PRAYAGRAJ

[Established under the U.P. Private Universities Act. No. 12 of 2019]

CURRICULUM & SYLLABI

Bachelor of Science

Physics(HONS.)

FACULTY OF BASIC AND APPLIED SCIENCES

COURSE STRUCTURE & EVALUATION SCHEME

B.Sc. (Hons.) Physics
[Academic Session 2021-22]

PRAYAGRAJ

FACULTY OF BASIC AND APPLIED SCIENCES

COURSE STRUCTURE & EVALUATION SCHEME

B.Sc. (Hons.) Physics
3 Year (6 Semester) Programme
United University, Prayagraj
Session 2021-2022

SUMMARY

Sem.	Core Subject (Physics)		Generic Courses (Computing Courses)		Ability Enhancement Courses (AEC)		Total	
	Number of Courses	Credit	Number of Courses	Credit	Number of Courses	Credit	Number of Courses	Credit
I	4	12	2	6	2	6	8	24
II	4	10	2	6	2	6	8	24
III	6	18	1	4	1	4	8	26
IV	4	12	2	6	1	4	7	22
V	6	18	2	6	-	-	8	24
VI	8	24	-	-	-	-	8	24
Total	**31**	**96**	**8**	**26**	**6**	**22**	**45**	**144**

COURSE STRUCTURE & EVALUATION SCHEME

B.Sc. (Hons.) Physics
3 Year (6 Semester) Programme
United University, Prayagraj
Session 2021-2022

Sr. No.	Course Code	Course Title	Teaching			Evaluation			Credit
			L	T	P	CA	ESE	Total	
SEMESTER-I									
1	SCUCPH101T	Mathematical Physics –I	4	-	-	50	50	100	4
2	SCUCPH101P	Mathematical Physics –I Lab	-	-	4	50	50	100	2
3	SCUCPH102T	Mechanics and Relativity	4	-	-	50	50	100	4
4	SCUCPH102P	Mechanics Lab	-	-	4	50	50	100	2
5	CASCPSC10T	Fundamentals of Computer and C-Programming	4	-	-	50	50	100	4
6	CASCPSC10P	C- Programming Lab	-	-	4	50	50	100	2
7	ARSPCSC10T	Introduction to Professional Communication	2	-	-	50	50	100	2
8	PTSPPSC10T	Professional Proficiency B.Sc. (Hons.) Physics –I	4	-	-	50	50	100	4
Total			**18**	**-**	**12**	**400**	**400**	**800**	**24**
SEMESTER-II									
1	SCUCPH201T	Electricity and Magnetism	4	-	-	50	50	100	4
2	SCUCPH201P	Electricity and Magnetism Lab	-	-	4	50	50	100	2
3	SCUCPH202T	Waves and Optics	4	-	-	50	50	100	4
4	SCUCPH202P	Waves and Optics Lab	-	-	4	50	50	100	2
5	CASCPSC20T	Fundamentals of Data Science	4	-	-	50	50	100	4
6	CASCPSC20P	Fundamentals of Data Science Lab	-	-	4	50	50	100	2
7	SCUCEV201T	Environmental Science	2	-	-	50	50	100	2
8	PTSPPSC20T	Professional Proficiency B.Sc. (Hons.) Physics –II	4	-	-	50	50	100	4
Total			**18**	**-**	**12**	**400**	**400**	**800**	**24**

Sr. No.	Course Code	Course Title	Teaching			Evaluation			Credit
			L	T	P	CA	ESE	Total	
SEMESTER-III									
1	SCUCPH301T	Mathematical Physics – II	4	-	-	50	50	100	4
2	SCUCPH301P	Mathematical Physics – II Lab	-	-	4	50	50	100	2
3	SCUCPH302T	Thermal Physics	4	-	-	50	50	100	4
4	SCUCPH302P	Thermal Physics Lab	-	-	4	50	50	100	2
5	ETSECSC31T	Digital Systems & Applications	4	-	-	50	50	100	4
6	ETSECSC31P	Digital Systems & Applications Lab	-	-	4	50	50	100	2
7	ETSECSC32T	Neural Network	4	-	-	50	50	100	4
8	PTSPPSC30T	Professional Proficiency B.Sc. (Hons.) Physics –III	4	-	-	50	50	100	4
Total			**20**	**-**	**12**	**400**	**400**	**800**	**26**
SEMESTER-IV									
1	SCUCPH401T	Mathematical Physics – III	4	-	-	50	50	100	4
2	SCUCPH401P	Mathematical Physics – III Lab	-	-	4	50	50	100	2
3	SCUCPH402T	Elements of Modern Physics	4	-	-	50	50	100	4
4	SCUCPH402P	Elements of Modern Physics Lab	-	-	4	50	50	100	2
5	CASPYSC40T	Python Programming	4	-	-	50	50	100	4
6	CASPYSC40P	Python Programming Lab	-	-	4	50	50	100	2
7	PTSPPSC40T	Professional Proficiency B.Sc. (Hons.) Physics –IV	4	-	-	50	50	100	4
Total			**16**		**12**	**350**	**350**	**700**	**22**

Sr. No.	Course Code	Course Title	Teaching			Evaluation			Credit
			L	T	P	CA	ESE	Total	
SEMESTER-V									
1	SCUCPH501T	Quantum Mechanics & Applications	4	-	-	50	50	100	4
2	SCUCPH501P	Quantum Mechanics Lab	-	-	4	50	50	100	2
3	SCUCPH502T	Solid State Physics	4	-	-	50	50	100	4
4	SCUCPH502P	Solid State Physics Lab	-	-	4	50	50	100	2
5	SCUCPH503T	Analog Systems & Applications	4	-	-	50	50	100	4
6	SCUCPH503P	Analog Systems & Applications Lab	-	-	4	50	50	100	2
7	CASMLSC50T	AI & Machine Learning	4	-	-	50	50	100	4
8	CASMLSC50P	AI& Machine Learning Lab	-	-	654	50	50	100	2
Total			**16**	**-**	**16**	**400**	**400**	**800**	**24**
SEMESTER-VI									
1	SCUCPH601T	Electromagnetic Theory	4	-	-	50	50	100	4
2	SCUCPH601P	Electromagnetic Theory Lab	-	-	4	50	50	100	2
3	SCUCPH602T	Statistical Mechanics	4	-	-	50	50	100	4
4	SCUCPH602P	Statistical Mechanics Lab	-	-	4	50	50	100	2
5	SCUCPH603T	Atmospheric Physics	4	-	-	50	50	100	4
6	SCUCPH603P	Atmospheric Physics Lab	-	-	4	50	50	100	2
7	SCUCPH604T	Nano Materials & Applications	2	-	-	50	50	100	2
8	SCUCPH604P	Project (B.Sc. Physics)	-	-	4	-	-	100	4
Total			**12**	**-**	**16**	**300**	**300**	**700**	**24**

L - Lecture, T - Tutorial, P- Practical

CA - Continuous Assessment

ESE - End Semester Examination

Guidelines on Continuous Assessment (CA)

Continuous Assessment (CA) of a course with weightage 50% has got two components

(a) **Class Tests** (b) **Teacher Assessment**

(a) **Class Tests (30% marks):** There should be 2-3 class tests of at least one hour in each paper. First test normally covers 40% of the course.

(b) **Teacher Assessment (20 % marks):** is based on some kind of assignments & VIVA etc. such as mini projects and its presentation, development of some tools & app and some presentations based on topics of the paper which may also be related to some kind of real life example. Normally there should be two mini projects, and its presentation and 6-8 presentations based on topics of the course.

SYLLABUS

FOR

B.Sc. (Hons.) Physics
(First Year)

PRAYAGRAJ

FACULTY OF BASIC AND APPLIED SCIENCES

Syllabus for B.Sc. (Hons.) Physics

Course Title: **MATHEMATICAL PHYSICS- I** **Course Code:** **SCUCPH101T**

Semester: I

L	T	P	C
4	0	0	4

Objective:

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

Unit	Content	Hours
1	**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.	9
2	**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, Maxima and Minima of functions of several variables, 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.	12
3	**Vector Calculus:** Scalar and Vector product and its invariance and rotations, Scalar & vector triple product and the reinterpretation inters fare and volume respectively. 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.	9
4	**Ordinary Differential Equation of Higher Order:** First Order Differential Equations and Integrating Factor, Homogeneous Equations with constant coefficients, Exact Differential equation, Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Method of variation of parameters.	9
5	**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).	6

Course Outcome

- Understand the concept of basic calculus.
- Understand the concept of Vector calculus.
- Study the concept of Orthogonal Curvilinear Coordinates.
- Study the concept of differential equation.
- Study the concept of probability.

Recommended Text Books

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.

Recommended 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, McGrawHill.
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.Zill and W.S.Wright, 5Ed., 2012, Jones and Bartlett Learning.~~
7. Mathematical Physics, Goswami, 1st edition, Cengage Learning.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **MATHEMATICAL PHYSICS LAB- I** **Course Code:** **SCUCPH101P**

Semester: I

L	T	P	C
0	0	4	2

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.

Topics	Description with Applications
Basics of scientific computing	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.
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ Programming fundamentals	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).
Programs:	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 desc ending order, Binary search.
Random number generation	Area of circle, area of square, volume of sphere, value of pi **(π).**
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. sin θ, cos θ, tan θ, etc.
Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method	Given Position with equidistant time data to calculate velocity and acceleration and vice-versa. Find the area of B-H Hysteresis loop.
Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods	First order differential equation • Radio active decay • Current in RC, LC circuits with D C source • Newton's law of cooling • Classical equations of motion

Course Outcome

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

Recommended Text Books

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.

Recommended 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, 3rd Edn., 2007, Wiley India Edition.
4. Numerical Methods for Scientists & Engineers, R.W.Hamming, 1973, Courier Dover Pub.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **MECHANICS AND RELATIVITY** **Course Code:** **SCUCPH102T**

Semester: I

L	T	P	C
4	0	0	4

Objective:

The course is designed to provide the fundamental concepts of Newtonian mechanics and their applications.

Unit	Content	Hours
1	**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.	10
2	**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.	12
3	**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. Keller's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).	10
4	**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..	5
5	**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.	8

Course Outcome:

- Understand the concept of Dynamics of rigid bodies.
- Understand the concept of Rotational dynamics and elasticity.
- Study the concept of Gravitational and central forces.
- Study the concept of simple harmonic motion.
- Understand the Concept of Special theory of relativity.

Recommended Text Books

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

Recommended 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. FeynmanLectures,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.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **MECHANICS LAB** **Course Code:** **SCUCPH102P**

Semester: I

L	T	P	C
0	0	4	2

Objective:

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

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 micro scope.
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 **g** and velocity for a freely falling body using Digital Timing Technique.
7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10. To determine the elastic Constants of a wire by Searle's method.
11. To determine the value of g using Bar Pendulum.
12. To determine the value of g using Kater's Pendulum.

Recommended 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.

Laboratory Outcomes

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **FUNDAMENTALS OF COMPUTER AND C- PROGRAMMING** **Course Code:** **CASCPSC10T**

Semester: I

L	T	P	C
4	0	0	4

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.

Unit	Content	Hours
1	**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.	8
2	**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.	10
3	**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 a multiple source files: extern and static.	9
4	**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.	10
5	**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.	8

Course Outcomes

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

Recommended Text Books

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.

Recommended 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.

Syllabus for B.Sc. (Hons.) Physics

Course Title: C- PROGRAMMING LAB **Course Code: CASCPSC10P**

Semester: I

L	T	P	C
0	0	4	2

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

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

- Write a program to find sum of all prime numbers between 100 and 500.
- Write a program to obtain sum of the first 10 terms of the following series for any positive integer value of X :
  $X + X^3/3! + X^5/5!! + X^7/7! + \ldots$
- Write a program to reverse the digits of a given number. For example, the number 9876 should be returned as 6789.
- 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.
- 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.
- 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
- 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 nth occurrence of 1st string s1 in 2nd string s2, or NULL if it is not present.
- 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
- 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 ……
- 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
- 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— ->

Laboratory Outcomes: After Completing of this lab course, students are able to –

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **INTRODUCTION TO PROFESSIONAL COMMUNICATION** **Course Code:** **ARSPCSC10T**

Semester: I

L	T	P	C
2	0	0	2

Objectives:

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.

Unit	Content	Hours
1	**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.	6
2	**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.	6
3	**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;	6
4	**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.	6
5	**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 ;	6

Course Outcomes

- 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.
- 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.
- Students will cultivate relevant technical style of communication & presentation at their work place & also for academic uses.
- Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing.
- 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.

Recommended Text Books

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.

Recommended 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.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **PROFESSIONAL PROFICIENCY** **Course Code:** **PTSPPSC10T**
B.Sc. (Hons.) Physics- I
Semester: I

L	T	P	C
4	0	0	4

Objectives:

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.

Unit	Content	Hours
1. **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.**	10
2. **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.**	15
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.**	
4.	**Quantitative Aptitude & Logical Reasoning** · **Simplification & Approximation** · **Alpha-Numeric Series & Miscellaneous** · **Coding-Decoding**	**20**

Course Outcomes

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **ELECTRICITY AND MAGNETISM** **Course Code:** **SCUCPH201T**

Semester: II

L	T	P	C
4	0	0	4

Objective:

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

Unit	Content	Hours
1	**Electric Field and Electric Potential** Electric field. Electric flux. Gauss' Law with applications to charge distribution with spherical l, 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.	**10**
2	**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.	**5**
3	**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.	**6**
4	**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.	**12**
5	**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 eServices L C R Circuit: (1) Resonance, (2) Power Dissipation nd (3) Quality Factor, and (4) Band Width. Parallel L C R Circuit.	**12**

Course Outcome

- Understand the concept of Electric field and potential.
- Understand the concept of Dielectrics.
- Study the concept of Magnetic field and Magnetisation.
- Study the concept of Electrical Circuits.
- Understand the Concept of Current and charge sensitivity.

Recommended Text Books

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.

Recommended 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. FeynmanLecturesVol.2,R.P.Feynman,R.B.Leighton, M.Sands, 2008, Pearson Education.
4. Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **ELECTRICITY AND MAGNETISM LAB** **Course Code:** **SCUCPH201P**

Semester: II

L	T	P	C
0	0	4	2

Objective:

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

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 Nortontheorems.
7. To verify the Superposition, and Maximum power transfer theorems.
8. To determine self inductance of a coil by Anderson'sbridge.
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 determineits (a) Anti- resonant frequency and (b) Quality factor Q.
11. To determine self-inductance of a coil by Rayleigh's method.
12. To determine the mutual inductance of two coils by Absolute method.

Recommended Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. AText 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.

Laboratory Outcomes

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **WAVES AND OPTICS** **Course Code:** **SCUCPH202T**

Semester: II

L	T	P	C
4	0	0	4

Objective:

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

Unit	Content	Hours
1	**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.	12
2	**Wave Optics:** Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.	3
3	**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.	12
4	**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.	14
5	**Holography:** Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms.	4

Course Outcome

- Understand the concept of Waves and their propagation.
- Understand the concept of radiation and its nature.
- Study the concept of Interference.
- Study the concept of Diffraction.
- Understand the Concept of Holography.

Recommended Text Books

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

Recommended 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 Publications.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **WAVES AND OPTICS LAB** **Course Code:** **SCUCPH202P**

Semester: II

L	T	P	C
0	0	4	2

Objective:

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

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 the wave length of sodium source using Michelson's interferometer.
8. To determine wavelength of sodium light using Fresnel Biprism.
9. To determine wavelength of sodium light using Newton's Rings.
10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
11. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Recommended 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.

Laboratory Outcomes

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **FUNDAMENTALS OF DATA SCIENCE** **Course Code:** **CASCPSC20T**

Semester: II

L	T	P	C
4	0	0	4

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

Unit	Content	Hours
1	**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 probability- Statistical Inference: Populations and samples- Statistical modeling-mean, median, mode & covariance, fitting a model- Hypothesis Testing, Intro to Python.	9
2	**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.	10
3	**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.	10
4	**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.	8
5	**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	8

Course Outcomes

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

Recommended Text Books

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.

Recommended 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.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **FUNDAMENTALS OF DATA SCIENCE LAB** **Course Code:** **CASCPSC20P**

Semester: II

L	T	P	C
0	0	4	2

Objective: 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.

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.

Lab Outcomes:

Upon completion of the course, students will be able to

- Analyse and interpret results from descriptive and predictive data analysis
- Apply their knowledge to a given problem domain and articulate potential data analysis problems
- Identify potential pitfalls, and social and ethical implications of data science
- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.

Syllabus for B.Sc. (Hons.) Physics

Course Title: **ENVIRONMENTAL SCIENCE** **Course Code:** **SCUCEV201T**

Semester: II

L	T	P	C
2	0	0	2

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.**

Unit	Content	Hours
1.	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).	6
2.	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.	6
3.	Environmental Pollution: air pollution, water pollution, thermal pollution, noise pollution, soil pollution; Solid Waste Management; Environmental Impact Assessment.	6
4.	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.	6
5.	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.	6

Course Outcomes

After undergoing the subject, the student will be able to:

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

Recommended Text Book

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

Syllabus for B.Sc. (Hons.) Physics

Course Title: **PROFESSIONAL PROFICIENCY** **Course Code:** **PTSPPSC20T**
B.Sc. (Hons.) Physics- II
Semester: II

L	T	P	C
4	0	0	4

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.

Unit	Content	Hours
1. **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.**	10
2. **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.**	**15**
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.**	
3.	**Quantitative Aptitude & Logical Reasoning** · **Clock** · **Average** · **Calendar**	**20**

Course Outcomes

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