. Salient features to trace Polar curve, Rose Curve, rectification of curves.

Unit IV: Multiple Integrals and Applications (06 Hours)

Direct Evaluation of Double and Triple integrations, Use of change of order of integration, Polar transformation of Cartesian variables. Applications of Double and triple integration to find Area, Volume.

Unit V: Statistics (06 Hours)

Measures of central tendency and dispersion, Moments, Skewness and Kurtosis, Curve fitting, Correlations and Regression.

List of Tutorials:

1. Examples on Exact, Reducible to exact and Linear Differential Equations.
2. Examples on Applications of Differential Equation. .
3. Use of **MATLAB** to solve differential Equation and show the solution graphically..
4. Examples on Reduction Formulae, Gamma functions.
5. Examples on Beta functions, Differentiation Under Integral Sign.
6. Use of **MATLAB** Use of MATLAB to solve integrals.
7. Examples on Curve Tracing.
8. Use of **MATLAB** to trace a curve.
9. Examples on Double and Triple integrations, change of order of integration.
10. Examples on Applications to find Area, Volume and Use of MATLAB to solve multiple integration and its graphical presentation.
11. Examples on Moments, Skewness and Kurtosis, Curve fitting.
12. Examples on Correlation, Regression and Use MATLAB to fitting of Curve and regression line.
13. Report on an Interesting Concept in Vedic Mathematics and Its Importance in Engineering.

Learning Resources

Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
2. Montgomery and Runger, “Applied Statistics and Probability for Engineers”, Wiley, India, 6 Edition, ISBN: 9788126562947
3. Advanced Engineering Mathematics by Peter V. O’Neil (Thomson Learning)
4. Applied Mathematics (Vol. I & II) by P.N. Wartikar and J.N. Wartikar (Vidyarthi Griha Prakashan, Pune)
5. Linear Algebra and Its Applications by Gilbert Strang, WELLESLEY -CAMBRIDGE PRESS Box 812060 Wellesley MA 02482.
6. Elements of Partial Differential Equations by Ian N. Sneddon, Dover Publications, Inc. Mineola, New York
7. MATLAB: An Introduction with Applications by Amos Gilat (John Wiley & Sons)

Text Books

1. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill)
2. Higher Engineering Mathematics by B. S. Grewal (Khanna Publications)

e-Resources

A NPTEL course on Engineering Mathematics II by Prof. Jitendra Kumar:

1. <https://nptel.ac.in/courses/111105121>

Pimpri Chinchwad Educational Trust's
Pimpri Chinchwad College of Engineering and Research, Ravet, Pune –
412101

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: First Year Engineering (2025 Pattern) **Semester: I**
Course Code: BSC-103-ASH **Name of Course: Engineering Chemistry**

Total Credits: 04			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
3	-	1	3	-	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To understand technology used in analyzing and enhancing the quality of water as a resource.
2. To gain knowledge of electro-analytical techniques that enable quick and accurate analysis of materials.
3. To understand structure, properties and applications of speciality polymers and nanomaterial.
4. To understand corrosion mechanisms and preventive methods for corrosion control.
5. To study conventional and alternative fuels with respect to their properties and applications.

Course Outcomes

On completion of this course, the students will be able to;

BSC-103.1 : Understand the practical approaches and techniques required to effectively monitor water quality.

BSC-103.2: Identify appropriate electro analytical techniques for understanding the materials.

BSC-103.3: Demonstrate the structure and properties of advanced engineering materials for various technological applications.

BSC-103.4: Identify the causes of corrosion and methods for minimizing corrosion.

BSC-103.5: Analyze different types of conventional and alternative fuels.

Course Content

Unit I: Water Technology (09 Hours)

Impurities in water, hardness of water: Types, Units and Numerical. Chemical analysis of water by determination of hardness by EDTA method. Alkalinity of water and its determination. Numericals on EDTA method and alkalinity. Disadvantages of hard water in boilers. Water softening techniques: Permutit and Ion exchange method. Water purification by reverse osmosis and electro-dialysis. Dissolved oxygen (DO), Biological oxygen demand (BOD) and Chemical oxygen demand (COD).

Unit II: Instrumental Methods of Analysis (09 Hours)

Introduction: Types of reference electrode (Calomel electrode), Indicator electrode (Glass electrode). Conductometry: Introduction, conductivity cell, conductometric titrations of acid versus base with titration curve. (Strong acid- Strong base). Applications of conductometry. pH metry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve and its applications. UV Spectroscopy: Nature of electromagnetic radiation and its characteristics. Interaction of matter with UV radiations leading to different electronic transitions. Electronic transitions in organic molecules. Beer's Lambert's law. Instrumentation of Double beam UV - Visible spectrophotometer. Terms involved in UV spectroscopy. Applications of UV Spectroscopy.

Unit III: Speciality Polymers and Nanomaterials (09 Hours)

A] Polymers: Introduction, Classification of polymers (Thermoplastics and Thermosetting). Specialty polymers: Introduction, preparation, properties and applications of the following polymers: 1.Engineering Thermoplastic: Polycarbonate, 2. Bio-degradable polymers: Poly (hydroxybutyrate- hydroxyvalerate), 3. Conducting Polymer: Polyacetylene. [B] Nanomaterials: Introduction, classification of nanomaterials based on dimensions (zero dimensional, one-dimensional, two-dimensional and three-dimensional), structure, properties and applications of graphene, carbon nanotubes, quantum dots. Applications of Nanotechnology in Various field of Engineering : Nanosensors, Nano-coatings, Nanochips, Nano Concrete Technology, Biomedical.

Unit IV: Corrosion and Material Protection (09 Hours)

Corrosion: Introduction, types of corrosion, mechanism of atmospheric corrosion and wet corrosion. Factors affecting corrosion: nature of metal and nature of environment. Different types of

corrosion, methods of prevention of corrosion - Cathodic protection. Metallic coatings and its types - Anodic and Cathodic coatings. Methods to apply metallic coatings - Hot dipping, metal cladding electroplating. Case studies and real-world applications in corrosion prevention.

Unit V: Energy Sources (09 Hour)

Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value, Higher calorific value and Lower calorific value, Determination of calorific value: Principle, construction and working of Bomb calorimeter and Boy's gas calorimeter. Solid fuel- Coal: Analysis of Coal-Proximate and Ultimate analysis. Alternative fuels: Power alcohol and biodiesel. Hydrogen gas as a future fuel. Lithium Ion Battery and Aluminium Air Battery construction ,working applications.

Learning Resources

Reference Books

1. Water and Wastewater Technology: Mark J. Hammer, Pearson Publication.
2. Water Pollution Control: A Guide to the Use of Water Quality Management Principles” by David H. Paull, EF Spon Publication.
3. Instrumental Methods of Chemical Analysis, G. R. Chatwal S. K. Anand, Himalaya Publishing House.
4. Spectroscopy of organic compounds, Iled, P. S. Kalsi, New Age-International Ltd., Publisher.
5. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadev Sreedhar, Wiley Eastern Limited.
6. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadev Sreedhar, Wiley Eastern Limited.

Text Books

1. Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand Company Ltd.
2. Engineering Chemistry by O. G. Palanna, Tata Magraw Hill Education Pvt. Ltd.
3. Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria Sons Publisher.
4. Textbook of Engineering Chemistry: Shashi Chawla, Dhanpatrai Publication.

e-Resources

- (a) https://chem.nju.edu.cn/_upload/article/files/b5/6f/01f0f2434d708df797208aea2613/83f2b441-65ee-44a6-ac47-ed21db462c5d.pdf.
- (b) <https://www.researchgate.net/publication/259118068>

MOOC / NPTEL:

- (a) <https://nptel.ac.in/courses/113104082>
- (b) <https://nptel.ac.in/courses/1221060252>

List of Experiment

- (a) To determine the hardness of water by the EDTA method.
- (b) To determine the alkalinity of water.
- (c) To determine the strength of strong acid using a pH meter.
- (d) To determine the maximum wavelength of absorption of CuSO₄, verify Beer's law and find the unknown concentration of the given sample.
- (e) Titration of a mixture of weak acid and strong acid with strong base using a conductometer.
- (f) Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin
- (g) Proximate analysis of coal.
- (h) To coat copper and zinc on an iron plate using electroplating.
- (i) To Study Chems sketch/ Chemdraw Software.
- (j) Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles./Synthesis of Iron Oxide nanoparticles.
- (k) Recent trends/ advancement in Chemistry.

Learning Resources

Reference Books

- i. Practical Engineering Chemistry by Dr. S. S. Dara, S Chand Publication.
- ii. Practical Chemistry by B. S. Bahl Arun Bahl, S Chand Publication.
- iii. Practical Engineering Chemistry by R. K. Bansal, S Chand Publication.
- iv. Experiments in Engineering Chemistry by P. C. Jain M. Jain, Dhanpat Rai Publication.

Pimpri Chinchwad Educational Trust's
Pimpri Chinchwad College of Engineering and Research, Ravet, Pune –
412101

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: First Year Engineering (2025 Pattern) Semester: I
Course Code: ESC-151-ASH Name of Course: Python Programming

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	–	2	–	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Puzzle	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	-	-	100

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To understand the fundamentals of Python programming and its syntax to support structured problem solving.
2. To use decision control statements to develop logic for solving basic computational problems using Python.
3. To use strings and functions to solve real-world problems through modular Python programs.
4. To demonstrate features of object oriented programming concepts using python.
5. To use NumPy, Pandas, and Matplotlib in Python programs to develop data-driven solutions for real-world problems.

Course Outcomes

On completion of this course, the students will be able to:

ESC-151.1 Understand the fundamentals of Python programming to support structured problem solving.

ESC-151.2 Apply decision control structures to develop computational problems in Python.

ESC-151.3 Apply user-defined functions and concepts of strings to solve problems.

ESC-151.4 Demonstrate object-oriented programming concepts in Python.

ESC-151.5 Use Python libraries to analyze data.

Course Content

Unit I: Introduction to Python and Basics (06 Hours)

Overview of Python programming language, Python syntax and indentation, Input and output functions. Variables, identifiers, constants, and data types, Operators.

Unit II: Control Structures (06 Hours)

Conditional Statements: if, if-else, it-elif-else, Nested if statements. Loops and Iteration: for, while Loop Control Statements: break, continue, Pass, nested loops. Range Function.

Unit III: Functions and Strings (06 Hours)

Functions: Defining and calling functions, Function Parameters and Arguments, Return values, Scope of variables, Lambda function, Recursion. Documentation string, String and its Built-in functions, Modules, Packages and Library Modules.

Unit IV: Introduction to Object-Oriented Programming (OOP) (06 Hours)

Introduction to OOP and its features. Classes and objects, Instance variables and method, Types of methods, class constructor and destructor, Class variable and object variable, Access specifiers. Inheritance, Polymorphism, Encapsulation and Abstraction.

Unit V: Introduction to Python libraries (06 Hour)

Introduction to NumPy : creating arrays, indexing, slicing. Pandas Series: creating Series, indexing, accessing elements. Pandas Data Frames: creating Data Frames. Matplotlib: line plots, scatter plots Statistics Library, Datetime Library.

Learning Recourses

Textbooks:

1. Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford University Press, ISBN 13: 978-0-19-948017-6

Reference Books:

1. “Python Crash Course” by Eric Matthes, 2nd Edition, No Starch Press, 2019, ISBN: 978-1593279288
2. R. Nageswara Rao, “Core Python Programming”, Dreamtech Press; Second Edition
[ISBN-10: 938605230X](#), [ISBN-13: 978-9386052308](#), [ASIN: B07BFSR3LL](#)
3. “Learning Python”, Romano Fabrizio, Packt Publishing Limited, 1st Edition, 2015, ISBN: [9781783551712](#), [1783551712](#)
4. “Head First Python - A Brain Friendly Guide”, Paul Barry, SPD O’Reilly, 2nd Edition, [2016](#), ISBN: [978-93-5213-482-3](#)
5. “Python: The Complete Reference”, Martin C. Brown, McGraw Hill Education, [4th Edition - 2018](#), ISBN-10: [9789387572942](#), ISBN-13: [978-9387572942](#)

e-Resources:

1. <https://www.udemy.com/topic/python/>
2. <https://thepythonguru.com/>
3. <https://www.learnpython.org/>
4. <https://www.w3schools.com/python/default.asp>
5. <https://www.programiz.com/python-programming>
6. <https://www.coursera.org/learn/python-crash-course>
7. <https://www.geeksforgeeks.org/python-programming-language-lab/>
8. <https://www.hackerrank.com/>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: II
Course Code: ESC-152-ASH Name of Course: Python Programming Lab.

Total Credits: 01			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
-	-	1	-	-	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	-	25	25

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. To understand the fundamental concepts of Python programming such as variables, operators, control flow, and basic data types.
2. To use functions to solve real-world problems through modular Python programs.
3. To explain object-oriented features to support modularity, code reuse.
4. To use Python libraries to create real-time applications.

Course Outcomes

On completion of this course, the students will be able to:

ESC-152.1 Apply GitHub and basic Python constructs for I/O programs.

ESC-152.2 Apply operators and control flow to solve computational problems.

ESC-152.3 Apply built-in functions on lists, tuples, dictionaries, and sets for data handling.

ESC-152.4 Construct functions, modules, and packages for modular programming.

ESC-152.5 Implement OOP concepts including inheritance for reusable class design.

ESC-152.6 Integrate Python concepts and python libraries to design capstone-level applications.

Python Programming Laboratory

Course Contents

The experiment set has been designed in a graded sequence of cognitive complexity, commencing with foundational programming constructs such as Python fundamentals, control structures, and user-defined functions, and culminating in advanced concepts including string manipulation, object-oriented programming principles, and the utilization of Python libraries for extended functionality. This structured progression fosters a holistic understanding of core Python programming principles among first-year engineering students.

List of Experiments

1. Create a GitHub account and repository to manage source code, followed by an introduction to Python programming through basic programs — displaying a welcome message and reading/displaying user input.
2. Implementation of Operators in Python.
3. Write python programs to demonstrate the use of control structures such as if, if-else, nested-if, for, while etc. by solving different real-world problems.
4. Implement Python program to demonstrate the use of built-in functions/methods on List and tuple.
5. Implement Python program to demonstrate the use of built-in functions/methods on Dictionary and set.
6. Develop Python programs to understand and implement the concepts of user-defined functions and string manipulation.
7. Write a python program to create and use a user defined module and package for a given problem.
8. Write a python program to implement 1. Single inheritance 2. Multiple Inheritance 3. Multilevel inheritance.
9. Implement Python program to perform operations using Numpy, Panda and Matplotlib.
10. Identify a problem relevant to your engineering branch and implement an efficient Python program to solve it, incorporating suitable control structures, functions, and python libraries.
11. Capstone Programming Exercise (Miniproject).

Sample Discipline-Specific Programs

Branch	Simple Problem Statement
Civil Engineering	<p>Write a Python program to calculate the cost of painting a wall, given area and cost per square meter.</p> <p>Write a Python program to determine the slope (gradient) of a road given rise and run.</p> <p>Write a Python program to calculate the water tank capacity given its length, breadth, and height, and estimate the number of days it will last for a given daily consumption.</p>
Mechanical Engineering	<p>Write a Python program to calculate the velocity ratio and mechanical advantage of a simple lifting machine.</p> <p>Write a Python program to compute the kinetic and potential energy of an object given mass, velocity, and height.</p> <p>Write a Python program to calculate the thermal expansion of a metal rod given original length, temperature change, and coefficient of expansion.</p>
Electronics and Telecommunication Engineering	<p>Write a Python program to calculate the power dissipated in a resistor given voltage and current ($P = VI$).</p> <p>Write a Python program to determine whether a given logic gate output (AND, OR, NOT) is correct for given binary inputs.</p> <p>Write a Python program to calculate the wavelength of a signal given frequency and speed of transmission.</p>
Computer Engineering	<p>Write a Python program to implement a linear search and binary search on a list of numbers and compare the number of comparisons.</p> <p>Write a Python program to check whether a given string is a palindrome, using a user-defined function.</p> <p>Write a Python program using a class and inheritance to represent a base Employee class and a derived Manager class with an additional bonus attribute.</p>
Information Technology (IT)	<p>Write a Python program to count the frequency of each word in a given sentence using a dictionary.</p> <p>Write a Python program to implement a basic contact book (add, search, delete contact) using a list of dictionaries.</p> <p>Write a Python program using exception handling to validate user input for a division operation, handling division-by-zero and invalid input errors.</p>

e-Resources:

1. Resource: <https://engineerstutor.com/category/c-programing/>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/ II
Course Code: ESC-103-ASH Name of Course: Engineering Graphics and Applications

Total Credits: 03			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	1	2	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Asgmt.	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	-	125

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

The primary objectives of this course are to:

1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, simple geometrical construction and draw projection of point and line.
2. To draw conic sections by various methods, involutes, cycloid and spiral
3. To imagine visualization of lateral surface development of solids.

4. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views.
5. To visualize three dimensional engineering objects and shall be able to draw their isometric views.
6. To acquire knowledge about various CAD drafting software's and its basic commands required to construct the simple engineering objects.

Course Outcomes

On completion of this course, the students will be able to:

- ESC103.1** Understand the fundamentals of Engineering Graphics and basic principles of geometric construction and apply the knowledge of Projections, Methods to prepare the drawings for points and lines.
- ESC103.2** Apply the knowledge of Engineering Graphics to construct the various engineering curves and illustrate the application of various engineering curves.
- ESC103.3** Imagine and draw the development of the lateral surface of solid.
- ESC103.4** Apply the concept of orthographic projection of an object to draw several 2D views for visualizing the physical state of the object.
- ESC103.5** Apply the visualization skill to draw an isometric projection from given orthographic views.

Course Content

Unit I: Fundamentals of Engineering Drawing and Projection of Point and Line (06 Hours)

Fundamentals of Engineering Drawing - Introduction to drawing instruments and their uses, Drawing sheets sizes and their layouts, Types of Lines, Scale and Dimensioning, Dimensioning methods, General rules of dimensioning.

Projection of Point and Line - Theory of projection, Projection of points in all possible quadrants. Projection of line when parallel to both the reference planes, Projections of lines when it is perpendicular to one of the reference planes, when line is inclined to one and parallel to other reference plane, Line inclined to both reference planes (first angle projection).

Unit II: Engineering Curves (06 Hours)

Engineering Curves: Conic Sections- Ellipse, Parabola and Hyperbola by directrix focus and rectangle method, Helix on Cylinder and Cone, Cycloid, Involute of circle, Archimedean spiral.

Unit III: Development of Lateral Surfaces (06 Hours)

Development of Lateral Surfaces: Introduction, Method of development, development of lateral surfaces of right solids, prisms, pyramids, cylinder, and cone.(with cutting plane)

Unit IV: Orthographic Projections (06 Hours)

Introduction, Principle of projection, Plane of Projection, Method of Projection, Orthographic Projection, First and Third angle method of projection, Hidden features, curved features, circular features. etc. Typical problems by first angle projection method, Types of sections, sectional orthographic projection (only full sectional orthographic view)

Unit V: Isometric View (06 Hour)

Introduction of isometric view, Isometric lines, planes, Non-isometric lines and planes, Isometric scale, Isometric projection and view, Construction of isometric view from given orthographic views.

Engineering Graphics Laboratory/Experiment

Part-A: Each assignment should have minimum 2 problems to be drawn on A2 size drawing sheet

Assignment 1: Draw Projection of Line.

Assignment 2: Construct any Engineering Curve. (4 Problems)

Assignment 3: Draw the development of lateral surface of a solid.

Assignment 4: Draw orthographic view of any machine element.

Assignment 5: Draw Isometric view for given orthographic views.

Part-B: Complete the following assignment using CAD Software

1. **Assignment 1:** Draw orthographic view of any machine element along with sectional view.
2. **Assignment 2:** Draw Isometric view for given orthographic views.
3. **Assignment 3:** Draw 3-D Modeling – Free hand sketching of any existing/innovative products/components.
4. **Assignment 4:**
 - Draw Plan for Single Storey Building (**Civil Engineering**)
 - Draw Layout of any product-based industry (**Mechanical Engineering**)
 - Engineering drawing such as Complex Circuit, Sensor Diagrams (**E&TC Engineering**)
 - Draw the Layout of Computer device with internal structure (**Computer & IT Engineering**)

Learning Resources

Textbooks:

1. Bhatt, N. D. and Panchal, V. M. (2016), “*Engineering Drawing*”, Charotar Publication, Anand, India.
2. K. Venugopal (2015), “*Engineering and Graphics*”, New Age International, New Delhi.
3. Jolhe, D. A. (2015), “*Engineering Drawing with Introduction to AutoCAD*”, Tata McGraw Hill, New Delhi.
4. Rathnam, K. (2018), “*A First Course in Engineering Drawing*”, Springer Nature Singapore Pte. Ltd., Singapore.

Reference Books:

1. Madsen, D. P. and Madsen, D. A. (2016), “*Engineering Drawing and Design*”, Delmar Publishers Inc., USA.
2. Bhatt, N. D. (2018), “*Machine Drawing*”, Charotar Publishing House, Anand, India.
3. Dhawan, R. K. (2000), “*A Textbook of Engineering Drawing*”, S. Chand, New Delhi.

4. Luzadder, W. J. and Duff, J. M. (1992), “*The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production*”, Peachpit Press, USA.

e-Resources

1. NPTEL Course: *Engineering Graphics and Design*
https://onlinecourses.nptel.ac.in/noc21_me128/preview
2. NPTEL Course: *Introduction and Geometric Construction*
<https://archive.nptel.ac.in/content/storage2/courses/112103019/module1/lec3/1.html>
3. NPTEL Course: *Computer Aided Engineering Drawing*
<https://archive.nptel.ac.in/courses/112/102/112102101/>

Pimpri Chinchwad Educational Trust's
Pimpri Chinchwad College of Engineering and Research, Ravet, Pune –
412101

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: First Year Engineering (2025 Pattern) **Semester: I/ II**
Course Code: PCC-101-ASH **Name of Course: Engineering Thermodynamics**

Total Credits: 03			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	1	2	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Asgmt.	Attd.	Quiz	TEE	Rubrics	Rubrics	
6	14	6	14	3	7	50	25	–	125

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

The primary objectives of this course are to:

1. To introduce the fundamentals of thermodynamics.
2. To understand the concepts of laws of thermodynamics.
3. To apply the concepts of statistical thermodynamics and triple point of water.
4. To understand the fuel combustion process, products of combustion and boiler draught.
5. To understand the properties of steam and their effect on performance of vapour power cycle.

Course Outcomes

On completion of this course, the students will be able to:

- PCC101.1 Describe the basics of thermodynamics with heat and work interactions.
- PCC101.2 Apply laws of thermodynamics to steady flow and non-flow processes.
- PCC101.3 Apply the concepts of statistical thermodynamics and triple point of water.
- PCC101.4 Analyse the fuel combustion process, products of combustion and boiler draught.
- PCC101.5 Determine the properties of steam and their effect on performance of vapour power cycle.

Course Content

Unit I: Fundamentals of Thermodynamics (05 Hours)

Introduction, Review of basic definitions, Zeroth law of Thermodynamics, Macro and Microscopic Approach, State Postulate, State, Path, Process and Cycles, Point function and Path function, quasi static process, Equilibrium, Temperature (concepts, scales, international fixed points and measurement of temperature.

First Law of Thermodynamics: Concept of heat and work, Sign convention and its conversion. First law of thermodynamics, Joules experiments, Equivalence of heat and work. Application of first law to flow and non-flow Processes and Cycles. Steady flow energy equation (SFEE), Applications of SFEE to various devices such as Nozzle, Turbine, Compressors, Boilers etc. PMM-I kind.

Unit II: Ideal Gas and laws of Thermodynamics (05 Hours)

Properties and Processes of Ideal Gas Law, Equation of State, Ideal Gas constant and Universal Gas constant, Ideal gas Processes- on P-v and T-s diagrams, Constant Pressure, Constant Volume, Isothermal, Adiabatic, Polytropic, Calculations of Heat transfer, Work done, Internal Energy

Second Law of Thermodynamics: Thermal reservoir, Heat Engine, Refrigerator and Heat pump: Schematic representation, Efficiency and Coefficient of Performance (COP), Carnot Theorem/Principles, Carnot Cycle.

Unit III: Statistical thermodynamics Specific Heat Capacities (05 Hours)

Kinetic Theory of Gases: Introduction, Assumptions of Kinetic Theory of Gases, Calculation of the Pressure of an Ideal Gas, RMS Speed.

Specific Heat Capacities of Gases: Two Kinds of Specific Heat Capacities of Gases (C_p C_v) Molar specific heat, Relation Between C_p and C_v for an Ideal Gas, De-termination of C_p C_v of a Gas, Phase Diagrams :Triple Point, Anomalous nature of water.

Unit IV: Fuels, Combustion, Steam Generators Boiler Draught (08 Hours)

Combustion theory, Combustion Equations, Stoichiometric Air-Fuel Ratio, Theoretical and Excess air requirements, Equivalence ratio, Analysis of products of combustion.

Steam Generators: Classification, Constructional details of low pressure boilers, Construction and working principle of boiler, Boiler mountings and accessories, Instrumentations required for safe and efficient operation.

Boiler Draught: Classification, Necessity of Draught, Natural draught, Determination of Height

of chimney.

Unit V: Properties of Pure substances Thermodynamics of Vapour Cycle (07 Hour)

Properties of Pure substances: Formation of steam, Phase changes, Properties of steam, Use of Steam Tables, Study of P-v, T-s and h-s plots (Mollier Chart) for steam, Dryness fraction, Change of Properties, Work and Heat transfer.

Thermodynamics of Vapour Cycle: Rankine Cycle, Introduction to Steam power Plant, Efficiency of Rankine Cycle, Effect of Varying operating parameters like Superheat, Boiler and Condenser Pressure on performance of Rankine cycle.

Engineering Thermodynamics Laboratory/Experiment

List of Experiments:

The Term work shall consist of successful completion of any seven Practical (from 1 to 9) and Industrial Visits.

Expt. No.	Practical Content
01	Joule's experiment to validate, first law of thermodynamics.
02	Survey of temperature sensors used in various thermal systems.
03	Determination of dryness fraction of steam using combined separating and throttling calorimeter.
04	Determination of HCV of solid or gaseous fuel using Bomb or Junker's calorimeter respectively.
05	Study and demonstration of Boiler mounting and accessories.
06	Thermodynamic Analysis of any System / Model by using any Computer Software.
07	Determination of specific heat at constant pressure and constant volume.
08	Demonstration on Exhaust Gas Analyser and Smoke meter.
09	Activity: Presentation based on any one of following 1. Hydrogen as fuel to IC engine and Fuel Cell. 2. CNG Engine and its comparison with petrol and diesel engines. 3. CBG Engine, Method of production and future scope. 4. Air Cooler, Effect of temperature, humidity, air velocity etc. on its performance. 5. Hybrid vehicles.
10	Industrial Visits Visit any Process Industry/Plant having Boiler equipped with Accessories. The visit report consists of • Details about the Industry/Process Plant. • Operational description of the Equipment with specification, its use, capacity, application etc.

Note

1. Perform any seven experiments from experiment No. 1 to 9.
2. Experiment No. 10 (Industrial Visit) is mandatory.

Learning Resources

Text Books:

1. P. K. Nag, *Engineering Thermodynamics*, Tata McGraw Hill Publications.
2. R. K. Rajput, *Engineering Thermodynamics*, EVSS Thermo, Laxmi Publications.
3. P. L. Ballaney, *Thermal Engineering*, Khanna Publishers.
4. C. P. Arora, *Thermodynamics*, Tata McGraw Hill.
5. Domkundwar, Kothandaraman and Domkundwar, *Thermal Engineering*, Dhanpat Rai Publishers.
6. M. M. Rathore, *Thermal Engineering*, Tata McGraw-Hill.

Reference Books:

1. Rayner Joel, *Basic Engineering Thermodynamics*, AWL-Addison Wesley.
2. Cengel and Boles, *Thermodynamics: An Engineering Approach*, McGraw Hill.
3. G. Van Wylen, R. Sonntag and C. Borgnakke, *Fundamentals of Classical Thermodynamics*, John Wiley & Sons.
4. Holman J. P., *Thermodynamics*, McGraw Hill.
5. M. Achuthan, *Engineering Thermodynamics*.
6. Steam Tables / Data book.

e-Resources:

1. <https://www.youtube.com/watch?v=rFDjZwdVr-U&t=84s>
2. <https://www.youtube.com/watch?v=9GMBpZZtjXM>
3. <https://www.youtube.com/watch?v=6JwhQtw3JFg>
4. <https://www.youtube.com/watch?v=zpmAV6pOAnM>

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: I/ II
Course Code: VSE-101-ASH Name of Course: Design Thinking and
Idea Laboratory

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
1	–	1	1	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	50	-	50

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. Understand design thinking principles and their application in engineering.
2. Understand key intellectual property rights, including patents and copyrights.
3. Develop innovative, user-focused solutions for real-world challenges.
4. Communicate and collaborate effectively in multidisciplinary teams.
5. Develop effective design pitching and presentation skills.

Course Outcomes

On completion of this course, the students will be able to:

- VSE101.1** IDENTIFY stages and concepts of Design Thinking.
- VSE101.2** EXPLAIN the concepts and significance of Intellectual Property Rights.
- VSE101.3** DEVELOP creative and innovative solutions to real-world problems
- VSE101.4** DEMONSTRATE effective communication and collaboration in multidisciplinary teams.
- VSE101.5** DEVELOP prototype, pitch, and/or IPR for innovative design solutions.

Note:

1. The 1hour-per-week lecture session aims to explain the concept of the respective course content in common.
2. The 2hour-per-week practical session provides students with hands-on experience in applying theoretical concepts. It enhances their understanding, critical thinking, and problem-solving skills through practical activities.

Course Content

Week 1-2: Introduction to Design Thinking and the Innovation Process

Conventional Thinking: - structured, logical, and linear approach to solving a problem. (Existing knowledge, proven methods, rules, and previously successful solutions).

Design Thinking: - user-centered, creative, and iterative approach to identify problems and develop innovative solutions. Exploring brainstorming, lateral thinking, mind mapping, SCAMPER, and other creativity methods. (Empathize → Define → Ideate → Prototype → Test).

Assignment-1: Problem Identification Using Design Thinking Process – Empathy Mapping. (Select a real-world problem faced by students, users, or a community. Study the problem from the user's perspective and prepare an Empathy Map).

Week 3-4: Intellectual Property Rights (IPR)

Fundamentals and Importance of Intellectual Property Rights: – Define IPR and explain the concept of intellectual property, Various Types of IPs. Understand the basic principles of ownership, protection, exclusivity, and commercialization of IPs.

Utility Patents and Design Patents: – Definition and purpose, Difference between Utility Patent and Design Patents, Basic patentability requirements like novelty, inventive step/non-obviousness, and industrial applicability/usefulness, Basic overview of the patent application process.

Assignment-2: Draft of Utility/Design Patent – Prepare and present a basic utility or design patent application for an innovative product or engineering solution.

Week 5-6: Prototyping and Testing

Introduction to Prototyping: – Purpose and importance of prototypes, Types: low-fidelity prototypes (Paper sketches, Storyboards, Cardboard models, Wireframes, Simple mock-ups etc.) and high-fidelity prototypes (Interactive digital prototypes, 3D-printed models, Functional electronic prototypes, Working software prototypes etc.)

Testing: – Planning and conducting prototype tests, User testing and feedback collection,

Usability and functionality testing. Analyze test results and user feedback, Identify problems and improvement areas, Refine the prototype.

Assignment-3: Prototype Development and Model Making – Develop, and refine physical prototypes to improve design solutions based on user feedback and test results for an innovative engineering solution proposed.

Week 7-8: Effective Communication and Team Collaboration

Effective Communication and Design Presentation: – Fundamentals of Effective Communication (Verbal, non-verbal, written, and visual communication), Visual Communication in Design (Sketches, diagrams, models, and infographics), Design Presentation Techniques (problem, user needs, concept, and solution).

Collaboration in Multidisciplinary Teams :– Fundamentals of Team Collaboration (Meaning and importance of collaboration, Characteristics of effective teams, Team roles and responsibilities), Working in Multidisciplinary Teams (Understanding different disciplines and perspectives, Integrating technical and non-technical expertise, Knowledge sharing and coordination).

Assignment-4: PPT Presentation – Form a team and work together to identify a real-world problem, develop a user-centered solution, and present the solution to a panel. (Problem statement, Team roles and responsibilities, Design concept/prototype, Team presentation).

Week 9-10: Prototype Demonstration and Pitching

Prototype Demonstration: – Purpose and importance of prototype demonstration, Explaining prototype features and functionality, Demonstrating the prototype step-by-step, Highlighting user needs addressed.

Intellectual Property Rights for Design Solutions: – Register the innovative solution and patents prepared to IP India (attached Patent Forms and Patent Submission Acknowledgment).

Assignment-5: Prototype Pitch Challenge – Students demonstrate their prototype and deliver a 5–8 minute pitch explaining the problem, user needs, solution, prototype, and expected impact.

Learning Resources

Text Books:

1. Robert Curedale, *Design Thinking: Process and Methods*, 5th Edition.

Reference Books:

1. Design Thinking: Understanding How Designers Think and Work by Nigel Cross.
2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.
3. The Design of everyday Things by Don Norman.
4. Design Thinking: Creativity and Innovation by S. Balaram.
5. Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days by Jake Knapp.
6. Creative confidence: Unleashing the Creative Potential Within Us All by Tom Kelley and David Kelley

e-Resources:

1. <https://www.designdisciplin.com/the-story-of-design-thinking/>
2. <https://online.hbs.edu/blog/post/what-is-design-thinking>

Sample Case Studies

1. **Design Thinking in Healthcare** Redesigning a patient's waiting room experience.
2. **Design Thinking in Product Development** the evolution of the smartphone.
3. **Tata Nano:** the people's Car, explore how TATA motors aimed to revolutionize the automobile industry by creating an affordable and compact car for the masses.
4. **Ola Cabs:** Transforming Transportation in India, learn how Ola, and Indian ride-sharing platform, disrupted the traditional taxi industry by applying innovative design thinking to its services and business model.
5. **Flipkart:** E-commerce success story, on of India's leading e-commerce platforms, employed design thinking to grow its business and offer a wide range of products and services.
6. **Swiggy:** redefining food delivery, investigate how swingy, an Indian food delivery platform, leveraged design thinking to enhance the food delivery experience for customers and partner restaurants.

Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering & Research
Ravet, Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: Applied Sciences and Humanities (2025 Pattern) Semester: II

Course Code: CCC-151-ASH

Name of Course: Life Skills-II

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
1	–	1	1	–	2

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	25	-	25

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. This course will introduce the students to the skills like time management, career planning, financial literacy.
2. This course will train the students in developing and utilizing their skills in visual arts, performing arts and sports for their physical, mental and emotional wellbeing.

Course Outcomes

On completion of this course, the students will be able to:

CCC151.1 Understand importance of time as a resource and the techniques to manage the available time effectively.

CCC151.2 Develop minute observation, critical thinking and problem solving abilities.

CCC151.3 Apply the knowledge gained in professional development and financial literacy to plan their own careers.

CCC151.4 Apply the techniques learned to develop competence in art and sports to be pursued as a life-long hobby for contentment and as a career for more intent seeker.

Course Content Laboratory

Week I: Teamwork and Collaboration

Practical: Building effective teams; Importance of teamwork in projects.

Activity: Bridge Building Challenge-In groups, students design and construct a bridge using limited materials (e.g., Newspapers, popsicle sticks, straws, or toothpicks) that can support a certain weight.

Assignment: Write a note on teamwork skills.

Week II: Human Relationships

Practical: Dynamics of family relationships. Empathy, respect, affection. Emotional intelligence. Nature of friendship and its importance. Guru-Shishya relation and expectations.

Assignment: Take an online test on EI Quotient and attach the report.

Week III: Yoga Meditation

Practical: Practice of Yoga postures in sitting and standing positions.

Assignment: Write a note on benefits of each sitting and standing posture (āsana). Prepare a collage of your own sitting Yoga posture and standing Yoga posture photographs.

Week IV: Yoga Meditation

Practical: Introduction to Prāṇāyām and Meditation. Practice of Prāṇāyām and guided meditation.

Assignment: Write a note on benefits of Prāṇāyām and Meditation. Create a personal Yoga-Prāṇāyām-Meditation plan or agenda.

Week V: Yoga Holistic Health

Practical: Practice of selected Yoga Asanas, Pranayama, relaxation techniques and Yoga practices for physical and mental well-being.

Week VI: Physical Fitness Training

Practical: Warm-up and conditioning exercises; introduction to endurance, strength, flexibility, agility and explosive strength; practice of fitness tests

Week VII: Financial Literacy

Practical: Guest interactive lecture on Finance and Economics, earning versus spending, Basics of budgeting, saving, and investing. Skills to manage expenses and prioritize spending.

Assignment: Write a weekly budget with your income (as in pocket-money) versus your likely expenses. Now make detailed and minute entries of your expenses for a week.

Week VIII: Practical Examination

Practical: Physical Fitness Assessment: 1. Cardiovascular Endurance: 12-Minute Run/Walk Test and Harvard Step Test. 2. Flexibility: Sit and Reach Test. 3. Abdominal/Muscular Endurance: Sit-Ups Test. 4. Agility: Shuttle Run Test. 5. Explosive Strength: Standing Broad Jump etc.

Reference Books:

1. *Getting Things Done: The Art of Stress-Free Productivity* by David Allen.
2. *The Financial Diet: A Total Beginner's Guide to Getting Good with Money* by Chelsea Fagan and Lauren VerHage.
3. *Critical Thinking: A Beginner's Guide* by Sharon M. Kaye.
4. *Career Development: A Human Resource Development Perspective* by Robert A. Day.
5. *The Complete Guide to Clean Eating: A Healthy Lifestyle and Clean Food Cookbook for Everyone* by Anna Jones.
6. *Sports Fitness: A Comprehensive Guide to Achieving Your Goals* by James O. Naughton.
7. *Mindset: The New Psychology of Success* by Carol S. Dweck. Publisher: Ballantine Books, 2019.
8. *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma* by Bessel van der Kolk.

e-Resources

1. *Getting Things Done* by David Allen – E-book available on platforms like Google Books. Also refer to related articles on time management at [Mind Tools](#).
2. *Time Management for Personal & Professional Productivity* – Online course on [EdX](#).
3. *Work Smarter, Not Harder: Time Management for Personal & Professional Productivity* – Available on [Coursera](#).
4. [Coursera Platform](#) – Offers a variety of life skills courses delivered by top universities and professionals worldwide.
5. *National Endowment for Financial Education (NEFE)* – Comprehensive financial literacy resources available at www.nefe.org.

Pimpri Chinchwad Educational Trust's
Pimpri Chinchwad College of Engineering and Research, Ravet, Pune –
412101

(An Autonomous Institute affiliated to Savitribai Phule Pune University, Pune)

Department: First Year Engineering (2025 Pattern) **Semester: I**
Course Code: IKS-101-ASH **Name of Course: Indian Knowledge System**

Total Credits: 02			Teaching Scheme (Hrs/week)		
Lecture	Tutorial	Practical	Lecture	Tutorial	Practical
2	–	–	2	–	–

Examination Scheme

FA						SA	CA/ TW	PE	TOTAL
FA-1 (Unit 1 & 2)		FA-2 (Unit 3 & 4)		FA-3 (Unit 5)		All Units	All Units	All Units	
Attd.	UT	Attd.	Viva/ Oral	Attd.	Quiz	TEE	Rubrics	Rubrics	
-	-	-	-	-	-	-	50	-	50

Abbreviations Used

Abbr.	Full Form	Abbr.	Full Form
FA	Formative Assessment	SA	Summative Assessment
CA / TW	Continuous Assessment / Term Work	PE	Practical End-Semester Exam
Attd.	Attendance	UT	Unit Test
Asgmt.	Assignment	Quiz	Subjective/ Objective Quiz
TEE	Term End Exam		

Course Objectives

In this course we aim to enable student to

1. Understand the historical, philosophical, and scientific foundations of Indian Knowledge Systems (IKS).
2. Explore ancient Indian contributions in mathematics, astronomy, metallurgy, and engineering.

3. Learn about Ayurveda, yoga, and holistic well-being practices for personal and professional application.
4. Examine the evolution of language, literature, and knowledge transmission through classical texts and oral traditions.
5. Analyze the relevance and application of IKS in modern scientific, technological, and professional fields.

Course Outcomes

On completion of this course, the students will be able to;

IKS101.1 : Describe the significance and evolution of Indian Knowledge Systems.

IKS101.2: Analyze key contributions of ancient Indian scholars in science, mathematics, and engineering.

IKS101.3 : Apply principles of Ayurveda and yoga for well-being and holistic health.

IKS101.4: Evaluate the role of language, literature, and knowledge transmission in shaping professional ethics and skills.

IKS101.5: Integrate IKS principles into contemporary scientific, technological, or sustainable practices.

Course Content

Unit I: Foundations of Indian Knowledge Systems(06 Hours)

Introduction to IKS: Significance and modern relevance, Historical Context: Key events shaping IKS with timelines and maps, Philosophical Concepts: Dharma, Karma, and Yoga in modern life and professions.

Unit II: Key Contributors and Scientific Developments in IKS (06 Hours)

Key Contributors: Aryabhata, Brahmagupta, Kautilya, Charak, Sushruta, etc, Mathematics Astronomy: Contributions of Aryabhata, Brahmagupta, Bhaskara decimal system, zero, planetary models, Metallurgy Material Science: Wootz steel, zinc extraction, iron pillar of Delhi.

Unit III: Engineering, Sustainability, and Environmental Science (06 Hours)

Ancient Engineering Marvels: Temple architecture, stepwells, town planning (Indus Valley), Sustainability Practices: Vrikshayurveda, water conservation, organic agriculture, Traditional Knowledge in Environmental Management.

Unit IV: Ayurveda, Yoga, and Holistic Well-being (06 Hours)

Fundamentals of Ayurveda: Tridosha theory (Vata, Pitta, Kapha) and its applications, Ayurvedic Diet Lifestyle: Dinacharya (daily routine), Ritucharya (seasonal routine), Sattvic diet, Yoga for Physical Mental Well-being: Asanas, Pranayama, and their scientific benefits, Holistic Healing Approaches: Naturopathy, Siddha, Unani, and their integration into modern medicine.

Unit V: Language, Literature, and Knowledge Transmission in IKS (06 Hour)

Language Development and Timelines: Evolution of Sanskrit, Pali, Prakrit, and Tamil in knowledge dissemination, Guru-Shishya Parampara: Traditional education system, oral traditions, and their relevance today, Classical Texts Their Professional Relevance: Classical texts of ancient times for ethics leadership, Vedas, Upanishads and their relevance in today's world, Panchatantra Storytelling Traditions: Practical wisdom, communication skills, and problem-solving through ancient narratives

Learning Resources

Reference Books

1. Bose, D. M., Sen, S. N., & Subbarayappa, B. V. (1971) – *A Concise History of Science in India*, Indian National Science Academy, New Delhi.
2. Joseph, George Gheverghese (1991) – *The Crest of the Peacock: Non-European Roots of Mathematics*, Princeton University Press, USA.
3. Sharma, P. V. (Translator) (2014) – *Charaka Samhita*, Choukhamba Orientalia, Varanasi.
4. Kautilya (Translated by R. Shamasastry) (1915) – *Arthashastra*, Government Press, Bangalore.

Text Books

1. Mahadevan, B. (2022) – *Introduction to Indian Knowledge Systems: Concepts and Applications*, PHI Learning Pvt. Ltd., New Delhi.
2. Kapoor, Kapil (2020) – *Indian Knowledge Systems*, D.K. Printworld (P) Ltd., New Delhi.
3. Dharampal (2000) – *The Beautiful Tree: Indigenous Indian Education in the Eighteenth Century*, Other India Press, Goa.

e-Resources

1. Indian Knowledge Systems (IKS), AICTE – <https://iksindia.org>
2. National Digital Library of India (NDLI) – <https://ndl.iitkgp.ac.in>
3. Indira Gandhi National Centre for the Arts (IGNCA) – <http://ignca.gov.in>
4. Ayush Research Portal (Ministry of AYUSH) – <https://ayushportal.nic.in>
5. Bharat Vidya (IGNCA & Ministry of Education) – <https://bharatvidya.in>

List of Assignments

1. Comparative analysis of ancient and modern knowledge systems (e.g., Ayurveda vs. Allopathy, Yoga vs. Modern Fitness).
2. Solve three Vedic mathematics problems and create a 3D model/sketch of an ancient stepwell, temple, or Indus Valley town.
3. Identify medicinal plants, compare Ayurvedic and modern medicine, and design a personalized Ayurvedic lifestyle chart based on **Tridosha** theory.
4. Research ancient Indian dietary habits based on Ayurveda and traditional food practices. Create a 7-day meal plan following principles like **Sattvic diet**, **Ritucharya**, and balanced nutrition.
5. Analyze ethical and leadership lessons from **Bhagavad Gita** or **Panchatantra** and write a case study on their relevance in the professional world.
6. Visit an ancient Indian monument (e.g., Ajanta-Ellora, Konark Sun Temple, Rani Ki Vav) and document its architectural, historical, and scientific significance.
7. Prepare a presentation on how Indian Knowledge Systems can be applied in modern professions like engineering, medicine, or architecture.
8. Choose a significant personality (e.g., Aryabhata, Charaka, Kautilya) or an ancient Indian artwork (e.g., Madhubani painting, Ajanta murals) and present its contributions.
9. Write an essay on any one of the philosophical doctrines of IKS and write its modern relevance.