Course Code:	Course Title: **RESEARCH METHODOLOGY AND PUBLICATION ETHICS**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 2 Hrs

Course Objectives

1. To familiarize students with fundamental research concepts and various methodologies used in academic and industrial research.
2. To develop skills in designing and conducting systematic research, including data collection, analysis, and interpretation.
3. To equip students with knowledge and tools for ethical and effective publication in peer-reviewed journals and conferences.

Course Outcomes (COs)

1. Understand and apply the fundamental principles of research design, methodology, and data collection techniques in scientific inquiry.
2. Critically evaluate different research methods and select appropriate tools and techniques for conducting ethical and impactful research.
3. Demonstrate the ability to identify research problems, formulate hypotheses, and structure a research proposal with clear objectives and methodology.
4. Recognize and adhere to ethical standards in academic research and publications, including issues of plagiarism, authorship, and peer review processes.
5. Develop effective academic writing and communication skills for the preparation of research papers and publications in peer-reviewed journals.

CONTENT	**Hours**
UNIT-1	
Meaning of Research, Characteristics of Scientific Research, etc. Science and Common Sense, Characteristics of Scientific Research, Steps in Scientific Research, Methods of Scientific Research, Criteria of Good Research **Types of Research** Normative Research, Scientific Research, and Value-Free Research, Types of Research, Research Approaches **Social Science Research Vs. Scientific Methods** Significance of Research in Social Sciences, Scientific Methods, Defining the Problem of Research, Concepts and Constructs, Meaning and Function of Research Design	5

UNIT-2	
Research Design Characteristics of a Good Research Design , Phases in Research Design, Important Concepts Relating to Research Design, Research Design in Case of Exploratory Research Studies, Research Design in Case of Descriptive and Diagnostic Research Studies. **Research Design and Sampling** Research Design in Case of Hypothesis-Testing Research Studies (Experimental Research), Informal Experimental Designs, Formal Experimental Designs, Sampling and Its Purposes, Steps in Sample Design **Sampling** Principles of Sampling, Sample Size Determination, Non-Random Sampling, Random Sampling, Complex Random Sampling, Measurement and Scaling Techniques, Classification of Measurement Scales, Criteria of Good Measurement, Comparative Scaling Techniques, Non-comparative Scaling Techniques ,Likert Scales. **Scaling Techniques, Data Collection and Methods** Guttman and Bogardus Scales, Types of Data, Primary Data Collection – Observation Method, Interview Method of Data Collection, Collection of Data through Questionnaires.	10
UNIT-3	
Data Collection Methods and Preparation, Projective Techniques, Collection of Secondary Data, Case Study, Pilot Study and Pre-Testing, Questionnaire Checking, Editing and Coding of Data. **Data Preparation and Analysis** Classification, Tabulation, Graphical Representation, Types of Analysis, Statistics in Research. **Hypotheses and Synopsis Writing** Hypotheses, Difference Between a Proposition, a Hypothesis and a Theory, Basic Concepts Concerning Testing of Hypothesis, Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association. Python and AI tools as a statistical tool. **Synopsis Writing** Synopsis Writing I, Synopsis Writing II, Synopsis Writing III , Steps in Writing a Research Report Appraisal of the Research Proposal/Project.	10
UNIT-4	
Philosophy and Ethics Introduction to philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgements and reactions. **Scientific Conduct** Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP). Redundant publications: duplicate and overlapping publications, salami slicing, selective reporting and misrepresentation of data.	10

Publication Ethics Publication ethics: definition, introduction and importance. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types. Violation of publication ethics, authorship and contributorship. Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.	
UNIT-5	
Open Access Publishing Open access publications and initiatives, SHERPN/RoMEO online resource to check publisher copyright & self-archiving policies, Software tool to identify predatory publications developed by SPPU, Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc. Publication Misconduct : Subject specific ethical issues, FFP, authorship, Conflicts of interest. Complaints and appeals: examples and fraud from India and abroad. Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools. **Databases and Research Metrics** Databases and Indexing databases. Citation databases: Web of Science, Scopus, etc. Research Metrics: Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score. Metrics: h-index, g index, i10 index and alternative metrics.	10

Books and references

- Kothari, C. R. (2004). Research Methodology: Methods and Techniques. India: New Age International (P) Limited.
- Ahuja, R. (2001). ResearchMethods. India: Rawat Publications.
- Santhosh Kumar Yadav · research ethics, misconduct and the ensuing actions as per international law.

Course Content and Outcomes

Semester	
Paper Code	
Paper Title	**MACHINE LEARNING WITH PYTHON**
Number of teaching hours per week	03
Total number of teaching hours per semester	45
Number of credits	03

Objectives

This paper enables students to acquire basic knowledge in machine learning techniques and learn to applythe techniques in the area of pattern recognition and data analytics. Also this paper introduces python programming language as a machine learning tool.

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Have developed a good knowledge of basic principles of machine learning techniques and have developed a good knowledge of machine learning capabilities of python.
CO2	Understand	Have developed a very good understanding of types of machine learning techniques like supervised and un supervised learning.
CO2	Apply	Be able to use various machine learning models.
CO3	Analyze	Be able to compare various machine learning models and select a suitable model for a given problem.
CO4	Evaluate	Be able to evaluate various models in python and select the appropriate one for a given real time problem
CO5	Create	Be able to design and build small machine learning applications which can be used to solve various real time problems.

Content	Hours
Unit 1 **INTRODUCTION** Machine Learning, types of machine learning, examples. Supervised Learning: Learning class from examples, learning multiple classes, regression, model selection and generalization, Parametric Methods,parametric classification.	**5**
Unit 2 **DIMENSIONALITY REDUCTION** Introduction, subset selection, principal component analysis, factor analysis, linear discriminant analysis. **CLUSTERING** Introduction, mixture densities, k-means clustering, hierarchical clustering, Spectral clustering, choosing the number of clusters.	**10**
Unit 3 **DECISION TREES** Introduction, univariate trees, pruning, rule extraction from trees, learning rules from data. **BAYESIAN CLASSIFIER** Conditional probability, Bayes Theorem, Naïve Bayes algorithm, using numeric features with Naïve Bayes algorithm. **MULTILAYER PERCEPTRON** Introduction, training a perceptron, learning Boolean functions, multilayer perceptron, Back propagation algorithm, training procedures.	**10**
Unit 4 **KERNEL MACHINES** Introduction, optical separating hyper plane, v-SVM, kernel tricks, vertical kernel, defining kernel,multiclass kernel machines, one-class kernel machines. **HIDDEN MARKOV MODELS** Introduction, discrete Markov processes, hidden Markov models, basic problems of HMM, evaluationproblem, finding the state sequence, learning model parameters, Continuous observations, HMM with inputs, model selection with HMM. **REINFORCEMENT LEARNING** Introduction, single state case, elements of reinforcement learning, temporal difference learning,generalization, partially observed state.	**10**
Unit 5 **MACHINE LEARNING WITH PYTHON** **Data framing**: numpy: Ndarray, Array attributes Array creation routines, Indexing and slicing, ArrayBroadcasting, Array manipulation, Mathematical functions, Statistical functions, Search, sort and counting functions, Matrix Library, Linear algebra. **Pandas:** Series, Data frame, Panel, Basic functionality: axes, dtype, empty, ndim, size, values, head, tail.Descriptive Statistics, Reindexing, iterations, sorting, options and Customization, Indexing and SelectingData, Statistical Functions,Window Functions, Aggregation, Missing data, Group by, Merging, concatenation, Categorical data, I/O tools:read_csv,read_table.	**10**

Data Visualization: Matplotlib, Barplot, Histograms, Box plots, Area plot, Scatter plot, Pie chart, **Scikit:** Classifiers: K-nearest, SVM, Naive base, Linear Regression. Clustering: K Means, Spectral,Hierarchical, DBSCAN, OPTICS. Dimensionality Reduction: PCA, MDS, LDA.	
SELF STUDY –6 hours of self-study will be assigned from the above units.	

References

- E. Alpaydin, Introduction to Machine Learning. 4th MIT Press, 2020.
- K. P. Murphy, Machine Learning: A Probabilistic Perspective. MIT Press, 2022.
- P. Harrington, Machine Learning in Action. Manning Publications, 2012
- C. M. Bishop, Pattern Recognition and Machine Learning. Springer, 2016.
- Andreas C. Muller, Sarah Guido, Introduction to Machine Learning with Python

Course Code:	Course Title: Cloud Computing
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 45	Formative Assessment Marks:
Exam Marks:	Exam Duration:

Course Objectives

To equip students with a foundational and practical understanding of cloud computing by exploring its concepts, architecture, service and deployment models, virtualization technologies, green and market-oriented approaches, and leading industry platforms such as AWS.

Course Outcomes (COs):

CO1 : Understand the fundamental concepts, characteristics, and deployment models of cloud computing, and differentiate between traditional on-premises computing and cloud environments.

CO2 : Analyze cloud computing architecture and service models (IaaS, PaaS, SaaS), and evaluate tools and technologies used for cloud resource provisioning and management.

CO3 : Explain virtualization technologies, classify various virtualization techniques, and assess their role and impact on cloud computing.

CO4 : Evaluate green and market-oriented cloud computing architectures, including energy-efficient strategies and federated cloud environments.

CO5 : Explore real-world cloud platforms with a focus on Amazon Web Services (AWS) and gain awareness of other platforms such as Microsoft Azure through self-study.

Content	**Hours**
Unit – 1	
Introduction to Cloud Computing Introduction to Cloud Computing, History of Cloud Computing, Vision of cloud computing, On-Premises vs. Cloud, Characteristics and Benefits of Cloud Computing, Cloud Infrastructure Management, Challenges and Risks, Building cloud computing environments, Cloud Deployment Models: public, private, hybrid and community.	8
Unit-2	
Cloud Computing Architecture The cloud computing reference model, Introduction to IaaS, PaaS and SaaS, Evolution of SaaS, Challenges of SaaS Paradigm, SaaS Integration Services, Introduction to Platform As a service (PaaS), Integration of Private and Public Cloud, Technologies and Tools for Cloud Computing, Resource Provisioning services, Introduction	10

Infrastructure As a Services (IaaS), Background and Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action.	
Unit-3	9
Virtualization Introduction to Virtualization Technologies, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples	
Unit-4	8
"**green" cloud computing architecture** Energy efficiency in clouds, Energy-efficient and green cloud computing architecture. **Market-oriented cloud computing** Market-based management of clouds, Market-oriented cloud computing, A reference model for MOCC. Federated clouds/InterCloud, Characterization and definition, Cloud federation stack **Self-Study : Cloud Applications**	
UNIT 5	10
Cloud Platforms in Industry Amazon web services Self-Study: Microsoft Azure	

Text Book

- **Rajkumar Buyya , Christian Vecchiola , S.Thamarai Selvi , "Mastering Cloud Computing: Foundations and Applications Programming", Morgan Kaufmann Publishers In, 2013**
- **Rajkumar Buyya , James Broberg , Andrzej Goscinski, "Cloud Computing: Principles and Paradigms", First Edition, 2011, willey**

Reference Books

- Thomas Erl, Zaigham Mahmood, and Ricardo Puttini," Cloud Computing Concepts, Technology & Architecture", PRENTICE HALL, 2013
- Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw Hill Edition, Fourth Reprint, 2010
- Barrie Sosinsky (2011) Cloud Computing Bible, Wiley, India
- Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing for Dummies", Wiley India Edition,2010

- John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press, 2010.
- Michael Miller, “Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.

BSC HONOURS SYLLABUS

Title: DESIGN AND ANALYSIS OF ALGORITHMS

Code:

Total Hours: 45 hrs

Hours /week: 3 hrs

Credits: 3

Course Objectives

- To understand the basic concepts of algorithm design techniques.
- To analyze the time and space complexity of algorithms.
- To learn how to design efficient algorithms for solving computational problems.
- To explore different algorithmic strategies and evaluate their performance.

Learning outcomes

- One can design efficient algorithms using the various approaches for real world problems.
- Analyze the running time of algorithms for problems in various domains.
- Implement the algorithms and design techniques to solve problems.

UNIT 1

INTRODUCTION TO ALGORITHMS (7)

Definition and characteristics of an algorithm, Analysis of Algorithms: Time and Space Complexity, Asymptotic Notations: Big O, Big Theta, Big Omega, Recurrences and their solutions: Substitution method, Recursion tree. Best, Worst, and Average Case Analysis

UNIT 2 (10)

DIVIDE AND CONQUER

General method, Binary Search , Merge Sort, Quick Sort , Strassen's Matrix Multiplication , Arithmetic with Large integers. Analysis of Divide and Conquer Algorithms

UNIT 3

GREEDY METHOD (10)

General method, Characteristics of Greedy Algorithms .Minimal Spanning Tree (Prim's and Kruskal's Algorithm), Shortest Paths, Knapsack Problem (Fractional). Dynamic Programming, Chained Matrix Multiplication, Optimal Storage on Tapes, Shortest Paths (Dijkstra's and Floyd– Warshall algorithm), Optimal Binary Search Trees.

UNIT 4

BACKTRACKING METHOD **(10)**

8-queens problem, Graph Coloring, Hamiltonian Cycles, Branch and Bound -0/1 Knapsack problem, Travelling Salesman problem, Approximation Graph Coloring, Task Scheduling, Bin Packing.

UNIT 5

GRAPH ALGORITHMS **(8)**

BFS, DFS and its applications. Polynomial Evaluation, Intractable Problems: Basic Concepts, Nondeterministic Algorithms, NP Completeness, Cook's Theorem, Examples of NP-Hard and NP-Complete problems.

TEXT BOOK

- E. Horowitz, S. Sahni, and S. Rajasekaran, *Fundamentals of Computer Algorithms*, 2nd ed. Hyderabad, India: Universities Press, 2008.

REFERENCES

- V. Aho, J. E. Hopcroft, and J. D. Ullman, *The Design and Analysis of Computer Algorithms*, Reading, MA: Addison-Wesley, 1974.
- S. E. Goodman and S. T. Hedetniemi, *Introduction to the Design and Analysis of Algorithms*, New York, NY: McGraw-Hill, 1977.
- G. Brassard and P. Bratley, *Algorithmics: Theory and Practice*, New Delhi: Prentice-Hall of India (PHI), 1996.
- S. K. Basu, *Design Methods and Analysis of Algorithms*, New Delhi: Prentice-Hall of India (PHI), 2005.
- A. Levitin, *Introduction to the Design and Analysis of Algorithms*, 3rd ed. Boston, MA: Pearson Education, 2012.
- S. Sen and A. Kumar, *Design and Analysis of Algorithms*, 1st ed. Cambridge: Cambridge University Press, 2019.
- S. Sridhar, *Design and Analysis of Algorithms*, 2nd ed. New Delhi: Oxford University Press, 2024.
- I. C. Mohan, *Design and Analysis of Algorithms*, 1st ed. New Delhi: PHI Learning Pvt. Ltd., 2012.

Course Code:	Course Title: Data Analytics
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 39	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 2 Hrs 30 Mins

Course Objectives

This course aims to equip students with a comprehensive understanding of advanced data analytics, covering data preprocessing, exploratory analysis, predictive modeling, and visualization techniques. It emphasizes the use of modern tools and frameworks aligned with current industry practices. Students will develop the ability to derive insights from structured and unstructured datasets using statistical and machine learning approaches.

Course Outcomes (COs):

CO1 : Describe the principles, types, and applications of data analytics in various industries.

CO2 : Analyze and preprocess data using appropriate techniques and tools

CO3 : Build and Evaluate predictive models using machine learning algorithms

CO4 : Visualize and interpret data to derive actionable business insights

CO5 : Design and execute a complete data analytics project from problem definition to deployment.

Content	**Hours**
Unit – 1	
Foundations of Data Analytics ● Introduction to Data Analytics and the Data Science Lifecycle ● Types of Data: Structured, Semi-Structured, and Unstructured ● Data Types and Measurement Scales ● Types of Analytics: Descriptive, Diagnostic, Predictive, Prescriptive ● Introduction to Python for Data Analytics ● Hands-on: Jupyter Notebook, Data Import & Basic Exploration **Tools**: Python (Pandas, NumPy), Jupyter, Excel	8
Unit-2	
Data Preparation and Exploratory Data Analysis (EDA) ● Data Cleaning: Handling Missing Data, Duplicates, Outliers ● Data Transformation: Normalization, Encoding, Binning ● Feature Engineering & Feature Selection Techniques	10

● Exploratory Data Analysis: Univariate & Bivariate Analysis\ ● Data Visualization & Interpretation ● Hands-on: Charts, Heatmaps, Histograms, Boxplots **Tools**: Python (Matplotlib, Seaborn, Plotly), Power BI/Tableau (Intro)	
Unit-3	10
Predictive Analytics and Machine Learning ● Introduction to Machine Learning Models ● Regression Techniques: Linear, Logistic ● Classification Models: Decision Tree, K-Nearest Neighbors, Random Forest ● Model Evaluation Metrics: Accuracy, Precision, Recall, F1, ROC-AUC ● Cross Validation, Overfitting & Regularization ● Hands-on: Model Training, Testing, Evaluation **Tools**: Scikit-learn, TensorFlow/Keras (Intro), Google Colab	
Unit-4	10
Big Data Analytics ● Introduction to Big Data Concepts ● Hadoop Ecosystem vs. Apache Spark ● Real-time vs. Batch Processing ● PySpark: DataFrames, Transformations, Actions ● Introduction to NoSQL Databases (MongoDB overview) ● Hands-on: Spark (local setup or Databricks/Google Colab integration) **Tools**: PySpark, MongoDB (Intro)	
UNIT 5	7
Industry Applications, Optimization & Capstone Project ● Industry Use Cases: Fraud Detection, Market Basket Analysis, Customer Segmentation ● Optimization Techniques in Analytics (Linear Programming, Decision Modeling) ● Prescriptive Analytics & Simulation Basics Ethical Use of Data & AI Regulations (GDPR, Bias in AI) ● Capstone Project: End-to-End Problem Solving **Tools**: Full Stack Workflow (Python + Visualization Tool + Report Writing)	

Text Book

- Grus, J. (2022). *Data Science from Scratch: First Principles with Python* (2nd ed.) Publisher: O'Reilly Media
- Géron, A. (2023). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow* (3rd ed), Publisher: O'Reilly Media

Reference Books

Course Code:	Course Title: **Cyber Security**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 2 Hrs

Course Objectives:

1. To provide an understanding of the main issues related to security in modern networked computer systems.
2. To understand concepts and foundations of computer security.
3. Basic knowledge about security-relevant decisions in designing IT infrastructures like personal laptop to large-scale infrastructures.

Course Outcomes:

Here the students will be able to understand

1. An extensive, detailed, and critical understanding of the concepts, issues, principles and theories of computer network security.
2. Theoretical and detailed practical knowledge of a range of computer.
3. Network security technologies as well as network security tools and services.
4. Gain experience of analysing, designing, implementing and validating solutions to computer network security challenges using common network security tools and formal methods.
5. Demonstrate knowledge of reasoning and knowledge representation for solving cybercrime problems.

CONTENT	**Hours**
UNIT-1	
Cyber Laws Internet Governance – Challenges and Constraints, Cyber Threats: - Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage, State and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, The Indian Penal code, National Cyber Security Policy 2017.	7
UNIT-2	
Cyber Security Introduction to Cyber Security. Confidentiality, Integrity and Availability – Triad. Attacks: Threats, Risk Assessment and Analysis, Hackers and types, Information Classification, Policies, Procedure and Guidelines, Vulnerabilities and Risk, Layers of cyber security. Self-study: Best cyber security practices.	8
UNIT-3	

Basics of Cryptography Symmetric and Asymmetric Cryptosystems, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques. Data Encryption Standard (DES), Principles of public key cryptosystems-The RSA Algorithm-Key management - Diffie Hellman Key exchange, Hashing, MD5 and SHA-1 Algorithms. Self-study: SHA 512 Algorithm	10
UNIT-4	
Network and Wireless Attacks Network Sniffing, packet analysis, display and capture filters, Ettercap, DNS Poisoning, ARP Poisoning, Denial of services, Vulnerability scanning, Setup network, IDS/IPS, Router attacks, Man-in-the-middle Attack, MAC Filtering, Packet Encryption, Packet Sniffing, Types of authentication, Attacks on WEP, WPA Encryption. Case study: Fake hotspots.	7
UNIT-5	
Network Security IP security architecture, Security protocols, IP Sec, Firewalls, IDPS – Types and technologies. Trusted systems – Electronic payment protocols, SET Network Security Applications, Authentication, Mechanisms: Passwords, Cryptographic authentication protocol, Kerberos, X.509 certificate, Digital Signatures. Web Security: SSL Encryption, Securing online payments (OTP). Self-study: Transport layer secure.	10

Text Books:

1. Sunit Belapure and Nina Godbole, "Cyber Security : Understanding Cyber-crimes andLegal perspectives", Wiley India Pvt Ltd,2020.
2. Atul Kahate, "Cryptography and Network Security," Tata McGraw-Hills (Reprinted 2021).

References:

1. William Stallings; "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall Publication Inc., 2007.
2. Nina Godbole and Sunit Belapore; "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publications, 2011.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

4. Michael E Whiteman and Herbert J Mattord; “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003.

5. Alfred J. Menezes, Paul. C. Van Oorschot, and Scott A. Vanstone “Handbook of Applied Cryptography”, CRC press, Lib of Congress -2006

Course Code: CA5P2	**Course Title:** Cyber Security Lab
Course Credits: 02	**Hours/Week:** 04
Total Contact Hours: 52	**Formative Assessment Marks**: 25
Exam Marks: 25	**Exam Duration:** 2 Hrs

Course Objectives:

The student should be made

1. Exposed to different Cipher techniques
2. Learn to implement the algorithms DES, RSA, MD5,SHA-1
3. Learn to use security tools Cryptool, GnuPG, KF sensor, VI Strumbler.

Course Outcomes:

Here the students will be able to understand

1. An extensive, detailed and critical understanding of the concepts, issues, principles and theories of computer network security.
2. Theoretical and detailed practical knowledge of a range of computer.
3. Network security technologies as well as network security tools and services.
4. Gain experience of analysing, designing, implementing and validating solutions to computer network security challenges using common network security tools and formal methods.
5. Demonstrate knowledge of reasoning and knowledge representation for solving cybercrime problems.

LIST OF EXPERIMENTS

1. Write a program to encrypt and decrypt a Password.
2. Implement the substitution mono alphabetic technique by using Caesar Cipher algorithm.
3. Write a Program to implement Play fair Cipher algorithm.
4. Write a program to demonstrate polyalphabetic cipher by using Hill Cipher algorithm.
5. Implement Substitution and transposition technique by using Vigenère Cipher algorithm.
6. Write a program to implement Rail fence – row & Column Transformation technique.

7. Write a program to implement Row & Column Transformation technique
8. Demonstrate Data Encryption Standard Algorithm using Cryptool.
9. Implement the RSA Algorithm using HTML and Java script.
10. Write a program to demonstrate Diffie-Hellman's key exchange.
11. Demonstrate Message digest (MD5) Algorithm.
12. Implement the SHA-1 hashing Algorithm.
13. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
14. To ensure security of any one web browser.
15. Working with Sniffers for monitoring network communication using Wireshark.
16. Implement KALI LINUX to demonstrate basic command.
17. Understanding NMAP for ports Monitoring.

Semester	
Paper Code	
Paper Title	**MACHINE LEARNING WITH PYTHON LAB**
Number of teaching hours per week	02
Total number of teaching hours per semester	
Number of credits	01

Using Pandas

Problem 1: Loading, Exploring Data, Data Selection and Filtering
Load Iris dataset and display few rows.From the Iris dataset, create a new DataFrame containing only rows where the sepal length is greater than 5 and the species is setosa.

Problem 2: a:Data Cleaning
Handle missing values in the Iris dataset. Replace any missing values with the mean of the respective column.
b:**Grouping and Aggregation**
Group the Iris dataset by species and calculate the mean, median, and standard deviation of each numeric column for each species.

Problem 3: Merging DataFrames
Create two DataFrames with information about students and courses. Merge these DataFrames based on a common column, such as student ID.

Problem 4: Time Series Analysis
Load a dataset with a time series (e.g., stock prices) into a DataFrame. Analyze trends, calculate daily returns, and plot the results.

Problem 5: a: Pivot Tables
Using a DataFrame of sales data, create a pivot table to show the total sales for each product category and each month.
b: **Data Visualization**
Load a dataset of your choice and create a few meaningful visualizations using pandas and Matplotlib or Seaborn. For example, plot histograms, scatter plots, or line charts.

Using NUMPY

Problem 6: **Creating Arrays and Array Operations:**
Create a 1D array with elements from 0 to 9.
Create a 2D array with shape (3, 4) filled with random numbers.
Calculate the mean and standard deviation of a given array.
Normalize the values of an array (subtract the mean and divide by the standard deviation).

Problem 7: **Indexing and Slicing & Matrix Operations:**
Extract the third column from a 2D array.
Reverse the order of elements in a 1D array.
Create two matrices (2x3 and 3x4) and perform matrix multiplication.
Find the determinant of a 3x3 matrix.

Problem 8: Generating Array, Reshaping and Stacking:
Create a 1D array of 10 evenly spaced values between 0 and 1.

Generate a 3x3 identity matrix.
Reshape a 1D array into a 2D array with shape (2, 5).
Stack two arrays vertically and horizontally.

Problem 9: Statistical Operations, Broadcasting:
Generate a random 2D array and calculate the mean along each axis.
Find the minimum and maximum values in a given array.
Create a 1D array and add a constant value to each element without using a loop.
Multiply each row of a 2D array by a different constant.

Problem 10: Plot histogram for the given dataset

10-15	15-20	20-25	25-30	30-35
5	6	9	8	2

Problem 11: Draw box-and-whisker plot for the data set {3, 7, 8, 5, 12, 14, 21, 13, 18}.

Problem 12: Draw Line Plot and Bar chart for the following data.

Elapsed time (s)	0	1	2	3	4	5	6
Speed(m/s)	0	3	7	12	20	30	45.6

PART B

1. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
2. Demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
3. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
4. Implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data set
5. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set.
6. Apply K-Means clustering algorithm to cluster a set of data stored in a .CSV file
7. Implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
8. Implement the parametric Linear Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

appropriate data sets.