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 2025–2026

Mechanical Engineering

Effective from Academic Year: 2025-26

PCET's Pimpri Chinchwad College of Engg. & Research
An Autonomous Institute
Ravet, Pune - 412101

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

S. A. Patil

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

PCET's Pimpri Chinchwad College of Engg. & Research
An Autonomous Institute
Ravet, Pune - 412101

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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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 study the Mean Value Theorems and their generalizations, leading to Taylor's and Maclaurin's series, useful in finding expansion of function in ascending powers of x.
2. To find full range and half range Fourier series representation of periodic functions and obtain harmonic components of periodic functions and their significance in engineering applications.
3. To understand the derivatives of multivariable functions, Euler's Theorem on homogeneous function, their role in finding extreme values. Apply the Jacobian to determine partial derivatives of implicit functions and to check functional dependence.

4. To learn fundamental concepts of matrices and linear algebra, including solving systems of linear equations, linear dependence and independence.
5. To compute eigenvalues and eigenvectors of symmetric and Non symmetric matrices, apply the Cayley-Hamilton theorem to find inverse of a Matrix, Diagonalization of the matrix.

Course Outcomes

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

BSC-101.1 Apply mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.

BSC-101.2 Analyze the function to obtain the Fourier series representation and harmonic components of periodic functions useful in engineering applications.

BSC-101.3 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.

BSC-101.4 Apply fundamental concepts of matrices and linear algebra to solve systems of linear equations, check linear dependence and independence.

BSC-101.5 Apply Eigen values, Eigen vectors and use it to diagonalize a Matrix which is applicable to engineering problems.

Course Content

Unit I: Single Variable Calculus (06 Hours)

Mean Value Theorem: Rolle's, Lagrange's and Cauchy's Theorem, Expansion of Function: Taylor's and Maclaurin's Series.

Unit II: Fourier Series (06 Hours)

Fourier series: Full range and Half rage Fourier series expansion of periodic function with standard and arbitrary period, Harmonic analysis, Applications to problems in Engineering.

Unit III: Function of Several Variables and its Applications (07 Hours)

Partial Derivative: Introduction to function of several variables, partial derivatives, Euler's theorem on homogeneous functions, partial derivative of composite function. Applications of partial differentiation, Jacobian, functional dependence, maxima and minima of function of two variables.

Unit IV: Linear Algebra : Matrices, System of linear Equation (06 Hours)

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

Unit V: Linear Algebra : Eigen Values and Eigen Vectors, Diagonalization (05 Hour)

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

Tutorial

List of Tutorials

1. Examples on Mean Value Theorem, Taylors Theorem.
2. Examples on Maclaurin's Theorem.
3. Introduction to MATLAB Use of MATLAB for mean value theorems.
4. Examples on Full Range and Half range expansion.
5. Examples on Harmonic Analysis.
6. Use of MATLAB to find Fourier coefficient.
7. Examples on Euler's Theorem, Composite function.
8. Examples on Jacobian, maxima Minima.
9. Use of MATLAB to find extreme values of a function.
10. Examples on system of Linear Equations, LI , LD.
11. Examples on Eigen Values and Eigen Vectors, Diagonalization.
12. Use of MATLAB to solve system of Linear Equations and to find Eigen values and Eigen Vectors.
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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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 Ultrasonics.
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 - CO_2 Laser, Applications of lasers – Holography, Industrial, IT, Medical.
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, 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: 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.

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

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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

Abbreviations Used

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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 how C programs are structured and how input/output operations work.
2. To demonstrate program execution using control flow.
3. To use 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 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, Data Types, Variables, 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 (06 Hours)

Introduction to Functions - Function declaration, definition, and calling. Return values and function parameter passing, Recursive functions,

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.

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.
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 fundamental programming constructs to design and implement C programs that solve basic mathematical and logical problems using structured problem-solving techniques.

ESC 102.2 Develop modular C programs by utilizing functions, arrays, strings, and structures to construct solutions for computational problems.

ESC 102.3 Demonstrate problem-solving skills by implementing C programs that utilize arrays, pointers, recursion, dynamic memory allocation, and file operations to develop solutions for computational tasks.

Programming in"C" Laboratory

These assignments are structured progressively based on cognitive complexity, beginning with foundational concepts such as input/output operations and arithmetic expressions, and advancing to more complex topics including dynamic memory management and recursive function implementation. Completing these tasks facilitates a comprehensive understanding of core C programming constructs, tailored for first-year engineering students.

Need to complete any 8 from given below (including simple, average and advance assignments) and one mini-project in a group of maximum 5 students:

Simple Assignments: (Minimum 4)

These assignments introduce fundamental programming concepts, focusing on syntax, basic data types, and control structures.

List of Experiments

1. Write a program that identifies the largest of three input numbers.
2. Write a program to calculate the factorial of a number.
3. Write a program that checks if a given number is prime.
4. Write a program that calculates the sum of digits of a given integer.
5. Write a program that performs addition, subtraction, multiplication, and division based on user input.
6. Write a program that determines whether a given integer is even or odd.
7. Write a program that identifies whether a number is divisible by 7.
8. Write a program to print multiplication table of a given number.

Average Assignments: (Minimum 3)

Focus on intermediate topics such as function, structure,string , array and file operations.

1. Write a program to reverse a number.
2. Write a program to display the Fibonacci series up to N terms.
3. Write a program to Copy the contents of one file to another file.
4. Write a program to search an element in an array using linear search
5. Write a program to Reverse a string without using a library function.

6. Write a program using structures to store student information such as name, roll number, and marks..

Advanced Assignments: (Minimum 1)

These assignments involve working with arrays, pointers, recursion and file operations

1. Write a program to calculate the sum of elements in an array using pointers.
2. Write a program to multiply two matrices.
3. Write a program to find the greatest common divisor (GCD) and least common multiple (LCM) of two numbers using recursion.
4. Write a program that dynamically allocates memory for an array and deallocates it.
5. Write a program to create a file, write data to it and read data from the 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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CA / TW	Continuous Assessment / Term Work	**PE**	Practical End-Semester Exam
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:

ESC104.1	Understand basic concept of forces, moments and couples in two-dimension force system.
ESC104.2	Apply concept of free body diagram for static equilibrium in two-dimension and three-dimension force system.
ESC104.3	Analyze the practical example involving friction and application of two force members.
ESC104.4	Analyze rectilinear and curvilinear motion of particle.
ESC104.5	Apply Newtons' second law, work energy principle, and impulse momentum principle to particle motion.

Course Content

Unit I: Fundaments of Mechanics (06 Hours)

Fundaments 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, centroid of plane lamina.

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 coplanar and non-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, Ladder friction and block 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 space force system
4. Coefficient of Restitution
5. Study of curvilinear motion

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. 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'stheorem

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

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
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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. 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:

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

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

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

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

BSC-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

Add-On Experiment:
(a) https://de-iitr.vlabs.ac.in
e-Books:
(a) 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 *Note: Photo evidences of above are expected in the report.*
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 *Note: Product must be usable for the Institute or domestic purpose. Also write a sequence of operations in the report along with production time.*
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	**Write a program** for the sequence of operations performed to develop any mechanical component using any suitable programming language.
06	**Create simple 3D models** using CAD software and print using a 3D printer, including pre- and post-processing. *(Component manufactured should be related to the specific branch)*
07	**Inspection of component** manufactured during preceding practical using various measuring instruments such as Vernier Caliper, Micrometer, Height Gauge, etc.

Important Notes:

1. All experiments to be performed in **groups of four to five students**.
2. There should not be any **repetition of layout/jobs/programs/models**.
3. For **Experiments 1 and 2**, students are supposed to visit a **nearby workshop or industry**.
4. For **Experiment 3**, students are supposed to prepare **useful parts/products**.
5. For **Experiment 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_74K01KX9YtVZACpOoFYy6oaJIC

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

Unit I: Introduction to Life Skills and Time Management (05 Hours)

Introduction And Importance of Different life skill, Techniques for SMART Goal, Personality Development, SWOT Analysis , Time Mgmt in Engg and Technology, Case studies- PDCA Cycle

Unit II: Yoga Meditation (05 Hours)

Introduction to yoga, Paths of Yoga, Patanjali's Yoga Philosophy, Yogic concept of Health, Meditation

Unit III: Health Well being (05 Hours)

Introduction to health well being , Healthy balance diet, Diet mental health , Dietary choices , Types of nutrition

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, Dhyan, 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: Yoga & Meditation

Practical: Practice of Surya-Namaskar and Yoga postures in supine position.
Assignment: Write note on benefits of each supine position asan. Make a collage of your own Surya-namaskar photographs and supine Yoga posture photographs.

Week VI: Yoga & Meditation

Practical: Practice of Surya-Namaskar and Yoga postures in prone position.
Assignment: Write note on benefits of ach prone position asan. Make a collage of your own prone Yoga posture photographs.

Week VII: Critical Thinking Problem-Solving:

Practical: Case Study Analysis of a real-world Engineering failure or success (e.g., the Challenger disaster, Environmental issues, etc). Research on the case, root-cause analysis, discussion and probable solution.
Assignment: Write a report on key issues in the case study and propose alternative strategies that the Engineers could have taken.

Week VIII: Critical Thinking Problem-Solving

Practical: Brain Teaser Competitions/ Blind Coding Competition.
Assignment: Create your own brain teasers (at least 2) related to any Engineering concepts.

Week IX: Health and Well-being

Practical: Introduction to Health and Well-being, Definition of health; Physical, mental and emotional well-being.
Activities: Group discussions on personal health experiences/Guest Lecture on Health and Wellness.
Assignment: Write a daily routine that you should follow, which will lead to a healthy and happy you.

Week X: Nutrition and Healthy Eating

Practical: Importance of balanced diet. Nutritional requirements for students.
Activity: Guest Lecture on Diet Nutrients.
Assignment: Prepare a chart of typical 50 food items you frequently eat, with the amount calories consumed. Against each, also write the number of steps you should walk each day to burn those calories.

Week XI: Dietary Choices and Impact on Health

Practical: Understanding macronutrients and micronutrients; How diet affects performance and health.
Activities: Cooking workshop on healthy snacks /Fireless Cooking Competition.
Assignment: Prepare a diet chart for yourself, clearly indicating the schedule and food items you would consume for a whole week.

Week XII: 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.
Assignment: Gifting the Diyas and Lanterns to orphanage/Oldage Homes and make their Diwali Special.

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

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: 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

1. Mathematical modeling of physical systems through differential equations.
2. Advanced integration methods useful to solve multiple integrals and their real-world applications.
3. Curve tracing, and concepts of solid geometry.

Course Outcomes

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

BSC-151.1 : Apply advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, and Differentiation under integral sign to solve Integrations.

BSC-151.2: Analyze the curve for a given equation in Cartesian, Polar form and Rose curve and trace it.

BSC-151.3:Apply the concepts of solid geometry to solve problems on sphere, cone, and cylinder in a comprehensive manner.

BSC-151.4: Apply integration techniques to solve multiple integrals and their applications.

BSC-151.5: Apply the effective mathematical tools for solving first order ordinary differential equation and use them to Model physical systems.

Course Content

Unit I: 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 II: 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 III: Solid Geometry (06 Hours)

Basic of Three Dimensional Geometry, Spherical polar and cylindrical coordinate systems. Using different concepts of 3-D geometry to find equation of Sphere: Tangent Plane, Orthogonal Sphere, Sphere passing through circle in 3-D. Equation of right circular cone and equation of right circular cylinder.

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: Differential Equations of first order and its applications (06 Hour)

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.

List of Tutorials:

1. Examples on Reduction Formulae, Gamma functions.
2. Examples on Beta functions, Differentiation Under Integral Sign.
3. Use of **MATLAB** to solve integrals.
4. Examples on Curve Tracing.
5. Examples on Sphere, right circular Cone and right circular cylinder.
6. Use of **MATLAB** to trace a curve.
7. Examples on Double and Triple integrations, change of order of integration.
8. Examples on Applications to find Area, Volume.
9. Use of **MATLAB** to solve multiple integration and its graphical presentation.
10. Examples on Exact, Reducible to exact and Linear Differential Equations.
11. Examples on Applications of Differential Equation.
12. Use of MATLAB to solve differential Equation and show the solution graphically.
13. Guest lecture on Financial Planning and Assignment on it.

Learning Resources

Reference Books

(a) Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
(b) Advanced Engineering Mathematics by M. D. Greenberg (Pearson Education)
(c) Advanced Engineering Mathematics by Peter V. O'Neil (Thomson Learning)
(d) Thomas' Calculus by George B. Thomas (Addison Wesley, Pearson)
(e) Applied Mathematics (Vol. I Vol. II) by P.N.Wartikar and J.N.Wartikar Vidyarthi Griha Prakashan, Pune.
(f) Elementary Linear Algebra. by Ron Larson and David C. Falvo (Houghton Mifflin Harcourt Publishing Company)
(g) MATLAB An Introduction with Applications by Amos Gilat, JOHN WILEY SONS, INC

Text Books

(a) Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill)
(b) Higher Engineering Mathematics by B. S. Grewal (Khanna Publication)

e-Resources

A NPTEL course on Engineering Mathematics II by Prof. Jitendra Kumar
(a) Link:https://nptel.ac.in/courses/111105121

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: 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. Top-down and bottom –up approach. Fundamentals of Sensors and its types. Nano-chips and Nano coatings. Recent trends of nanomaterials and its applications.

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 and anodic 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.

List of Experiment

1. To determine the hardness of water by the EDTA method.
2. To determine the alkalinity of water.
3. To determine the strength of strong acid using a pH meter.
4. o determine the maximum wavelength of absorption of CuSO, verify Beer's law and find the unknown concentration of the given sample.
5. Titration of a mixture of weak acid and strong base using a conductometer.
6. Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin
7. Proximate analysis of coal.
8. To coat copper and zinc on an iron plate using electroplating.
9. To Study Chemsketch/ Chemdraw Software.
10. Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles./Synthesis of Iron Oxide nanoparticles.
11. Recent trends/ advancement in Chemistry.

Learning Resources

Reference Books

(a) Water and Wastewater Technology: Mark J. Hammer, Pearson Publication.
(b) Water Pollution Control: A Guide to the Use of Water Quality Management Principles" by David H. Paull, EF Spon Publication.
(c) Instrumental Methods of Chemical Analysis, G. R. Chatwal S. K. Anand, Himalaya Publishing House.
(d) Spectroscopy of organic compounds, IIed, P. S. Kalsi, New Age-International Ltd., Publisher.
(e) Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadev Sreedhar, Wiley Eastern Limited.
(f) Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadev Sreedhar, Wiley Eastern Limited.

Text Books

(a) Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand Company Ltd.
(b) Engineering Chemistry by O. G. Palanna, Tata Magraw Hill Education Pvt. Ltd.
(c) Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria Sons Publisher.
(d) Textbook of Engineering Chemistry: Shashi Chawla, Dhanpatrai Publication.

e-Resources

i. https://chem.nju.edu.cn/_upload/article/files/b5/6f/01f0f2434d708df797208aea2613/83f2b441-65ee-44a6-ac47-ed21db462c5d.pdf.
ii. .https://www.researchgate.net/publication/259118068

MOOC / NPTEL:

i. https://nptel.ac.in/courses/113104082
ii. https://nptel.ac.in/courses/1221060252

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-151-ASH **Name of Course: Pyhton 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 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 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, constants, and data types, 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, Pass, nested loops.

Unit III: Functions (06 Hours)

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

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

Introduction to OOP and its features. Classes and objects, Instance variables and method, class constructor and destructor, Class variable and object variable, Access specifiers.

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

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

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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. 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 fundamental Python programming constructs to develop programs that demonstrate solutions for basic computational problems.

ESC-152.2 Develop Python programs by applying flow control statement and functions to develop solutions for mathematical computations, problem-solving tasks.

ESC-152.3 Implement Python programs by applying object-oriented principles and utilizing external libraries to analyze data and develop real-world applications.

Python Programming Laboratory

These practical sessions progressively build students' proficiency in advanced programming constructs and problem-solving methodologies, establishing a solid foundation in Python programming.

Need to complete any 8 from given below (including simple, average and advance assignments) and one mini-project in a group of maximum 5 students:

Simple Assignments: (Minimum 4)

Introduces basic concepts like variables, conditionals, loops, and input/output.
List of Experiments

1. Take two numbers as input and print their sum.
2. Check whether a number is positive, negative, or zero
3. Check whether a given number is odd or even.
4. Find the factorial of a number.
5. Write a program to check whether a number is prime or not.
6. Generate the multiplication table of a given number.
7. Write a program to swap numbers.
8. Take two numbers as input and find the largest number from three numbers.
9. Check whether a year is a leap year

Average Assignments: (Minimum 3)

Focus on intermediate topics such as functions, OOP concepts, Python libraries.

1. Write a function to generate the Fibonacci series up to n terms.
2. Find the largest and smallest number from a list.
3. Write a program that calculates the sum of digits of a given number.
4. Check if a number is an Armstrong number.
5. Write a function to calculate the area of a circle, square, or rectangle.
6. Define a class Rectangle to calculate area and perimeter.
7. Plot a line graph and bar chart using Matplotlib.

Advanced Assignments: (Minimum 1)

Involves object-oriented programming, and external libraries/APIs for real-world applications.

1. Create a Bank Account class with methods for deposit, withdrawal, and balance inquiry.
2. Design a Student class that accepts student information and calculates grades based on marks.
3. Create a NumPy array and perform element-wise addition and multiplication.
4. Find the mean, median, and standard deviation of a NumPy array.
5. Create a DataFrame using dictionaries and lists.
6. Load data from a CSV file using Pandas and display basic statistics.
7. Create a pie chart for visualizing category-wise data.

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 Education 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-MECH **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	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), Constant volume gas thermometer and constant pressure gas thermometer, mercury in glass thermometer.
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, Throttling Processes (Open and Closed systems), 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, Kinetic Interpretation of Temperature, Deductions from Kinetic.
Specific Heat Capacities of Gases: Two Kinds of Specific Heat Capacities of Gases, Molar specific heat, Relation Between Cp and Cv for an Ideal Gas, Determination of Cp of a Gas, Determination of Cv of a Gas, Equipartition of Energy, 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, Enthalpy of formation, Adiabatic flame temperature.

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, Comparison of Carnot cycle and 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.

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

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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. Learn to use the Empathize, Define, Ideate, Prototype, and Test phases to create user-centered designs.
2. Gain knowledge of patents, copyrights, and licensing to protect designs.
3. Use ideation and prototyping techniques to generate and refine design solutions
4. Develop skills in collaboration, conflict resolution, and co-creation within teams.
5. Learn to pitch and present designs effectively to stakeholders using visuals and storytelling.

Course Outcomes

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

VSE101.1 Remember and recall the Design Thinking methodology (Empathize, Define, Ideate, Prototype, Test), including user research, personas, and defining user needs.

VSE101.2 Understand and apply Intellectual Property Rights (IPR) concepts for protecting and commercializing design solutions, including copyright, patents, and licensing strategies.

VSE101.3 Create innovative solutions using ideation, collaborative brainstorming, and prototyping techniques, incorporating iterative testing feedback.

VSE101.4 Analyze team dynamics and design challenges to identify key problems and insights, and evaluate different approaches to collaboratively solve design challenges.

VSE101.5 Evaluate and present design solutions persuasively using storytelling, visuals, and design principles, integrating feedback to refine prototypes.

Course Content

Week I: Introduction to Design Thinking and the Innovation Process

Lecture: Overview of Design Thinking: The 5 Phases (Empathize, Define, Ideate, Prototype, Test)
Key Concepts: User-centered design, iterative process, empathy, problem-solving
Activity: Group icebreaker to demonstrate iterative problem-solving
Assignment: Reflection on real-world examples of design thinking
COs Addressed: CO1

Week II: Intellectual Property Rights (IPR) – Part 1: Introduction and Patents

Lecture: Introduction to Intellectual Property Rights (IPR), focusing on Utility Patents and Design Patents
Key Concepts: IPR for design protection, patenting ideas, licensing, and commercialization
Activity: Discuss IPR importance in the design process; explore patenting for product designs
Assignment: Create a strategy for protecting your design project with potential IPR issues
COs Addressed: CO2

Week III: Intellectual Property Rights (IPR) – Part 2: Copyrights & Licensing

Lecture: Focus on Copyrights in Design Thinking, licensing, and ownership
Key Concepts: Copyrights, licensing, ownership, protecting designs through copyrights
Activity: Discuss strategies for protecting designs and licensing
Assignment: Develop a plan to protect intellectual property using copyright and licensing
COs Addressed: CO2

Week IV: Empathize & Define – Understanding the User and Framing the Problem

Lecture: Techniques for user research (Interviews, Observations, Immersion) and how to define problems based on insights
Key Concepts: Empathy, user personas, stakeholder analysis, problem statement, Point of View (POV)
Activity: Conduct user interviews, build personas, and write a POV statement
Assignment: Refine the problem definition and create a concise problem statement
COs Addressed: CO1

Week V: Ideate – Generating Creative Solutions

Lecture: Techniques for ideation – Brainstorming, Mind Mapping, SCAMPER
Key Concepts: Divergent thinking, creative confidence, sketching ideas
Activity: Collaborative brainstorming session and generating multiple solutions
Assignment: Create at least five potential solutions through sketches
COs Addressed: CO3

Week VI: Prototype – Building Tangible Solutions

Lecture: Prototyping methods (low vs. high fidelity prototypes)
Key Concepts: Rapid prototyping, feedback loops, iterating designs
Activity: Build low-fidelity prototypes (e.g., paper prototypes, wireframes)
Assignment: Construct a prototype of your selected idea
COs Addressed: CO3

Week VII: Test & Experimentation – Getting Feedback and Iterating

Lecture: Techniques for testing prototypes (Usability Testing, A/B Testing)
Key Concepts: Iterative testing, refining designs based on feedback
Activity: Conduct usability tests on prototypes with peers and collect feedback
Assignment: Analyze user feedback and iterate on the design
COs Addressed: CO3

Week VIII: Introduction to the Idea Lab & Teamwork

Lecture: What is an Idea Lab? Tools, resources, and fostering creativity. Roles and effective teamwork in design thinking projects
Key Concepts: Cross-disciplinary teams, collaborative environment, rapid experimentation, roles in teams, communication
Activity: Explore tools in the Idea Lab (e.g., 3D printing, digital tools) and form project teams
Assignment: Brainstorm innovative project ideas for the Idea Lab and select a design challenge to work on
COs Addressed: CO5

Week IX: Collaborative Design Challenge and Prototyping

Lecture: Best practices for teamwork in a collaborative lab environment. The importance of iteration and feedback in design

Key Concepts: Co-creation, rapid iteration, feedback loops
Activity: Collaborative design challenge with teams, create prototypes using available tools
Assignment: Develop and refine prototypes with feedback loops
COs Addressed: CO3, CO4

Week X: Pitching Your Idea

Lecture: How to effectively pitch design ideas and solutions to stakeholders using storytelling, persuasion, and presentation skills
Key Concepts: Storytelling, visuals, persuasion, communication
Activity: Develop a 5-minute pitch for your design project
Assignment: Prepare a pitch deck and deliver your final presentation
COs Addressed: CO5

Week XI: Refining the Prototype and Iteration

Lecture: Refining prototypes and pitches based on peer and user feedback
Key Concepts: Iteration, continuous feedback, finalizing solutions
Activity: Revise prototypes and pitch presentations
Assignment: Submit an updated prototype and refined pitch for peer review
COs Addressed: CO5

Week XII: Final Presentation and Reflection

Lecture: Reflection on the design thinking process and its real-world applications
Key Concepts: Applying design thinking beyond the course
Activity: Final project presentations – each group presents their design thinking journey
Assignment: Submit a final project report detailing the design thinking process, challenges, solutions, and reflections
COs Addressed: CO4, CO5

Sample Case Studies

1. Redesigning the Coffee Cup Lid
Scenario: A company redesigned traditional coffee cup lids to prevent spills and improve user comfort using empathy and iterative design.
Key Lessons:
Empathy: Understanding user frustrations with current lids.
Ideation: Brainstorming new lid designs.
Prototyping: Testing and refining designs with users.

2. Improved Toothpaste Tube Design
Scenario: A team developed a flip-cap, stand-up toothpaste tube to improve hygiene and reduce wastage.
Key Lessons:
Empathy: Identifying the challenge of squeezing the last bit of paste.
Ideation: Sketching flip-cap solutions.
Prototyping: Testing improved designs with users.

3. Airline Check-In Kiosk
Scenario: To reduce frustration, a self-check-in kiosk was simplified using user feedback.
Key Lessons:

Empathy: Observing users to identify pain points.
Prototyping: Creating and testing new interfaces.
Iteration: Refining based on usability feedback.

4. Smartphone App Redesign for Elderly Users
Scenario: An app was simplified for older users by increasing text size and improving navigation.
Key Lessons:
Empathy: Understanding elderly users' difficulties.
Ideation: Designing with accessibility in mind.
Testing: Validating improvements with target users.

5. Redesigning the School Backpack
Scenario: Students created a lighter, more comfortable backpack with better padding and straps.
Key Lessons:
Empathy: Listening to user complaints.
Prototyping: Creating mockups.
Testing: Refining based on feedback.

6. Recycling Bin Design
Scenario: A city used color-coded, labeled bins to improve recycling habits.
Key Lessons:
Empathy: Identifying confusion in waste sorting.
Ideation: Designing with visual cues.
Prototyping: Testing usability in public spaces.

7. The Ziplock Bag Redesign
Scenario: Feedback led to a better seal in Ziplock bags, reducing leaks.
Key Lessons:
Empathy: Understanding user sealing difficulties.
Prototyping: Testing better mechanisms.
Testing: Gathering and applying user feedback.

8. Reinventing the Grocery Store Cart
Scenario: A team improved cart maneuverability with swivel wheels and adjustable handles.
Key Lessons:
Empathy: Observing user experience in stores.
Prototyping: Building ergonomic variations.
Iteration: Refining based on usability trials.

9. The Paperclip Redesign
Scenario: A new colorful and larger paperclip was created for better visibility and use.
Key Lessons:
Empathy: Recognizing minor daily frustrations.
Ideation: Conceptualizing better designs.
Prototyping: Experimenting with form and function.

10. Customizable Water Bottles for Kids
Scenario: Designers created colorful, interchangeable water bottles tailored to kids' preferences.
Key Lessons:
Empathy: Understanding children's interests.

Ideation: Creating engaging features.
Prototyping: Testing which designs kids preferred.

Learning Resources

Text Books:

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

Reference Books:

1. Walter Brenner, Falk Uebernickel, *Design Thinking for Innovation*, Springer Link, 2016.
2. Christian Müller-Roterberg, *Handbook of Design Thinking*, Kindle Direct Publishing, ISBN: 978-1790435371.
3. Anuja Agarwal, *Design Thinking: A Framework for Applying Design Thinking in Problem Solving*, CL India.
4. Nigel Cross, *Design Thinking: Understanding How Designers Think and Work.*
5. Tim Brown, *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.*
6. Ranjan Nayar and Jaidip Subedi, *Design Thinking for Visual Communication.*
7. Don Norman, *The Design of Everyday Things*; S. Balaram, *Design Thinking: Creativity and Innovation.*
8. Jake Knapp, *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days.*
9. Tom Kelley and David Kelley, *Creative Confidence: Unleashing the Creative Potential Within Us All* (Foreword by Ratan Tata).

e-Resources:

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

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

Unit I: Inter personal Development. (05 Hours)

Foundation of Team Work Collaboration , Collaboration Strategies for success, Communication in Human relationships, EQ Intelligence relationships , Balance clarity in life

Unit II: Yoga and Holistic Health (05 Hours)

Introduction to Yoga Physical Fitness, Components of Physical Fitness, Yoga for Physical Fitness , Yoga for Mental well-being , Pranayama and Relaxation Techniques

Unit III: Career Planning Financial literary (05 Hours)

Certification and up gradation of an entrepreneur, Interactive sessions through guest lectures, videos etc. Financial literacy, Investing plans, Case studies, Budget and GDP.

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: Career Planning and Development

Practical: Meaning of the term 'Career', Outcomes of career, 'Liking What You Do' against 'Doing What You Like', Work satisfaction, Advantage and disadvantage of each category (Business versus Self employed professional versus Salaried job).
Assignment: Make a chart about your Education plan and Career plan with all details like professional category (business/self-employed/salaried) of your choice, time-scale, qualification and skills necessary, expected expenditure, desired merit and expected income.

Week VI: Career Planning and Development

Practical: Skills required as an employee, Skills required as an entrepreneur, Up-gradation, Certification, Life-long learning.
Assignment: Make two detailed charts, similar to the one made in earlier week, but in the remaining two categories (business/self-employed/salaried) which are not your choices at present.

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: Financial Literacy

Practical: Guest interactive lecture on What is GDP of a Nation? GDP of Bharat. Budget of the Nation. How does budget affect a common man? How does budget affect an Engineer?
Assignment: Map the expense entries with the weekly budget made earlier. Report your findings and enlist the ways to monitor and control the expenses.

Week IX: Performing and Visual Arts

Practical: Discussion and demonstration of Mimicry, one-act play, improvisation, dancing, singing, instrument-playing, story-telling, poem-reading, painting, drawing, sculpture, Photography, etc.
Assignment: Make a visual collage of India's ancient visual and performing arts.

Week X: Performing Arts

Practical: Performing arts and Visual arts competitions.
Assignment: Write an article on how the performing and visual arts improve the quality of human life.

Week XI: Physical Education

Practical: Expert session on Introduction to various sports and recreational activities, Sportsmanship, Importance of individual sports (badminton, running). Overview of different sports. Sports as means of exercise to improve mental and physical health, Sports as career.
Assignment: Assignment: Prepare a mini project on any one sport Activity.

Week XII: Sports

Practical: Individual and Group Sports training/practice sessions and tournaments.
Assignment: Write a sports news on tournaments conducted.

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 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: 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

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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. 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.