Syllabus for B.Sc. (Hons.) Mathematics

L	T	P	C
4	0	0	4

Course Title: **Probability and Statistics** **Course Code** **SCUCMT301T**

Semester: III I

Objective:

Students will use appropriate statistical terms to describe data. Identify the types of data (qualitative, quantitative, discrete, and continuous). Identify the types of sampling (random, stratified, systematic, cluster). Identify the misuses of statistics

Unit	Content	Hours
1	Probability Functions and Moment Generating Function Basic notions of probability, Conditional probability and independence, Baye's theorem.	9
2	Random variables - Discrete and continuous, Cumulative distribution function, Probability mass/density functions; Transformations, Mathematical expectation, Moments, Moment generating function, Characteristic function.	9
3	Univariate Discrete and Continuous Distributions Discrete distributions: Uniform, Bernoulli, Binomial, Negative binomial, Geometric and Poisson; Continuous distributions: Uniform, Gamma, Exponential, Chi-square, Beta and normal; Normal approximation to the binomial distribution.	9
4	Correlation, Regression and Central Limit Theorem The Correlation coefficient, Covariance, Calculation of covariance from joint moment generating function, Independent random variables, Linear regression for two variables	9
5	The method of least squares, Bivariate normal distribution, Chebyshev's theorem, Strong law of large numbers, Central limit theorem and weak law of large numbers.	9

Course Outcomes

- define the principal concepts about probability.
- express the concept of probability and its features
- explain the concept of a random variable and the probability distributions
- explain major distributions of random variables.

Recommended Text Books

1. S.M. Ross, Introduction to probability models (Six Edition) Academic Press, 1997.
2. A..M. Yagolam and I.M. Yagolam, Probability and Information, Hindustan Publishing Corporation, Delhi, 1983.

Recommended Reference Books

1. Robert V. Hogg, Joseph W. McKean & Allen T. Craig (2013). Introduction to Mathematical Statistics (7th edition), Pearson Education
2. Sheldon M. Ross (2014). Introduction to Probability Models (11th edition). Elsevier.

3. A. M. Yaglom and I. M. Yaglom (1983). Probability and Information. D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi

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L	T	P	C
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Course Title: Group Theory **Course Code SCUCMT302T**

Semester: III

Objective:

This course aims to provide an initial approach to the subject of Algebra, which is one of the basic foundations of modern mathematics. The focus of the course is to study certain algebraic structures like Groups & their properties

Unit	Content	Hours
1	Groups and its Elementary Properties Symmetries of a square, Definition and examples of groups including dihedral, permutation and quaternion groups, Elementary properties of groups.	9
2	Subgroups and Cyclic Groups Subgroups and examples of subgroups, Cyclic groups, Properties of cyclic groups, Lagrange's theorem, Euler phi function, Euler's theorem, Fermat's little theorem.	9
3	Normal Subgroups Properties of cosets, Normal subgroups, Simple groups, Factor groups, Cauchy's theorem for finite abelian groups; Centralizer, Normalizer, Center of a group, Product of two subgroups; Classification of subgroups of cyclic groups.	9
4	Permutation Groups Cycle notation for permutations, Properties of permutations, Even and odd permutations, alternating groups, Cayley's theorem and its applications.	9
5	Homomorphism and Isomorphism of groups, Fundamental theorem of homomorphism, Group Automorphism, Inner Automorphism.	9

Course Outcomes

After successful completion of the course, the student will be able to;

- acquire the basic knowledge and structure of groups, subgroups and cyclic
- get the significance of the notion of a normal
- get the behaviour of permutations and operations on
- study the homomorphisms and isomorphisms with
- understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
- understand the applications of ring theory in various

Recommended Text Books

1. M. Artin, Abstract Algebra, 2nd Ed., Pearson,2011
2. Joseph A. Gallian (2017). Contemporary Abstract Algebra (9th edition).
3. Ramji Lal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer.

Recommended Reference Books

1. J. J. Rotman, An Introduction to the Theory of Groups, 4th Ed., Springer Verlag, 1995.
2. I.N. Herstein, Topics in Algebra, Wiley Eastern Limited, India,1975
3. John B. Fraleigh (2007). A First Course in Abstract Algebra (7th edition). Pearson.

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L	T	P	C
4	0	0	4

Course Title: MECHANICS **Course Code SCUCMT303T**

Semester: III

Objective:

To develop problem solving skills in mechanics through the application of concepts in statics and dynamics to complex problems.

Unit	Content	Hours
1	Statics Equilibrium of a particle, Equilibrium of a system of particles, Necessary conditions of equilibrium, Moment of a force about a point, Moment of a force about a line, Couples, Moment of a couple, Equipollent system of forces, Work and potential energy, Principle of virtual work for a system of coplanar forces acting on a particle or at different points of a rigid body, Forces which can be omitted in forming the equations of virtual work.	10
2	Centres of gravity of plane area including a uniform thin straight rod, triangle, circular arc, semicircular area and quadrant of a circle, Centre of gravity of a plane area bounded by a curve, Centre of gravity of a volume of revolution	9
3	Flexible strings, Common catenary, Intrinsic and Cartesian equations of the common catenary, Approximations of the catenary.	9
4	Rectilinear Motion Simple harmonic motion (SHM) and its geometrical representation, SHM under elastic forces, Motion under inverse square law, Motion in resisting media, Concept of terminal velocity, Motion of varying mass.	10
5	Motion in a Plane Kinematics and kinetics of the motion, Expressions for velocity and acceleration in Cartesian, polar and intrinsic coordinates; Motion in a vertical circle, projectiles in a vertical plane and cycloidal motion.	7

Course Outcomes

On successful completion of this course, students are expected to be able to:

1.Identify the mechanics theory of equilibrium for mechanical systems.
2. Identify the concepts of kinematics of particles and rigid bodies.
3. Describe the motion for particles and associate its related equations.
4. Evaluate kinetics of particles using both free body and kinetics diagrams.

Recommended Text Books

1. S L Loney, The Elements of Statics and Dynamics Part-I (Statics), New Age International (P) Ltd
2. S L Loney, The Elements of Statics and Dynamics Part-II (Dynamics), New Age International (P) Ltd
3. R. S. Varma (1962). A Text Book of Statics. Pothishala Pvt. Ltd.

Recommended Reference Books

1. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, Statics, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney (2006). An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies. Read Books.

3. P. L. Srivatava (1964). Elementary Dynamics. Ram Narin Lal, Beni Prasad Publishers Allahabad.

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L	T	P	C
4	0	0	4

Course Title: Image processing using Matlab **Course Code CASCPSC30T**

Semester: III

Objective: Image processing becomes a very important aspect in various industries ranging from process industry to medical field. This course will help to understand, analyze a wide range of problems and provide solutions related to the design of image processing systems through suitable algorithms, structures, diagrams, and other appropriate methods.

UNIT	Topic	Hrs
1	**Introduction and Digital Image Fundamentals:** The origins of Digital Image Processing Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image as a 2D data, Image representation – Gray scale and Color images.	9
2	**Digital image Representation:** Reading, Displaying, Writing Images using MATLAB, Data Classes, Image Types using MATLAB, Converting Between data classes and Image Types, Introduction to Matlab Function used in MATLAB Programming.	9
3	**Image enhancement in Spatial domain:** Basic gray level Transformations, Histogram Processing Techniques, Enhancement Using Arithmetic and Logic operations, Combining Spatial Enhancement Methods. Basics of Spatial Filters.	9
4	**Image Enhancement in the Frequency Domain:** Introduction to Fourier Transform and the frequency Domain, Computing and Visualizing the 2D DFT (MATLAB), Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering. **Image Restoration and Reconstruction:** Noise Models, Noise Reduction, MMSE (Wiener) Filtering.	9
5	**Object Recognition and Case studies:** Object Recognition- Pattern Recognition and pattern classes, case studies – image analysis, Face Detection and Recognition, Application of Image processing in industries.	9

Course Outcomes:

- Students will be able to aware of Image Processing techniques.
- Design, analyze and realize various algorithms for image processing case studies.
- Select the appropriate hardware and software tools for image analysis.
- Develop the diagnostic tools for Medical applications.

Recommended Text Book:

1. Gonzalez & Woods, ―Digital Image Processing, 3rd ed., Pearson education, 2008
2. Jain Anil K., ―Fundamentals Digital Image Processing, Prentice Hall India, 2010

Text/Reference Books:

1. Milan Sonka, Vaclav Hlavav, Roger Boyle, ―Image Processing, Analysis and Machine Vision,
2nd ed., Thomson Learning, 2001
2. Rangaraj M. Rangayyan, ―Biomedical Image Analysis, CRC Press, 2005
3. Pratt W.K, ―Digital Image Processing, 3rd ed., John Wiley & Sons, 2007
4. Digital Image Processing, 3rd Edition, by Rafael C Gonzalez and Richard E Woods. Publisher: Pearson Education

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		L	T	P	C
		4	0	0	4
Course Title:	**Image processing using Matlab Practical**	**Course Code**	**CASCPSC30P**		

Semester: **III**

Objective: To apply various techniques and algorithms to manipulate digital images to achieve desired results.

List of Experiments:

1. Simulation and Display of an Image, Negative of an Image(Binary & Gray Scale)
2. Implementation of Relationships between Pixels.
3. Intensity transformation of images.
4. Implementation of Transformations of an Image.
5. Contrast stretching of a low contrast image, Histogram, and Histogram Equalization.
6. Display of bit planes of an Image.
7. Display of FFT (1-D & 2-D) an analysis of an image.
8. Computation of Mean, Standard Deviation, Correlation coefficient of the given image.

9. Implementation of Image Smoothening Filters (Mean and Median filtering of an Image).
10. Implementation of image sharpening filters and Edge Detection using Gradient Filters.

Laboratory Outcomes:

At the end of the course, student will be able to:

- Understand and comprehend the basics of Matlab.
- Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.
- Explain the use of the built-in data structures list, sets, tuples and dictionary. Make use of functions and its applications.

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L	T	P	C
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Course Title: **PROFESSIONAL PROFICIENCY** **Course Code:** **PTSPPSC30T**

Semester: **III**

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**	Phrasal Verbs, Idioms and Phrases, Interchange of Sentences (Affirmative to Negative), Composition (Expressing opinions and critical thoughts on current issues), Comprehension (Advanced Level),Cloze Test. **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.**	**15**
2. **Soft Skills**	**Speaking activities, Describe a Picture:** Tell a story around an idiom you have studied, Finish the sentence, Would you Rather and Why?,Talk about an activity you enjoy doing, Give directions, Timed discussion. **The aim should be to attempt to immerse the students in the language so that they develop exposure to it and develop confidence for further professional exposure.**	**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** • Blood Relation • Direction and Distance • Percentage	**15**

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.) Mathematics

		L	T	P	C
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Course Title:	**COMPLEX ANALYSIS**	**Course Code**	**SCUCMT401T**		
Semester:	**IV**				

Objective:

The objective of the course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity and complex integration are presented. Cauchy's theorem and its applications, the calculus of residues, and its applications are discussed in detail.

Unit	Content	Hours
1	Functions of a complex variable, Concepts of limit, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations (Cartesian and polar form), Harmonic functions, Orthogonal system, Power series as an analytic function.	**9**
2	Elementary functions, Mapping by elementary functions, Linear and bilinear transformations, fixed points, Cross ratio, Inverse points and critical points, Conformal transformations	**9**
3	Complex Integration, Line integral, Cauchy's fundamental theorem, Cauchy's integral formula, Morera's theorem, Liouville theorem, Maximum Modulus theorem, Taylor and Laurent series.	**10**
4	Singularities and zeros of an analytic function, Rouche's theorem, Fundamental theorem of algebra, Aanlytic continuation.	**8**
5	Residue theorem and its applications to the evaluation of definite integrals, Argument principle.	**9**

Course Outcome

Students will be able to-

1. Handle certain integrals not evaluated earlier and will know a technique for counting the zeros of polynomials.
2. This course is a prerequisite to many other advanced analysis courses.

Recommended Text Books

1. R.V.Churchill and J.W.Brown, (1984) Complex Variables and Applications. McGraw Hill International Book Co., Singapore. (Third Edition)
3. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi

Recommended Reference Books

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications (Eighth Edition), McGraw - Hill International Edition, 2009.
2. Joseph Bak and Donald 1. Newman, Complex analysis (2ndEdition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

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Course Title: Linear Algebra **Course Code SCUCMT402T**

Semester: IV

L	T	P	C
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Objective:

This course to learn, how Linear Algebra is ubiquitous in Mathematics and therefore a strong foundation has to be laid in studying the abstract algebraic concepts intertwining geometric ideas. The fundamental notions of vector spaces viz linear dependence, basis and dimension and linear transformations on these spaces have to be studied thoroughly.

Unit	Content	Hours
1	Vector Spaces Definition and examples, Subspace, Linear span, Quotient space and direct sum of subspaces, Linearly independent and dependent sets, Bases and dimension.	9
2	Linear Transformations Definition and examples, Algebra of linear transformations, Matrix of a linear transformation, Change of coordinates, Rank and nullity of a linear transformation and rank-nullity theorem.	11
3	Further Properties of Linear Transformations Isomorphism of vector spaces, Isomorphism theorems, Dual and second dual of a vector space, Transpose of a linear transformation	8
4	Eigen vectors and eigen values of a linear transformation, Characteristic polynomial and Cayley–Hamilton theorem, Minimal polynomial.	5
5	Inner Product, orthogonality, Cauchy–Schwarz inequality, Gram–Schmidt orthogonalisation, Diagonalisation of symmetric matrices.	9

Course Outcomes

- Provide an axiomatic description of an abstract vector space
- Define subspace of a vector space
- Given a linear transformation and bases, find a matrix representation for the linear transformation
- Find the eigenvalues and eigenvectors of a matrix
- Understand how to determine the angle between vectors and the orthogonality of vectors.

Recommended Text Books

1. Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd Edition). Narosa Publishing House
2. Kenneth Hoffman & Ray Kunze (2015). Linear Algebra (2nd edition). Prentice-Hall.

Recommended Reference Books

1.Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003). Linear Algebra (4thedition). Prentice-Hall of India Pvt. Ltd.
2. Gilbert Strang (2014). Linear Algebra and its Applications (2nd edition). Elsevier.
3. Serge Lang (2005). Introduction to Linear Algebra (2nd edition). Springer India.

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Course Title: Partial differential equations **Course Code SCUCMT403T**

Semester: IV

L	T	P	C
4	0	0	4

Objective:

Understand the application of Partial Differential Equations, Learn to solve fundamental solution of Laplace equation.

Unit	Content	Hours
1	First Order Partial Differential Equations Order and degree of Partial differential equations (PDE), Concept of linear and non-linear partial differential equations, Partial differential equations of the first order, Lagrange's method, Some special type of equation which can be solved easily by methods other than the general method, Charpit's general method.	9
2	Second Order Partial Differential Equations with Constant Coefficients Classification of linear partial differential equations of second order, Homogeneous and nonhomogeneous equations with constant coefficients.	10
3	Partial differential equations reducible to equations with constant coefficient, Second order PDE with variable coefficients	10
4	Classification of second order PDE, Reduction to canonical or normal form; Monge's method	8
5	Solution of heat and wave equations in one and two dimensions by method of separation of variables.	8

Course Outcomes

After completion the students will be able to:

- Solve Partial Differential Equation of Second Order.
- Understand the application of Partial Differential Equations
- Find the solutions of Laplace equation and Poisson's equation

Recommended Text Books

1. Ian N. Sneddon: Elements of Partial Differential Equations, McGraw Hill Book Company, 1988
2. J.N. Sharma & Kehar Singh: Partial Differential Equations
3. A. S. Gupta (2004). Calculus of Variations with Applications. PHI Learning.

Recommended Reference Books

1. M.D. Raisinghania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co.,New Delhi.

2. Erwin Kreyszig (2011). Advanced Engineering Mathematics (10th edition). Wiley.

3. TynMyint-U & Lokenath Debnath (2013). Linear Partial Differential Equation for Scientists and Engineers (4th edition). Springer India.

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Course Title: Mathematical Methods **Course Code SCUCMT404T**

L	T	P	C
4	0	0	4

Semester: IV

Objective:

Course intends to deliver the concept of Laplace transforms, Fourier series and apply it to various levels.

Course Outcomes

Unit	Content	Hours
1	Laplace Transforms Laplace transform, Linearity, Existence theorem, Laplace transforms of derivatives and integrals, Shifting theorems, Change of scale property, Laplace transforms of periodic functions, Dirac's delta function.	7
2	Further Properties of Laplace Transforms and Applications Differentiation and integration of transforms, Convolution theorem, Integral equations, Inverse Laplace transform, Lerch's theorem, Linearity property of inverse Laplace transform, Translations theorems of inverse Laplace transform, Inverse transform of derivatives, Applications of Laplace transform in obtaining solutions of ordinary differential equations and integral equations.	10
3	Fourier Transforms Fourier and inverse Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier sine and cosine transforms, Linearity property, Change of scale property, Shifting property, Modulation theorem, Relation between Fourier and Laplace transforms.	9
4	Solution of Equations by Fourier Transforms Solution of integral equation by Fourier sine and cosine transforms, Convolution theorem for Fourier transform, Parseval's identity for Fourier transform, Plancherel's theorem, Fourier transform of derivatives, Applications of infinite Fourier transforms to boundary value problems, Finite Fourier transform, Inversion formula for finite Fourier transforms.	10
5	Fourier series Fourier cosine and sine series, Fourier series, Differentiation and integration of Fourier series, Absolute and uniform convergence of Fourier series, Bessel's inequality, The complex form of Fourier series.	9

Course Outcomes

Students shall be able to:

- Apply the Laplace Transform and its properties to evaluate the Integrals.
- Apply Laplace & Inverse Laplace Transform to the solution of differential equations
- Interpret the concept of Fourier Transform and Inverse Fourier Transform.

Recommended Text Books

1. Walter Rudin (2017). Fourier Analysis on Groups. Dover Publications.
2. M R Spigel, Theory and Problems of Laplace Transform, Schaum Outline Series. 2018.

Recommended Reference Books

1. James Ward Brown & Ruel V. Churchill (2011). Fourier series and Boundary Value Problems. McGraw-Hill Education.
2. R.R.Goldberg, Fourier Transform, Cambridge Univ. Press,2009
3. Advanced Engineering Mathematics Kreyszig E. 9th Ed (Wiley, 2006)

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Course Title: PYTHON PROGRAMMING **Course Code: CASPYSC40T**

Semester: IV

L	T	P	C
4	0	0	4

Course Objective:

- Master the fundamentals of writing Python programs.
- Learn core Python scripting elements such as variables and flow control structures
- Discover how to work with lists and sequence data
- Write Python functions to facilitate code reuse
- Use Python to read and write files
- Work with the Python standard library and modules.

Unit	Content	Hours
1	**Introduction to Python Language:** Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.	9
2	**Control Structures:** Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.	9
3	**Strings, Lists, Tuples and Dictionaries,:** Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.	9
4	**Functions & Modules:** Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables. Importing module, Math module, Packages and their composition	9
5	**File Handling:** Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations.	9

Course Outcomes:

- Understanding basic programming skills using Python programming language.
- Understanding the notion of data types and complex data types such as lists, tuples etc.
- Understanding the concept of decision making and iterative control structure in python.
- Understanding the concepts of functions and file handling in Python.

Recommended Text Book:

- R Nageswar Rao, *Core Python Programming*, 2018.
- Eric Mathews, Python Crash Course, 2019.

Recommended Reference Books:

- Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
  Exploring Python, Timothy A. Budd, Mc Graw Hill Education

Course Title: PYTHON PROGRAMMING LAB **Course Code: CASPYSC40P**

Semester: IV

L	T	P	C
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Laboratory Objectives:

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python.
- To develop the skill of designing Graphical user Interfaces in Python.
- To develop the ability to write database applications in Python.

List of Experiments:

Implement all the concepts taught in the Python Programming classes. Some experiments are:

1. Write a program to demonstrate different number data types in Python
2. Write a program to compute distance between two points taking input from the user using Pythagorean Theorem.
3. Write a Program for checking whether the given number is a even number or not.
4. Write a Python script that prints prime numbers less than 20.
5. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
6. Write a program to create, append, and remove lists in python.
7. Write a program to demonstrate working with tuples in python.
8. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
9. Write a python program to define a module and import a specific function in that module to another program
10. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
11. Write a Python class to implement pow(x, n) and other user defined functions.

Laboratory Outcomes:

At the end of the course, student will be able to:

- Understand and comprehend the basics of python programming.
- Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.
- Explain the use of the built-in data structures list, sets, tuples and dictionary. Make use of functions and its applications.

L	T	P	C
4	0	0	4

Course Title: PROFESSIONAL PROFICIENCY **Course Code: PTSPPSC40T**

Semester: IV

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**	Idioms and Phrases, Clause,(context building), Critical Analysis on News Articles/Current Affairs, Correction of Sentences, Reproduction of story/poem (Creative abilities) **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.**	15
2 **Soft Skills**	**Debate, Speech developing activities:** The world in twenty years, Guess the word, Time Trials, Describing a game, brainstorming an idea, listening and repeating. **The aim should be to enable the students to express themselves in the language and gain proficiency and confidence in speaking the language. They should develop skills to be able to better present their ideas and openly express their thoughts and opinions. They should develop independent and critical thinking.**	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** • Order and Ranking • Ratio and Proportion • Time and Work	15

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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.