Import all the libraries :

In [22]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Loading Data :

In [23]:

```
df = pd.read_csv('/kaggle/input/principal-component-analysis/Longley (1).csv')
```

In [24]:

```
df
```

Out[24]:

	GNP.deflator	GNP	Unemployed	Armed.Forces	Population	Employed
0	83.0	234.289	235.6	159.0	107.608	60.323
1	88.5	259.426	232.5	145.6	108.632	61.122
2	88.2	258.054	368.2	161.6	109.773	60.171
3	89.5	284.599	335.1	165.0	110.929	61.187
4	96.2	328.975	209.9	309.9	112.075	63.221
5	98.1	346.999	193.2	359.4	113.270	63.639
6	99.0	365.385	187.0	354.7	115.094	64.989
7	100.0	363.112	357.8	335.0	116.219	63.761
8	101.2	397.469	290.4	304.8	117.388	66.019
9	104.6	419.180	282.2	285.7	118.734	67.857
10	108.4	442.769	293.6	279.8	120.445	68.169
11	110.8	444.546	468.1	263.7	121.950	66.513
12	112.6	482.704	381.3	255.2	123.366	68.655
13	114.2	502.601	393.1	251.4	125.368	69.564
14	115.7	518.173	480.6	257.2	127.852	69.331
15	116.9	554.894	400.7	282.7	130.081	70.551

In [25]:

```
df.dtypes
```

Out[25]:

```
GNP.deflator    float64
GNP             float64
Unemployed      float64
Armed.Forces    float64
Population      float64
Employed        float64
dtype: object
```

In [26]:

```
X = df.drop('Employed', axis=1)
Y = df['Employed']
```

In [27]:

```
correlation = df.corr()
correlation
```

Out[27]:

	GNP.deflator	GNP	Unemployed	Armed.Forces	Population	Employed
GNP.deflator	1.000000	0.991589	0.620633	0.464744	0.979163	0.970899
GNP	0.991589	1.000000	0.604261	0.446437	0.991090	0.983552
Unemployed	0.620633	0.604261	1.000000	-0.177421	0.686552	0.502498
Armed.Forces	0.464744	0.446437	-0.177421	1.000000	0.364416	0.457307
Population	0.979163	0.991090	0.686552	0.364416	1.000000	0.960391
Employed	0.970899	0.983552	0.502498	0.457307	0.960391	1.000000

Apply PCA :

In [28]:

```
from sklearn.preprocessing import StandardScaler
```

In [29]:

```
# Scale data before applying PCA
scaling=StandardScaler()
```

In [30]:

```
# Use fit and transform method
scaling.fit(df)
Scaled_data=scaling.transform(df)
```

In [31]:

```
from sklearn.decomposition import PCA
```

In [32]:

```
# Set the n_components=3
principal=PCA(n_components=3)
principal.fit(Scaled_data)
x=principal.transform(Scaled_data)
```

In [33]:

```
# Check the dimensions of data after PCA
print(x.shape)
```

```
(16, 3)
```

Check Components :

In [34]:

```
# Check the values of eigen vectors
# prodeced by principal components
principal.components_
```

Out[34]:

```
array([[-0.46695493, -0.46748987, -0.30646472, -0.21200613, -0.4656055
6,
        -0.45579661],
       [ 0.02628724,  0.02306569, -0.62227098,  0.77353962, -0.0762474
5,
         0.08589854],
       [-0.04906877, -0.16405382,  0.67228378,  0.58400807, -0.0917922
6,
        -0.41136586]])
```

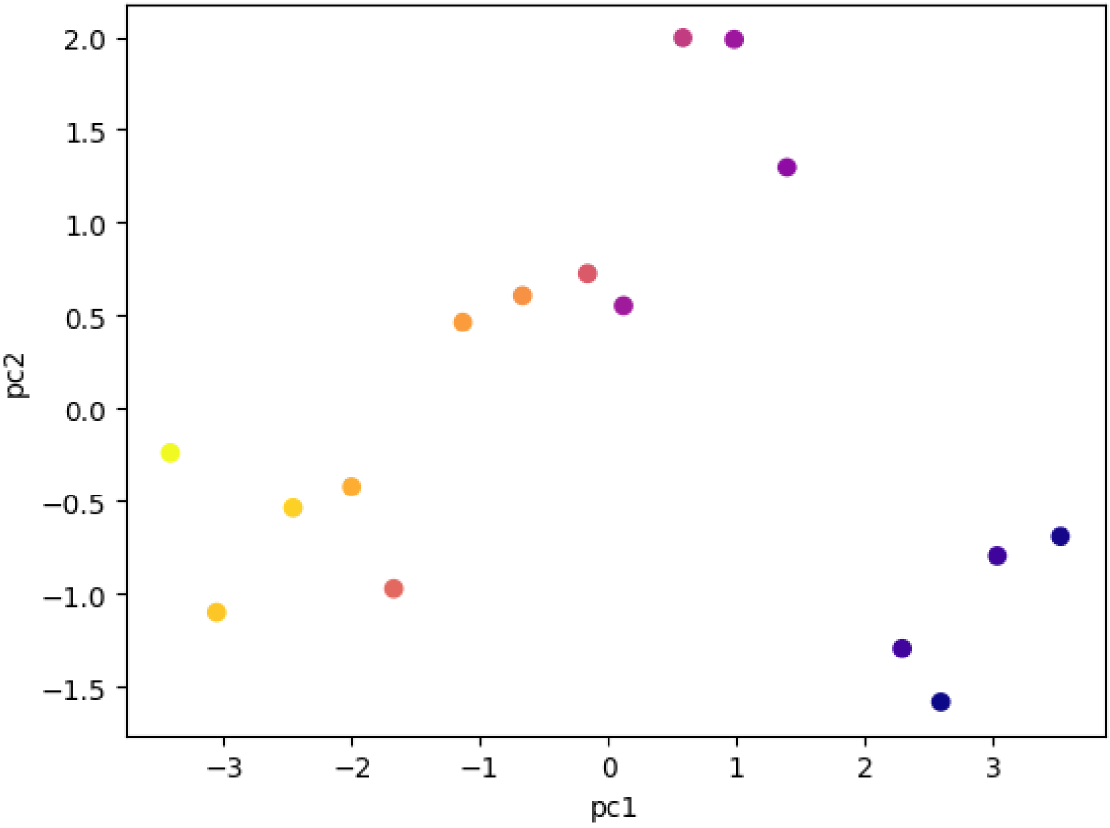
Plot the components (Visualization) :

In [35]:

```
# plt.figure(figsize=(10,10))
plt.scatter(x[:,0],x[:,1],c=df['Employed'],cmap='plasma')
plt.xlabel('pc1')
plt.ylabel('pc2')
```

Out[35]:

```
Text(0, 0.5, 'pc2')
```



Calculate variance ratio :

In [36]:

```
# check how much variance is explained by each principal component
print(principal.explained_variance_ratio_)
```

```
[0.75584735 0.19778211 0.0419845 ]
```

In [ ]: