3.Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.

**PROGRAM:**

import numpy as np

import pandas as pd

from sklearn.decomposition import PCA

import matplotlib.pyplot as plt

# Load the dataset manually from a CSV file

file\_path = "iris.csv" # Change this to your actual file path

iris\_df = pd.read\_csv(file\_path)

# Inspect the first few rows (Optional)

print(iris\_df.head())

# Rename columns if necessary (depends on the dataset format)

# Assuming the dataset has columns: ['sepal\_length', 'sepal\_width', 'petal\_length', 'petal\_width', 'species']

feature\_columns = ['sepal\_length', 'sepal\_width', 'petal\_length', 'petal\_width']

data = iris\_df[feature\_columns].values # Extract feature values

# Convert species names to numerical labels

label\_names = iris\_df['species'].unique() # Get unique species names

label\_mapping = {name: i for i, name in enumerate(label\_names)} # Create mapping

labels = iris\_df['species'].map(label\_mapping).values # Convert to numerical labels

# Apply PCA for dimensionality reduction

pca = PCA(n\_components=2)

data\_reduced = pca.fit\_transform(data)

# Create a DataFrame for the reduced data

reduced\_df = pd.DataFrame(data\_reduced, columns=['Principal Component 1', 'Principal Component 2'])

reduced\_df['Label'] = labels

# Plot the reduced data

plt.figure(figsize=(8, 6))

colors = ['r', 'g', 'b']

for i, label in enumerate(np.unique(labels)):

plt.scatter(

reduced\_df[reduced\_df['Label'] == label]['Principal Component 1'],

reduced\_df[reduced\_df['Label'] == label]['Principal Component 2'],

label=label\_names[label],

color=colors[i]

)

plt.title('PCA on Iris Dataset')

plt.xlabel('Principal Component 1')

plt.ylabel('Principal Component 2')

plt.legend()

plt.grid()

plt.show()

Output :

sepal\_length sepal\_width petal\_length petal\_width species

0 5.1 3.5 1.4 0.2 setosa

1 4.9 3.0 1.4 0.2 setosa

2 4.7 3.2 1.3 0.2 setosa

3 4.6 3.1 1.5 0.2 setosa

4 5.0 3.6 1.4 0.2 setosa

