

# Diploma Engineering

## Laboratory Manual

**(Introduction to Machine Learning)**

**(4350702)**

[Computer Engineering, Semester V]

Enrolment No	
Name	
Branch	Computer Engineering
Academic Term	2025-26 ODD
Institute	Government Polytechnic Jamnagar



**Directorate Of Technical Education Gandhinagar**  
**- Gujarat**

### CTE's Vision:

To facilitate quality technical and professional education having relevance for both industry and society, with moral and ethical values, giving equal opportunity and access, aiming to prepare globally competent technocrats.

### CTE's Mission:

1. Quality technical and professional education with continuous improvement of all the resources and personnel
2. To promote conducive ecosystem for Academic, Industry, Research, Innovations and Startups
3. To provide affordable quality professional education with moral values, equal opportunities, accessibility and accountability
4. To allocate competent and dedicated human resources and infrastructure to the institutions for providing world-class professional education to become a Global Leader ("Vishwa Guru")

### Institute's Vision:

To be an elite institute by creating technocrats who will contribute towards the betterment of the society.

### Institute's Mission:

- To be a student-centric institute, imparting fundamental, experimental and innovative skills, addressing societal problems for creating socially responsible citizens.
- To strengthen linkage with employers, industries, alumni and other stakeholders for the betterment of the institute.
- To promote co-curricular and extra-curricular activities for overall personality development of the students.

### Department's Vision:

To become a centre of excellence and generate competent professionals in the field of computer engineering for the betterment of the nation and society at large.

### Department's Mission:

- To inculcate practical skills into students.
- To facilitate students with suitable environment to develop their logical and analytical skills.
- To make available modern technology and related tools for hands-on experience.
- To inculcate interpersonal skills and ethical values into the students so that they can become successful professionals.



# Government Polytechnic Jamnagar

## Department of Computer Engineering

### Certificate

This is to certify that Mr./Ms .....  
Enrolment No. .... of 5th Semester of *Diploma in Computer Engineering* of Institute  
Government Polytechnic Jamnagar (GTU code: 625) has satisfactorily completed the term work in  
course Introduction to Machine Learning (4350702) for the academic year: 2025-26 Term: Odd  
prescribed in the GTU curriculum.

Place: G. P. Jamnagar

Date: .....

Signature of Course Faculty

Head of the Department

### **Programme Outcomes (POs):**

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the *engineering* problems.
2. **Problem analysis:** Identify and analyse well-defined *engineering* problems using codified standard methods.
3. **Design/ development of solutions:** Design solutions for *engineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern *engineering* tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyze individual needs and engage in updating in the context of technological changes *in field of engineering*.

**Practical Outcome - Course Outcome matrix**

<b>Course Outcomes (COs):</b>						
a) CO1: Describe basic concept of machine learning and its applications b) CO2: Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems c) CO3: Use Pandas library for data preprocessing d) CO4: Apply supervised learning algorithms based on dataset characteristics e) CO5: Apply unsupervised learning algorithms based on dataset characteristics						
<b>S. No.</b>	<b>Practical Outcome/Title of experiment</b>	<b>CO1</b>	<b>CO2</b>	<b>CO3</b>	<b>CO4</b>	<b>CO5</b>
1.	Explore any one machine learning tool. (like Weka, Tensorflow, Scikit-learn, Colab, etc.)	✓				
2.	Write a NumPy program to implement following operation <ul style="list-style-type: none"> <li>to convert a list of numeric values into a one-dimensional NumPy array</li> <li>to create a 3x3 matrix with values ranging from 2 to 10</li> <li>to append values at the end of an array</li> <li>to create another shape from an array without changing its data (3*2 to 2*3)</li> </ul>		✓			
3.	Write a NumPy program to implement following operation <ul style="list-style-type: none"> <li>to split an array of 14 elements into 3 arrays, each with 2, 4, and 8 elements in the original order</li> <li>to stack arrays horizontally (column wise)</li> </ul>		✓			
4.	Write a NumPy program to implement following operation <ul style="list-style-type: none"> <li>to add, subtract, multiply, divide arguments element-wise</li> <li>to round elements of the array to the nearest integer</li> <li>to calculate mean across dimension, in a 2D numpy array</li> <li>to calculate the difference between neighboring elements, element-wise of a given array</li> </ul>		✓			
5.	Write a NumPy program to implement following operation <ul style="list-style-type: none"> <li>to find the maximum and minimum value of a given flattened array</li> <li>to compute the mean, standard deviation, and variance of a given array along the second axis</li> </ul>		✓			
6.	Write a Pandas program to implement following operation		✓			

	<ul style="list-style-type: none"> <li>• to convert a NumPy array to a Pandas series</li> <li>• to convert the first column of a DataFrame as a Series</li> <li>• to create the mean and standard deviation of the data of a given Series</li> <li>• to sort a given Series</li> </ul>					
<b>7.</b>	<p>Write a Pandas program to implement following operation</p> <ul style="list-style-type: none"> <li>• to create a dataframe from a dictionary and display it</li> <li>• to sort the DataFrame first by 'name' in ascending order</li> <li>• to delete the one specific column from the DataFrame</li> <li>• to write a DataFrame to CSV file using tab separator</li> </ul>		✓			
<b>8.</b>	Write a Pandas program to create a line plot of the opening, closing stock prices of given company between two specific dates.		✓			
<b>9.</b>	Write a Pandas program to create a plot of Open, High, Low, Close, Adjusted Closing prices and Volume of given company between two specific dates.		✓			
<b>10.</b>	<p>Write a Pandas program to implement following operation</p> <ul style="list-style-type: none"> <li>• to find and drop the missing values from the given dataset</li> <li>• to remove the duplicates from the given dataset</li> </ul>			✓		
<b>11.</b>	Write a Pandas program to filter all columns where all entries present, check which rows and columns has a NaN and finally drop rows with any NaNs from the given dataset.			✓		
<b>12.</b>	Write a Python program using Scikit-learn to print the keys, number of rows-columns, feature names and the description of the given data.			✓		
<b>13.</b>	Write a Python program to implement K-Nearest Neighbour supervised machine learning algorithm for given dataset.				✓	
<b>14.</b>	Write a Python program to implement a machine learning algorithm for given dataset. (It is recommended to assign different machine learning algorithms group wise – micro project)					✓

### **Industry Relevant Skills**

*The following industry relevant skills are expected to be developed in the students by performance of experiments of this course.*

- Student will learn to automate variety of task making system more efficient and cost effective
- Student will learn efficient handling of data that will cater to better data analytics
- Student will learn to implement machine learning approaches to varied field of applications from healthcare to e-commerce.

### **Guidelines to Course Faculty**

- Course faculty should demonstrate experiment with all necessary implementation strategies described in curriculum.
- Course faculty should explain industrial relevance before starting of each experiment.
- Course faculty should involve & give opportunity to all students for hands on experience.
- Course faculty should ensure mentioned skills are developed in the students by asking.
- Utilise 2 hours of lab hours effectively and ensure completion of write up.
- Encourage peer to peer learning by doing same experiment through fast learners.

### **Instructions for Students**

- Organize the work in the group and make record of all observations.
- Students shall develop maintenance skill as expected by industries.
- Student shall attempt to develop related hand-on skills and build confidence.
- Student shall develop the habits of evolving more ideas, innovations, skills etc.
- Student shall refer technical magazines and data books.
- Student should develop habit to submit the practical on date and time.
- Student should well prepare while submitting write-up of exercise.

### **Safety and necessary Precautions followed**

- Read the experiment thoroughly before starting and ensure that you understand all the steps and concepts involved from underpinning theory.
- Keep the workspace clean and organized, free from clutter and unnecessary materials.
- Use the software according to its intended purpose and instructions.
- Ensure that all the necessary equipment and software are in good working condition.
- Never eat or drink in the lab, as it can cause contamination and create safety hazards.
- If any accidents or injuries occur, immediately notify the instructor and seek medical attention if necessary.

**Resources/Equipment Required**

<b>Sr. No.</b>	<b>Instrument/Equipment with Broad Specifications</b>
1	Computer system with operating system: Windows 7 or higher Ver., macOS, and Linux, with 4GB or higher RAM Python versions: 2.7.X, 3.6.X
2	Python IDEs and Code Editors (jupyter, spyder, google colab) Open Source: Anaconda Navigator
3	Internet Connection

**Assessment-Rubrics:**

<b>Criteria</b>	<b>Total Marks</b>	<b>Exceptional (5 - Marks)</b>	<b>Satisfactory (4 to 3 - Marks)</b>	<b>Developing (2 - Marks)</b>	<b>Limited (1 -Mark)</b>
<b>Engagement</b>	5	Performed practical him/her self	Performed practical with others help	Watched other students performing practical but not tried him/her self	Present in practical session but not attentively participated in performance
<b>Accuracy</b>	5	Accurately done	1-2 errors/mistakes found	3-5 errors/mistakes identified	More than 5 errors/mistakes committed
<b>Documentation</b>	5	No errors, Program is well Executed and Documented Properly.	Complete write-up and output tables but presentation is poor	Some of the commands missing with missing outputs	Poor write-up and diagram or missing content
<b>Understanding &amp; Explanation</b>	5	Fully understood the performance & can explain perfectly	Understood the performance but cannot explain	Partially understood the performance & can give little explanation	Partially understood and cannot give explanation
<b>Time</b>	5	Completed the work within 1 week	Work is submitted later than 1 week but by the end of 2nd week	Work done after 2nd week but before the end of 3rd week	Work submitted after 3 week time



### **Continuous Assessment Sheet**

**Enrolment No:**

**Term:**

**Name:**

<b>Sr</b>	<b>Course Outcome</b>	<b>Page</b>	<b>Start Date</b>	<b>End Date</b>	<b>Marks (25)</b>	<b>Sign</b>
1	CO1: Describe basic concept of machine learning and its applications (Practical 1)					
2	CO2: Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems (Practical 2-9)					
3	CO3: Use Pandas library for data preprocessing (Practical 10-12)					
4	CO4: Apply supervised learning algorithms based on dataset characteristics (Practical 13)					
5	CO5: Apply unsupervised learning algorithms based on dataset characteristics (Practical 14)					

**Date:** .....

**Practical No.1:** Explore any one machine learning tool. (like Weka, Tensorflow, Scikit-learn, Colab, etc.)

**A. Objective**

Getting familiarized with machine learning tools related to understand machine learning.

**B. Expected Program Outcomes (POs)**

PO1, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency**

- Installing and configuring softwares as per the requirements.
- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Describe basic concept of machine learning and its applications

**E. Practical Outcome(PRo)**

Understand different tools of machine learning.

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory:**

- Refer Unit 1 of course curriculum
- <https://www.javatpoint.com/machine-learning-tools>
- <https://www.simplilearn.com/best-machine-learning-tools-article>

**H. Source code:**

Snapshot of installing Machine learning tool.





**Practical No.2:** Write a NumPy program to implement following operation

- to convert a list of numeric values into a one-dimensional NumPy array
- to create a 3x3 matrix with values ranging from 2 to 10
- to append values at the end of an array
- to create another shape from an array without changing its data (3\*2 to 2\*3)
  
- **Objective**  
Getting familiarized with python machine learning libraries.
  
- **Expected Program Outcomes (POs)**  
PO1, PO2, PO3, PO4, PO6, PO7
  
- **Expected Skills to be developed based on competency:**
  - Programming skills.
  - Debugging skills.
  
- **Expected Course Outcomes(Cos)**  
Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems
  
- **Practical Outcome(Pro)**  
Store and represent data using python libraries
  
- **Expected Affective domain Outcome(ADos)**
  - Handle tools /components/equipment carefully with safety and necessary precaution.
  - In software ethics Environment sustainability and environment consciousness whenever suitable.
  
- **Prerequisite Theory**
  - Refer Unit 2 of course curriculum
  - <https://www.w3resource.com/python-exercises/numpy/python-numpy-exercise-3.php>
  - <https://www.w3schools.com/python/numpy/default.asp>
  - <https://www.javatpoint.com/numpy-tutorial>

- **Source code and Output:**
  - to convert a list of numeric values into a one-dimensional NumPy array
  - to create a 3x3 matrix with values ranging from 2 to 10
  - to append values at the end of an array
  - to create another shape from an array without changing its data (3\*2 to 2\*3)







Date: .....

**Practical No.3:** Write a NumPy program to implement following operation

- to split an array of 14 elements into 3 arrays, each with 2, 4, and 8 elements in the original order
- to stack arrays horizontally (column wise)

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(PRo)**

Split the data using python libraries

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/numpy/python-numpy-exercise-61.php>
- <https://www.w3schools.com/python/numpy/default.asp>
- <https://www.javatpoint.com/numpy-tutorial>

**H. Source code and Output:**

- to split an array of 14 elements into 3 arrays, each with 2, 4, and 8 elements in the original order
- to stack arrays horizontally (column wise)

Date: .....

**Practical No.4:** Write a NumPy program to implement following operation

- to add, subtract, multiply, divide arguments element-wise
- to round elements of the array to the nearest integer
- to calculate mean across dimension, in a 2D numpy array
- to calculate the difference between neighboring elements, element-wise of a given array

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(PRo)**

Used maths and Statistics functions on Data using Python libraries

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/numpy/python-numpy-math-exercise-1.php>
- <https://www.w3schools.com/python/numpy/default.asp>
- <https://www.javatpoint.com/numpy-tutorial>

**H. Source code and Output:**

- to add, subtract, multiply, divide arguments element-wise
- to round elements of the array to the nearest integer
- to calculate mean across dimension, in a 2D numpy array
- to calculate the difference between neighbouring elements, element-wise of a given array





Date: .....

**Practical No.5:** Write a NumPy program to implement following operation

- to find the maximum and minimum value of a given flattened array
- to compute the mean, standard deviation, and variance of a given array along the second axis

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(Pro)**

Used maths and Statistics functions on Data using Python libraries

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/numpy/python-numpy-stat-exercise-1.php>
- <https://www.w3schools.com/python/numpy/default.asp>
- <https://www.javatpoint.com/numpy-tutorial>

**H. Source code and Output:**

- to find the maximum and minimum value of a given flattened array
- to compute the mean, standard deviation, and variance of a given array along the second axis





Date: .....

**Practical No.6:** Write a Pandas program to implement following operation

- to convert a NumPy array to a Pandas series
- to convert the first column of a DataFrame as a Series
- to create the mean and standard deviation of the data of a given Series
- to sort a given Series

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(Pro)**

Used Pandas libraries for data analysis tasks in Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/pandas/python-pandas-data-series-exercise-6.php>
- [https://www.w3schools.com/python/pandas/pandas\\_intro.asp](https://www.w3schools.com/python/pandas/pandas_intro.asp)
- <https://www.geeksforgeeks.org/introduction-to-pandas-in-python/>

**H. Source code and Output:**

- to convert a NumPy array to a Pandas series
- to convert the first column of a DataFrame as a Series
- to create the mean and standard deviation of the data of a given Series
- to sort a given Series







Date: .....

**Practical No.7:** Write a Pandas program to implement following operation

- to create a dataframe from a dictionary and display it
- to sort the DataFrame first by 'name' in ascending order
- to delete the one specific column from the DataFrame
- to write a DataFrame to CSV file using tab separator

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(Pro)**

Used Pandas libraries for data analysis tasks in Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/pandas/python-pandas-data-frame-exercise-1.php>
- [https://www.w3schools.com/python/pandas/pandas\\_intro.asp](https://www.w3schools.com/python/pandas/pandas_intro.asp)
- <https://www.geeksforgeeks.org/introduction-to-pandas-in-python/>

**H. Source code and Output:**

- to create a dataframe from a dictionary and display it
- to sort the DataFrame first by 'name' in ascending order
- to delete the one specific column from the DataFrame
- to write a DataFrame to CSV file using tab separator







Date: .....

**Practical No.8:** Write a Pandas program to create a line plot of the opening, closing stock prices of given company between two specific dates.

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(PRo)**

To plot various graphs from the CSV file in Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/pandas/plotting/pandas-plotting-exercise-2.php>
- [https://www.w3schools.com/python/matplotlib\\_plotting.asp](https://www.w3schools.com/python/matplotlib_plotting.asp)
- <https://www.geeksforgeeks.org/graph-plotting-in-python-set-1/>
- <https://www.geeksforgeeks.org/introduction-to-pandas-in-python/>

**H. Source code and Output:**

Write a Pandas program to create a line plot of the opening, closing stock prices of given company between two specific dates.



Date: .....

**Practical No.9:** Write a Pandas program to create a plot of Open, High, Low, Close, Adjusted Closing prices and Volume of given company between two specific dates.

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Practice Numpy, Pandas, Matplotlib, sklearn library's inbuilt function required to solve machine learning problems

**E. Practical Outcome(Pro)**

To plot various graphs from the CSV file in Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 2 of course curriculum
- <https://www.w3resource.com/python-exercises/pandas/plotting/pandas-plotting-exercise-13.php>
- [https://www.w3schools.com/python/matplotlib\\_plotting.asp](https://www.w3schools.com/python/matplotlib_plotting.asp)
- <https://www.geeksforgeeks.org/graph-plotting-in-python-set-1/>
- <https://www.geeksforgeeks.org/introduction-to-pandas-in-python/>

**H. Source code and Output:**

Write a Pandas program to create a plot of Open, High, Low, Close, Adjusted Closing prices and Volume of given company between two specific dates







Date: .....

**Practical No.10:** Write a Pandas program to implement following operation

- to find and drop the missing values from the given dataset
- to remove the duplicates from the given dataset.

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Use Pandas library for data preprocessing

**E. Practical Outcome(Pro)**

Understand data pre-processing using Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 3 of course curriculum
- <https://www.w3resource.com/pandas/dataframe/dataframe-dropna.php>
- <https://www.kdnuggets.com/2020/07/easy-guide-data-preprocessing-python.html>
- <https://www.geeksforgeeks.org/data-preprocessing-machine-learning-python/>
- <https://builtin.com/machine-learning/how-to-preprocess-data-python>

**H. Source code and Output:**

- to find and drop the missing values from the given dataset
- to remove the duplicates from the given dataset.



Date: .....

**Practical No.11:** Write a Pandas program to filter all columns where all entries present, check which rows and columns has a NaN and finally drop rows with any NaNs from the given dataset.

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Use Pandas library for data preprocessing

**E. Practical Outcome(Pro)**

Understand data pre-processing using Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 3 of course curriculum
- <https://www.w3resource.com/python-exercises/pandas/filter/pandas-filter-exercise-25.php>
- <https://www.kdnuggets.com/2020/07/easy-guide-data-preprocessing-python.html>
- <https://www.geeksforgeeks.org/data-preprocessing-machine-learning-python/>
- <https://builtin.com/machine-learning/how-to-preprocess-data-python>

**H. Source code and Output:**

Write a Pandas program to filter all columns where all entries present, check which rows and columns has a NaN and finally drop rows with any NaNs from the given dataset.

**Output:**





Date: .....

**Practical No.12:** Write a Python program using Scikit-learn to print the keys, number of rows-columns, feature names and the description of the given data.

**A. Objective**

Getting familiarized with python machine learning libraries.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Use Pandas library for data preprocessing

**E. Practical Outcome(PRo)**

Understand data pre-processing using Python

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 3 of course curriculum
- <https://www.w3resource.com/machine-learning/scikit-learn/iris/python-machine-learning-scikit-learn-iris-basic-exercise-2.php>
- <https://www.kdnuggets.com/2020/07/easy-guide-data-preprocessing-python.html>
- <https://www.geeksforgeeks.org/data-preprocessing-machine-learning-python/>
- <https://builtin.com/machine-learning/how-to-preprocess-data-python>



**H. Source code and Output:**

Write a Python program using Scikit-learn to print the keys, number of rows-columns, feature names and the description of the given data.



Date: .....

**Practical No.13:** Write a Python program to implement K-Nearest Neighbour supervised machine learning algorithm for given dataset.

**A. Objective**

Understand supervised machine learning concept.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO5, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Apply supervised learning algorithms based on dataset characteristics

**E. Practical Outcome(PRo)**

Apply K-Nearest Neighbour supervised machine learning algorithm for given dataset

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 4 of course curriculum
- <https://www.javatpoint.com/k-nearest-neighbor-algorithm-for-machine-learning>
- <https://www.geeksforgeeks.org/k-nearest-neighbor-algorithm-in-python/>
- <https://www.analyticsvidhya.com/blog/2021/01/a-quick-introduction-to-k-nearest-neighbor-knn-classification-using-python/>
- <https://realpython.com/knn-python/>

**H. Source code and Output:**

Write a Python program to implement K-Nearest Neighbour supervised machine learning algorithm for given dataset.





Date: .....

**Practical No.14:** Write a Python program to implement a machine learning algorithm for given dataset. (It is recommended to assign different machine learning algorithms group wise – micro project)

**A. Objective**

Understand different machine learning algorithms.

**B. Expected Program Outcomes (POs)**

PO1, PO2, PO3, PO4, PO5, PO6, PO7

**C. Expected Skills to be developed based on competency:**

- Programming skills.
- Debugging skills.

**D. Expected Course Outcomes(Cos)**

Apply unsupervised learning algorithms based on dataset characteristics

**E. Practical Outcome(Pro)**

Apply machine learning algorithm for given dataset

**F. Expected Affective domain Outcome(ADos)**

- Handle tools /components/equipment carefully with safety and necessary precaution.
- In software ethics Environment sustainability and environment consciousness whenever suitable.

**G. Prerequisite Theory**

- Refer Unit 5 of course curriculum
- <https://www.geeksforgeeks.org/machine-learning-with-python/>
- <https://www.javatpoint.com/machine-learning-algorithms>
- <https://machinelearningmastery.com/a-tour-of-machine-learning-algorithms/>
- <https://www.coursera.org/articles/machine-learning-algorithms>

**H. Source code and Output:**

Write a Python program to implement a machine learning algorithm for given dataset. (It is recommended to assign different machine learning algorithms group wise – micro project)



**Output:**

