CURRICULUM AND SYLLABUS

B.Sc. (Honours) Physics

Academic Year: 2025 - 26

Department of Physics

United University

Rawatpur - Jhalwa (Prayagraj)

Uttar Pradesh

University Vision

"To establish a value based Global University having dynamic learning environment encouraging creativity and innovation, research inspired experimental learning and focusing on topics that are pertinent to the development of the region, the Country and the World."

University Mission

To achieve the Vision, the Mission of the University is

- "To provide a dynamic, inspiring, and varied learning environment with global exposure.
- To position the institution as a premier hub for research and experiential learning.
- To develop into an adaptable university meeting the demands of society and business.
- To incorporate Value thinking, integrity, wisdom and passion in professional for their career and life"

Department Vision

"The Vision of the Faculty of Applied Sciences & Humanities is to foster an inclusive academic environment that promotes interdisciplinary learning, critical thinking, and innovative research. We strive to cultivate a community of scholars dedicated to addressing global challenges through science, technology and the humanities. By aligning with the University's commitment to excellence, we aim to empower students with the knowledge, skills and ethical values needed to contribute meaningfully to society and to lead in their chosen fields."

Department Mission

"To create a community of learners where we may contribute to their expertise and admire one another to create an enhanced society.

To provide learners with a solid foundation not only in the field of engineering by employing model tools and research facilities but also to teach them maths, the fundamental sciences, Environmental issues, and human values.

The Department is focused on a student-centred curriculum that emphasizes intellectual development, connecting with challenging coursework, and assignment-based learning.

The department is committed to encouraging an entrepreneurial, innovative mind-set in the students by exposing them to a plethora of events and activities on a global level too.

It promotes the overall development of a good citizen and an upright individual.

We look forward to helping them strengthen their inborn skills with the proper training in their field and offer an opportunity for expression to lead a bright career ahead."

Program Educational Objectives

(Undergraduate)

1. **PEOs-1:** Develop a strong foundation in Physics, enabling graduates to pursue higher studies, research, or professional careers.
2. **PEOs-2:** Cultivate critical thinking, problem – solving, and analytical skills necessary for addressing real-world challenges.
3. **PEOs-3:** Encourage research-oriented thinking and innovation that contribute to academic and professional advancements.
4. **PEOs-4:** Instill ethical values, social responsibility, and an understanding of the broader impact of physics on society and the global scientific community.
5. **PEOs-5:** Promote a culture of continuous learning and adaptability to keep pace with advancements in physics and related fields.

Program Outcomes

On successful completion of the B.Sc. (Honors) Physics programme the student will acquire:

PO1 – *Disciplinary Knowledge:* Demonstrate a solid understanding of fundamental principles of classical and modern physics.

PO2 – *Experimental Skills:* Develop the ability to design, conduct and analyze experiments using modern laboratory equipment.

PO3 – *Mathematical Proficiency:* Apply advanced mathematical tools to solve complex physics problems.

PO4 – *Problem – Solving Ability:* Analyze and interpret physical problems and apply appropriate principles to find solutions.

PO5 – *Research Competency:* Develop skills in conducting independent research, including literature review, data analysis, and presentation of results.

PO6 – *Computational Skills:* Use computational tools and techniques to model physical systems and solve quantitative problems.

PO7 – *Communication Skills:* Effectively communicate scientific ideas, technical reports, and research findings in both written and oral formats.

PO8 – *Ethics and Social Responsibility:* Understand and apply ethical principles in scientific practice and research, contributing responsibly to societal needs.

PO9 - *Lifelong learning:* Cultivate a commitment to lifelong learning to adapt to new scientific advancements and technologies.

PO10 - *Teamwork and Collaboration:* Work effectively in teams, demonstrating leadership and collaboration in both academic and research settings.

PO11 – *Interdisciplinary Approach:* Integrate Physics with other disciplines to solve interdisciplinary problems.

Program Specific Outcomes

PSO1: Advanced Understanding of Physics Concepts

Develop a deep understanding of core concepts in physics, including classical mechanics, quantum mechanics, electromagnetism, solid-state physics, electronics, statistical mechanics and thermodynamics, preparing students for advanced studies and research in physics.

PSO2: Proficiency in Experimental Techniques

Develop the ability to design and conduct experiments, interpret experimental data, and effectively use modern laboratory instruments to explore and verify physical principles.

PSO3: Problem – Solving and Analytical Thinking

Apply mathematical and computational techniques to solve complex problems in physics, using tools like SCILAB, MATLAB, and Python for simulations and analysis.

Curriculum and Syllabus: First Year

BSc. (Honours) Physics

2025-2026 Session

Semester I

Contact Hours = 30

S. No.	Course Code	Course Name	Course Category	L	T	P	Credits C
1	SCUCPH101T	MATHEMATICAL PHYSICS- I	PC	4	0	0	4
2	SCUCPH101P	MATHEMATICAL PHYSICS – I LAB	PC	0	0	2	2
3	SCUCPH102T	MECHANICS AND RELATIVITY	PC	4	0	0	4
4	SCUCPH102P	MECHANICS LAB	PC	0	0	4	2
5	CASCPSC10T	FUNDAMENTALS OF COMPUTER AND C- PROGRAMMING	PC	4	0	0	4
6	CASCPSC10P	C - PROGRAMMING LAB	SEC	0	0	4	2
7	ARSPCSC10T	INTRODUCTION TO PROFESSIONAL COMMUNICATION	SS	2	0	0	2
8	PTSPPSC10T	PROFESSIONAL PROFICIENCY	SEC	4	0	0	4
9	UUSCVA001P	NSS/NCC/YOGA/MUSIC/SPORTS	VAD	0	0	2	0

Total Credits = 24

COURSE CATEGORY ABBREVIATIONS

1. Program Core – PC,
2. Soft Skills-SS,
3. Skill Enhancement Course-SEC
4. Compulsory Course-MC,
5. Program Elective-PE
6. Open Elective-OE
7. Value Audit Course-VAD
8. Internship/Project
9. Discipline Specific Elective – DSE
10. General Elective – GE
11. Ability Enhancement Course – AEC

Semester II

Contact Hours = 30

S. No.	Course Code	Course Name	Course Category	L	T	P	Credits C
1	SCUCPH201T	ELECTRICITY AND MAGNETISM	PC	4	0	0	4
2	SCUCPH201P	ELECTRICITY AND MAGNETISM LAB	PC	0	0	4	2
3	SCUCPH202T	WAVES AND OPTICS	PC	4	0	0	4
4	SCUCPH202P	WAVES AND OPTICS LAB	PC	0	0	4	2
5	CASCPSC20T	FUNDAMENTALS OF DATA SCIENCE	PC	4	0	0	4
6	CASCPSC20P	FUNDAMENTALS OF DATA SCIENCE LAB	SEC	0	0	4	2
7	SCUCEV201T	ENVIRONMENTAL SCIENCE	SEC	2	0	0	2
8	PTSPPSC20T	PROFESSIONAL PROFICIENCY	SEC	4	0	0	4

Total Credits = 24

COURSE DETAILS FOR SEMESTER – I

COURSE CODE & NAME: SCUCPH101T / MATHEMATICAL PHYSICS- I

COURSE OBJECTIVE

To familiarize students with a range of mathematical methods that is essential for solving advanced problems in theoretical physics.

COURSE OUTCOMES

1. Understand the concept of basic calculus.
2. Understand the concept of Vector calculus.
3. Study the concept of Orthogonal Curvilinear Coordinates.
4. Study the concept of differential equation.
5. Study the concept of probability.

UNIT I:

Matrices: Types of Matrices: Symmetric, Skew-symmetric and Orthogonal Matrices; Complex Matrices, Inverse and Rank of matrix using elementary transformations, System of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Eigen values and eigenvectors.

UNIT II:

Calculus: Differential Calculus: Introduction to limits, continuity and differentiability, Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions.

Partial derivatives, Euler's theorem of homogeneous function, Total derivative, Jacobians, Approximation of errors.

Integral Calculus: Indefinite integrals, Basic formulae. Integration by parts, Integration by substitution, Definite integrals. Properties of definite integrals, Evaluation of double integration & triple integration, Application of definite integral to find Area and Volume.

UNIT III:

Vector Calculus:

Vector differentiation: Gradient, Divergence and Curl and their Physical interpretation, Directional derivatives.

Vector Integration: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem, Stoke's theorem (without proof) and their applications.

UNIT IV:

Ordinary Differential Equation of Higher Order: First Order Differential Equations, Variable separable, Homogeneous Equations, Exact Differential equation, Linear differential equation, Integrating factor, Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations.

UNIT V:

Introduction to probability: Concept of Probability, Baye's theorem, Independent random variables, Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance (without Proof).

TEXTBOOKS

1. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
2. Mathematical Physics, H K Dass & Dr Rama Verma, S Chand and Compony Limited
3. Mathematical Physics, B.S. Rajpoot, 2010, Pragati Edition.

REFERENCE BOOKS

1. **Mathematical Methods for Physicists**, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
2. **An introduction to ordinary differential equations**, E. A. Coddington, 2009, PHI learning.
3. **Differential Equations**, George F. Simmons, 2007, McGraw-Hill.
4. **Mathematical Tools for Physics**, James Nearing, 2010, Dover Publications.
5. **Mathematical methods for Scientists and Engineers**, D.A. McQuarrie, 2003,VivaBook.
6. **Advanced Engineering Mathematics**, D. G. Zilland, W.S.Wright, 5Ed., 2012, Jones and Bartlett Learning.
7. **Mathematical Physics**, Goswami, 1st edition, Cengage Learning

COURSE CODE & NAME: SCUCPH101P / MATHEMATICAL PHYSICS LAB - I

COURSE OBJECTIVE

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

COURSE OUTCOMES

1. Highlights the use of computational methods to solve physical problems.
2. The course will consist of lectures (both theory and practical) in the Lab.
3. Evaluation done not on the programming but on the basis of formulating the problem.
4. Aim at teaching students to construct the computational problem to be solved.
5. Students can use any one operating system Linux or Microsoft Windows.

1. Topic: Basics of scientific computing
Description with Applications: Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, under flow & overflow- emphases size them port and making equations interims of dimensionless variables, Iterative methods.

2. Topic: Errors and error Analysis
Description with Applications: Truncation and round off errors, Absolute and relative errors, Floating point computations.

3. Topic: Review of C & C++ Programming fundamentals
Description with Applications: Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, cinandc out, Manipulators for data formatting, Control statements (decision making and looping statements) (If-statement. If-else Statement. Nestedif Structure. Else-if Statement. Ternary Operator. Go to Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops).

4. Topic: Programs
Description with Applications: Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of number sina spending descending order, Binary search.

5. Topic: Random number generation
Description with Applications: Area of circle, area of square, volume of sphere, value of pi (π).
6. Topic: Interpolation by Newton Gregory Forward and Backward difference

formula, Error estimation of linear interpolation
Description with Applications: Evaluation of trigonometric functions e.g. sin θ, cos θ, tan θ, etc.
7. Topic: Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method

Description with Applications: Given Position with equidistant time data to calculate velocity and acceleration and vice-versa. Find the area of B-H Hysteresis loop.

8. Topic: Solution of Ordinary Differential Equations (ODE)First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods:

Description with Applications:
First order differential equation

- Radioactive decay
- Current in RC, LC circuits with D C source
- Newton's law of cooling
- Classical equations of motion

TEXTBOOKS

1. Introduction to Numerical Analysis, S.S.Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2. A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.

REFERENCE BOOKS

1. **Schaum's Outline of Programming with C++**. J. Hubbard, 2000, McGraw-HillPub.
2. **Numerical Recipes in C: The Art of Scientific Computing**, W.H. Pressetal, 3rd Edn., 2007, Cambridge University Press.
3. **Elementary Numerical Analysis**, K.E. Atkinson, 3 rd Edn. , 2007, Wiley India Edition.
4. **Numerical Methods for Scientists & Engineers**, R.W.Hamming, 1973, Courier Dover Pub.

COURSE CODE & NAME: SCUCPH102T / MECHANICS AND RELATIVITY

COURSE OBJECTIVE

To develop a comprehensive understanding of Newtonian mechanics and their applications and introduce the fundamental concepts of special relativity.

COURSE OUTCOMES

1. Understand the concept of Dynamics of rigid bodies.
2. Understand the concept of Rotational dynamics and elasticity.
3. Study the concept of Gravitational and central forces.
4. Study the concept of simple harmonic motion.
5. Understand the Concept of Special theory of relativity.

UNIT I:

Fundamentals of Dynamics: Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean in variance. Momentum of variable- mass system: motion of rocket. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Conservative and non- conservative forces. Potential Energy. Energy diagram. Elastic potential energy. Forces gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

UNIT II:

Rotational Dynamics and Elasticity: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical, and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. Elastic constants, Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

UNIT III:

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

UNIT IV:

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor.

UNIT V:

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity. Relativistic addition of velocities. Variation of mass with velocity. Mass less Particles. Mass-energy Equivalence.

TEXTBOOKS

1. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000.
2. UniversityPhysics.F.WSears,M.WZemansky,H.DYoung13/e,1986,AddisonWesley .

REFERENCE BOOKS

1. **An introduction to mechanics**, D.Kleppner, R.J.Kolenkow,1973, McGraw-Hill.
2. **Mechanics**, Berkeley Physics, vol.1, C. Kittel, W. Knight, et.al. 2007, Tata McGraw-Hill.
3. **Physics**, Resnick, Halliday and Walker 8/e. 2008,Wiley.
4. **Analytical Mechanics**, G.R. Fowles and G.L.Cassiday.2005, Cengage Learning.
5. **Feynman Lectures**,Vol.I,R.P.Feynman,R.B.Leighton,M.Sands,2008,PearsonEducation
6. **Introduction to Special Relativity**, R. Resnick, 2005, John Wiley and Sons.
7. **University Physics**, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

COURSE CODE & NAME: SCUCPH102P / MECHANICS LAB

COURSE OBJECTIVE

To familiar students with mechanical apparatus and their applications in measuring various physical quantities.

COURSE OUTCOMES

1. To get familiarized with measuring instruments and safety practice in laboratory.
2. To get a first-hand experience of random error in observations.
3. To understand the concept of Modulus of rigidity and Moment of Inertia.
4. To know about the Coefficient of Viscosity.
5. To know about Elastic Constants and their utility.

List of Experiments:

A minimum of six experiments from the following should be performed.

1. Measurements of length (or diameter) using Vernier callipers, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a)Spring constant, (b) **g** and (c) Modulus of rigidity.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
7. To determine the Young's Modulus of a Wire by Optical Lever Method.
8. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
9. To determine the value of g using Bar Pendulum.
10. To determine the value of g using Kater's Pendulum.

REFERENCE BOOKS

1. **Advanced Practical Physics for students**, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. **Advanced level Physics Practical**, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. **A Text Book of Practical Physics**, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal.

COURSE CODE & NAME: CASCPSC10T / FUNDAMENTALS OF COMPUTER AND C – PROGRAMMING

COURSE OBJECTIVE

The course is designed to provide the foundation of logic development. This course will provide the base of further programming related courses. Students could develop their own logic and construct the programs & applications in C.

COURSE OUTCOMES

1. Develop efficient algorithms for solving a problem.
2. Use the various constructs of a programming language viz. conditional, iteration and recursion.
3. Implement the algorithms in "C" language.
4. Use simple data structures like arrays, stacks, and linked list in solving problems.
5. Handling File in "C".

UNIT I:

Introduction to Programming: The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation.

Algorithms for Problem Solving: Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate 'sin x' as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial.

UNIT II:

Introduction to 'C' Language.: Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple 'C' programs.

Conditional Statements and Loops: Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming.

Arrays: One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix; Null terminated strings as array of characters, Standard library string functions.

UNIT III:

Functions: Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type,

Function call, Block structure, Passing arguments to a Function: call by reference, call by value,

Recursive Functions, arrays as function arguments.
Storage Classes: Scope and extent, Storage Classes in a single source file: auto, extern and static, register, Storage Classes in multiple source files: extern and static.

UNIT IV:

Structures and Unions: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions.

Pointers: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation.

UNIT V:

Self-Referential Structures and Linked Lists

Creation of a singly connected linked list, Traversing a linked list, Insertion into a linked list, Deletion from a linked list.

File Processing: Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing.

TEXTBOOKS

1. Byron S Gottfried "Programming with C" Second edition, Tata Mc Grawhill, 2007 (Paperback).
2. R.G. Dromey, "How to solve it by Computer", Pearson Education, 2008.
3. Kanetkar Y, "Let us C", BPB Publications, 2007.
4. Hanly J R & Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2009.

REFERENCE BOOKS

1. E. Balagurusamy, **"Programming with ANSI-C"**, Fourth Edition, 2008, Tata Mc GrawHill.
2. Venugopal K. R and Prasad S. R, **"Mastering 'C'**, Third Edition, 2008, Tata McGraw Hill.
3. B.W. Kernighan & D.M. Ritchie, **"The C Programming Language"**, Second Edition, 2001, Pearson Education.
4. ISRD Group, **"Programming and Problem-Solving Using C"**, Tata Mc GrawHill, 2008.

COURSE CODE & NAME: CASCPSC10P/ C- PROGRAMMING LAB

COURSE OBJECTIVE

The course aims to acquire logical thinking, Implement the algorithms, Identify the correct and efficient ways of solving problems.

COURSE OUTCOMES

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code.
5. Gain experience of procedural language programming.

Note: A minimum of ten experiments from the following should be performed.

1. Write a program to find sum of all prime numbers between 100 and 500.
2. Write a program to obtain sum of the first 10 terms of the following series for any positive integer value of X:

   $X + X^3/3! + X^5/5! + X^7/7! + \ldots$
3. Write a program to reverse the digits of a given number. For example, the number 9876 should be returned as 6789.
4. Write a program to compute the wages of a daily laborer as per the following rules:

Hours Worked	Rate Applicable
Upto first 8 hrs	Rs 50/-
For next 4hrs	Rs 10/- per hr extra
For next 4hrs	Rs 20/- per hr extra
For next 4hrs	Rs 25/- per hr extra
For rest	Rs 40/- per hr extra

   Accept the name of the laborer and no. of hours worked. Calculate and display the wages. The program should run for N number of laborers as specified by the user.
5. Write a program to input 20 arbitrary numbers in one-dimensional array. Calculate Frequency of each number. Print the number and its frequency in a tabular form.
6. Define 2-dimensional array a (3,3), b (3,3), sum (3,3), diff (3,3), mult (3,3). Store 9

arbitrary numbers in a (3,3) and 9 arbitrary numbers in b (3,3). Do the following:

a) Calculate sum of a (3,3) and b (3,3) and store in sum (3,3) where sum (i,j)=a (i,j)+b (i,j)

b) Calculate difference of a (3,3) and b (3,3) and store in diff (3,3) where diff (i,j)=a (i,j)- b(i,j)

c) Calculate product of two arrays a (3,3) and b (3,3) and store in mult (3,3) where mult (i,j)= summation of a (i,k)*b (k,j) over k where k=1 to3.

Print the result in a tabular form.

7. Write a function, str_ search (char* s1, char* s2, int n), that takes two strings and an integer, as arguments and returns a pointer to the n^{th} occurrence of 1^{st} string s1 in 2^{nd} string s2, or NULL if it is not present.

8. Write a C function to remove duplicates from an ordered array. For example, if input array contains 10,10,10,30,40,40,50,80,80,100 then output should be 10,30,40,50,80,100.

9. Apply recursive call to do the following:

i. Input ‘n’(1-200). Calculate sum of ‘n’numbers.

ii. Input ‘n’(1-20). Calculate product of ‘n’numbers.

iii. Input ‘n’(2-20). Print ‘n’ number of Fibonacci numbers.

In Fibonacci sequence the sum of two successive terms gives the third term. The following are few terms of Fibonacci sequence:-1 1 2 3 5 8 13 ……

10. Write a program which will arrange the positive and negative numbers in a one-dimensional array in such a way that all positive numbers should come first and then all the negative numbers will come without changing original sequence of the numbers.

Example:

Original array contains: 10, -15,1,3, -2,0, -2, -3,2, -9

Modified array :10,1,3,0,2, -15, -2, -2, -3, -9

11. Write a menu driven program to maintain a Telephone Directory having following file structure:

1. Name: Character type: Length =20 characters.
2. Address Character type: Length =40 characters.

3. Phone: Character type: Length =12 characters.

   Menu

1. Addrecord(s)
2. Display record(s)
3. Search record(s)
4. Modify record(s)
5. Delete record(s)
6. Backup copy of File
7. Exit

   Type your choice= 1,2,3,4,5,6,7— ->

COURSE CODE & NAME: ARSPCSC10T / INTRODUCTION TO PROFESSIONAL COMMUNICATION

COURSE OBJECTIVE

1. To put in use the basic mechanics of Grammar.
2. To provide an outline to effective Organizational Communication.
3. Understand the role of communication in personal & professional success.
4. Prepare and present messages with a specific intent.

COURSE OUTCOMES

1. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing, and speaking etc.
2. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e., Reading, Writing, Listening, Thinking and Speaking.
3. Students will cultivate relevant technical style of communication & presentation at their workplace & also for academic uses.
4. Students will apply it at their workplace for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing.
5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.

UNIT I:

Components of Technical Writing and Functional Grammar: Words and Phrases: Word formation; Root words from foreign languages & their use in English; Prefixes &

Suffixes: Derivatives; Modals; Infinitives; vocabulary development: technical vocabulary, vocabulary used in formal letters/emails and reports.

UNIT II:

Fundamentals of Technical Communication: Introduction to Communication; Process of Communication; Technical Communication: features: Distinction between General and Technical Communication; The flow of communication: Downward, Upward, Lateral/Horizontal (Peer group); Barriers to Communication; Dimensions of Communication: Reading, Listening & Comprehension: skills, types & methods.

UNIT III:

Technical Style & Written Communication: Technical Style: Features; types; Requisites of Sentence Construction; Types of Sentences; Paragraph Development: Techniques and Methods: Inductive, Deductive, Spatial, Linear, Chronological etc. Devices.

UNIT IV:

Written Business Communication: Letter writing: Principles, Type: Sales; Credit letters; Claim; Adjustment Letters; Job Application & official letter; Reports: Types; Significance; Structure & drafting of Reports. Technical Proposal; Types; Writing of Proposal; Significance; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Finding; Notices; Agenda; Minutes of Meeting.

UNIT V:

Presentation Strategies & Oral Communication: Analysis of Audience and Locale; Nuances and Modes of Delivery; Kinesics; Proxemics; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections; Flow in Speaking; Public Speaking: method; Techniques: Clarity of substance; emotion; Humour.

TEXTBOOKS

1. Improve your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
2. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
3. Functional skills in Language and Literature, by R.P. Singh, Oxford Univ. Press, 2005, New Delhi.

4. Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw Hill Education, 2017.

REFERENCE BOOKS

1. **Communication Skills for Engineers and Scientists**, Sangeeta Sharma et.al. PHI Learning Pvt. Ltd, 2011, New Delhi.
2. **Business Correspondence and Report Writing** by Prof. R.C., Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd. , 2001, New Delhi.
3. **Word Power Made Easy** by Norman Lewis, W.R. Goyal Pub. & Distributors, 2009, Delhi.
4. **Developing Communication Skills** by Krishna Mohan, Mecra Bannerji- Macmillan India Ltd. 1990, Delhi.

COURSE CODE & NAME: PTSPPSC10T / PROFESSIONAL PROFICIENCY

COURSE OBJECTIVE

Students should be able to read and write correct English, attain reasonable fluency in the Language and should also be exposed to introductory lessons of Aptitude Building.

COURSE OUTCOMES

1. Better representation of himself/herself in terms of communication skills, overall personality development and aptitude building required for jobs.
2. This program will help students employable and ready for Industries /corporate and other Public and Private Sector jobs.

UNIT I:

Hard Skills: Revision: 1) Grammar (Basics) 2) Preposition 3) Tense 4) Subject-Verb Agreement 5) Synonyms & Antonyms

The goal is to teach Grammar implicitly through reading comprehensions. A short story/paragraph should be given for the students to identify the parts of speech and the other topics mentioned above. The classes should be learner centric, and the students should be able to apply the lessons learnt in their daily conversations.

UNIT II:

Soft Skills: Speaking: Etiquettes (not theoretical/written but practical) of Listening, Speaking, Writing, Speech Delivery.

The aim should be to attempt to make the students the centre of the learning process and break the ice with speaking the language. They should develop the confidence to speak and think in the language for further professional exposure. They should be engaging in intelligent conversation with the instructor and expressing themselves in English.

Practice Sheet: Questions (Subjective and Objective) based on the instruction given every week.

The aim should be to bring the instruction given in practice by making them write, speak, and think along the lines of the instruction given. The practice sheet should be evaluated, and necessary feedback must be given. Some exercise on compositional skills must be given so they develop a sense of writing and expressing themselves through the written word.

UNIT III:

Quantitative Aptitude & Logical Reasoning

- **Simplification & Approximation**
- **Alpha-Numeric Series & Miscellaneous**
- **Coding-Decoding**

COURSE DETAILS FOR SEMESTER – II

COURSE CODE & NAME: SCUCPH201T / ELECTRICITY AND MAGNETISM

COURSE OBJECTIVE

To familiarize students with fundamental concepts of Electricity, Magnetism and Electromagnetic field theory.

COURSE OUTCOMES

1. Understand the concept of Electric field and potential.
2. Understand the concept of Dielectrics.
3. Study the concept of Magnetic field and Magnetization.
4. Study the concept of Electrical Circuits.
5. Understand the Concept of Current and charge sensitivity.

UNIT I:

Electric Field and Electric Potential
Electric field. Electric flux. Gauss' Law with applications to charge distribution with spherical, cylindrical, and plane symmetry. Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. Potential and Electric Field dipole. Force and Torque and dipole.

UNIT II:

Electrostatic energy: Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor.

UNIT III:

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector **D**. Relations between **E**, **P** and **D**. Gauss' Law in dielectrics.

UNIT IV:

Magnetic Field and Magnetic Properties of Matter: Magnetic force between

current elements and definition of Magnetic Field **B**. Biot- Savart's Law and its simple applications: straight wire and circular loop. Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of **B**: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Magnetization vector (**M).** Magnetic Intensity (**H).** Magnetic Susceptibility and permeability. Relation between **B, H, M**. Ferro magnetism. B-H curve and hysteresis.

UNIT V:

Electromagnetic Induction and Electrical Circuits: Faraday's Law. Lenz's Law. Self-Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current. A C Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance, Series L C R Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor, and (4) Band Width. Parallel L C R Circuit.

TEXTBOOKS

1. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
2. University Physics. F.W Sears, M.W Zemansky, H.D Young 13/e,1986, Addison Wesley.

REFERENCE BOOKS

1. **Electricity, Magnetism & Electromagnetic Theory**, S. Mahajan and Choudhury, 2012, TataMcGraw.
2. **Electricity and Magnetism**, Edward M.Purcell, 1986 McGraw-Hill Education.
3. **Feynman Lectures** Vol.2,R.P.Feynman,R.B.Leighton, M.Sands, 2008, Pearson Education.
4. **Elements of Electromagnetics**, M.N.O. Sadiku, 2010, Oxford University Press.

COURSE CODE & NAME: SCUCPH201P/ ELECTRICITY AND MAGNETISM LAB

COURSE OBJECTIVE

To familiarize students with fundamental concepts of Electrical apparatus and using these to measure various electrical quantities.

COURSE OUTCOMES

1. To get familiarized with measuring instruments and safety practice in laboratory.
2. To get a first-hand experience of measuring the AC and DC current and voltages.
3. To understand the Measurement of field strength of Electric and Magnetic fields.
4. To know about the self-inductance and mutual inductance.
5. To know about various series and parallel circuits.

List of Experiments:

A minimum of six experiments from the following should be performed.

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine a unknown Low Resistance using Carey Foster's Bridge.
5. Measurement of field strength Bandits variation in a solenoid (determined B/dx)
6. To verify the Thevenin and Norton theorems.
7. To verify the Superposition, and Maximum power transfer theorems.
8. To determine self-inductance of a coil by Anderson's bridge.
9. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Bandwidth.
10. To study the response curve of a parallel LCR circuit and determine its (a) Anti-

resonant frequency and (b) Quality factor Q.

REFERENCE BOOKS

1. **Advanced Practical Physics for students**, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. **A Text Book of Practical Physics**, I. Prakash & Ramakrishna,11th Ed., 2011, Kitab Mahal.
3. **Advanced level Physics Practicals**, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. **Engineering Practical Physics**, S. Panigrahi and B. Mallick, 2015,Cengage Learning.
5. **A Laboratory Manual of Physics for undergraduate classes**, D.P. Khandelwal,1985,VaniPub.

COURSE CODE & NAME: SCUCPH202T / WAVES AND OPTICS

COURSE OBJECTIVE

To familiarize students with fundamental concepts of waves, their propagation in different media and optical phenomenon.

COURSE OUTCOMES

1. Understand the concept of Waves and their propagation.
2. Understand the concept of radiation and its nature.
3. Study the concept of Interference.
4. Study the concept of Diffraction.
5. Understand the Concept of Holography.

UNIT I:

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves. Velocity of Transverse waves.

Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.

UNIT II:

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.

UNIT III:

Interference: Division of amplitude and wave front. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes.

UNIT IV:

Diffraction: Fraunhofer Diffraction due to Single slit, Circular aperture, Double slit, Multiple slits. Diffraction grating. Resolving power of grating. Resolving Power of a telescope.

Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit, and a wire.

UNIT V:

Holography: Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms.

TEXTBOOKS

1. The Physics of Vibrations and Waves, H.J.Pain, 2013, John Wiley and Sons.
2. Optics, Ajoy Ghatak, 2008, Tata McGraw-Hill.

REFERENCE BOOKS

1. **Waves: Berkeley Physics Course**, vol.3, Francis Crawford, 2007,Tata McGraw-

Hill.

2. **Fundamentals of Optics**, F.A. Jenkins and H.E.White, 1981, McGraw-Hill.
3. **Principles of Optics**, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
4. **The Physics of Waves and Oscillations**, N.K.Bajaj, 1998, Tata McGrawHill.
5. **Fundamental of Optics**, A. Kumar, H.R. Gulati and D.R. Khanna, 2011, R. Chand.

COURSE CODE & NAME: SCUCPH202P / WAVES AND OPTICS LAB

COURSE OBJECTIVE

To familiarize students with fundamental concepts of optical instruments and using these to measure wavelength of light.

COURSE OUTCOMES

1. To get familiarized with measuring instruments and safety practice in laboratory.
2. To get an experience of measuring frequency and amplitude of waves.
3. To understand and measure wavelength of sources.
4. To know about the diffraction and measurement of wavelength.
5. To know about dispersive power and resolving power.

List of Experiments:

A minimum of six experiments from the following should be performed.

1. To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2 –T law.
2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster`s focusing; determination of angle of prism.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine wavelength of sodium light using Newton's Rings.

8. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
9. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
10. To determine dispersive power and resolving power of a plane diffraction grating.

REFERENCE BOOKS

1. **Advanced Practical Physics for students**, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. **A Text Book of Practical Physics**, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal.
3. **Advanced level Physics Practicals**, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
4. **A Laboratory Manual of Physics for undergraduate classes**, D.P. Khandelwal, 1985, Vani Pub.

COURSE CODE & NAME: CASCPSC20T/ FUNDAMENTALS OF DATA SCIENCE

COURSE OBJECTIVE

To create awareness towards various environmental issues like global warming, urbanization, pollutions, ozone layer depletion etc; their causes and remedial steps for protecting impacted society.

COURSE OUTCOMES

1. Apply principles of Data Science to the analysis of business problems.
2. Use data mining software to solve real-world problems.
3. Employ cutting edge tools and technologies to analyze Big Data.
4. Apply algorithms to build machine intelligence.
5. Demonstrate use of teamwork, leadership skills, decision making and organization theory.

UNIT I:

Introduction: What is Data Science? Data Science process; Matrices-Matrices to represent relations between data, and necessary linear algebraic operations on matrices-Approximately representing matrices by decompositions (SVD and PCA); Statistics: Descriptive Statistics: distributions and p

robability- Statistical Inference: Populations and samples- Statistical modeling-mean, median, mode & covariance, fitting a model- Hypothesis Testing, Intro to Python.

UNIT II:

Data preprocessing: Data cleaning- data integration- Data Reduction, Data Transformation and Data Discretization. Evaluation methods: Confusion matrix, Students T-tests and ROC curves-Exploratory Data Analysis (EDA): Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, Feature Generation and Feature Selection- Feature Selection algorithms- Filters; Wrappers.

UNIT III:

Basic Machine Learning Algorithms: Association Rule mining- Linear Regression- Logistic Regression- Classifiers- k-Nearest Neighbors (k-NN), k-means-Decision tree- Naive Bayes- Ensemble Methods- Random Forest. Decision Trees and Random Forests.
Data Visualization: Basic principles, ideas, and tools for data visualization.

UNIT IV:

Clustering: Choosing distance metrics- Different clustering approaches-hierarchical agglomerative clustering, k-means (Lloyd's algorithm),- DBSCAN- Relative merits of each method- clustering tendency and quality.

UNIT V:

Information Retrieval: Learn about structure and organization of various components of an IR system; Information representation models, term scoring mechanisms, etc. in the complete search system.

TEXTBOOKS

1. Cathy O'Neil and Rachel Schutt, “Doing Data Science, Straight Talk From The Frontline”, O'Reilly, 2014.

2. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", Third Edition. ISBN 0123814790, 2011.

REFERENCE BOOKS

1. Mohammed J. Zaki and Wagner Miera Jr, "**Data Mining and Analysis: Fundamental Concepts and Algorithms**", Cambridge University Press, 2014.
2. Matt Harrison, "**Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization**, O'Reilly, 2016.
3. Joel Grus, "**Data Science from Scratch: First Principles with Python**", O'Reilly Media, 2015.
4. Wes McKinney, "**Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython**", O'Reilly Media, 2012.

COURSE CODE & NAME: CASCPSC20P/FUNDAMENTALS OF DATA SCIENCE LAB

COURSE OBJECTIVES

The course should enable the students to:

1. Understand the basics of Python Programming Language.
2. Exposure on solving of data science problems.
3. Understand the visualization effect.

COURSE OUTCOMES

1. Analyze and interpret results from descriptive and predictive data analysis.
2. Apply their knowledge to a given problem domain and articulate potential data analysis problems.
3. Identify potential pitfalls, and social and ethical implications of data science.
4. Write, test, and debug simple Python programs.
5. Implement Python programs with conditionals and loops.
6. Develop Python programs stepwise by defining functions and calling them.

List of Experiments:

INTRODUCTION TO PYTHON-

1. A program to compute distance between two points taking input from the user Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
2. Write a Program for checking whether the given number is an even number or not.
3. Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
4. Write a program to count the numbers of characters in the string and store them in a dictionary data structure Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure.
5. Write function to compute gcd, lcm of two numbers.

READING AND WRITING DIFFERENT TYPES OF DATASETS-

a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk Location.
b. Reading Excel data sheet.
c. Reading XML dataset.

VISUALIZATIONS -

a. Find the data distributions using box and scatter plot.
b. Find the outliers using plot.
c. Plot the histogram, bar chart and pie chart etc. on sample data.

COURSE CODE & NAME: SCUCEV201T / ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

1. To impart basic knowledge of environmental studies.
2. To develop an attitude of concern for the environment.
3. To acquire skills to help people identifying and creating solutions for the environment related problems.
4. To understand the significance of sustainable development.

COURSE OUTCOMES

1. Comprehend the importance of ecosystem and sustainable.
2. Demonstrate interdisciplinary nature of environmental issues.
3. Identify different types of environmental pollution and control measures.
4. Adopt cleaner productive technologies.
5. Identify the role of non-conventional energy resources in environmental protection.
6. Analyze the impact of human activities on the environment.

UNIT I:

Introduction to Environmental Studies: Multidisciplinary nature of environmental studies; Scope and importance; Environmental education; Concept of sustainability and sustainable development. Ecosystems: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological pyramids. Nutrient cycle (carbon cycle, nitrogen cycle, Sulphur cycle, water cycle, oxygen cycle).

UNIT II:

Natural Resources: Renewable and non-renewable Resources, Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impact due to mining dam building on environment. Water: use and over exploitation of surface and ground water, floods, droughts. Water borne and water induced diseases.

UNIT III:

Environmental Pollution: air pollution, water pollution, thermal pollution, noise pollution, soil pollution; Solid Waste Management; Environmental Impact Assessment.

UNIT IV:

Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; hot spots; threats to biodiversity; Conservation of biodiversity: in-situ and ex -situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic, and informational value.

UNIT V:

Impact of energy usage on environment: Global warming, Climate change, Depletion of ozone layer, Acid rain. Environmental ethics, Role of NGOs, Environmental Laws: Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection. Act. Forest Conservation Act.

TEXTBOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Chemistry and Pollution Control by S.S. Dara; S Chand Publishing, New Delhi.
3. Environmental studies by Dr. Suresh K. Dhameja; S. K. Kataria & Sons, Delhi.
4. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi.
5. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

COURSE CODE & NAME: PTSPPSC20T / PROFESSIONAL PROFICIENCY

COURSE OBJECTIVES

Listening, Speaking, Reading, and Writing skills to be developed to enable the students to read and write correct English, attain reasonable fluency in the Language and should also be exposed to introductory lessons of Aptitude Building.

COURSE OUTCOMES

1. Better representation of himself/herself in terms of communication skills, overall personality development and aptitude building required for jobs.
2. This program will help students employable and ready for Industries /corporate and other Public and Private Sector jobs.

UNIT I:

Hard Skills: Transformation of Sentences (Simple, Complex, Compound), Direct-Indirect Speech, Active Passive Voice. Reading Comprehension.

The goal is to teach Grammar implicitly through reading comprehensions. A short story/paragraph should be given for the students to identify the parts of speech and the other topics mentioned above. The classes should be learner centric, and the students should be able to apply the lessons learnt in their daily conversations.

UNIT II:

Soft Skills: **Speaking:** Group Discussion, Role Play, Skit, Interviews.

The aim should be to develop the students' interpersonal skills though the activities and they should be in a position to better engage with their peers and also develop language speaking skills according to the situation that they are in. They should be comfortable in the use of the language by now and therefore should be in a better position to engage with their peers in the language.

Practice Sheet:

Questions (Subjective and Objective) based on the instruction given for hard skills to be distributed every week.

The aim should be to bring the instruction given in practice by making them write, speak and think along the lines of the instruction given. The practice sheet should be evaluated, and necessary feedback must be given. Some exercise on compositional skills must be given so that they develop a sense of writing and expressing themselves through the written word.

UNIT III:

Quantitative Aptitude & Logical Reasoning

- **Clock**
- **Average**
- **Calendar**