Project - 4 (DATASET: Breast Cancer Prediction)

In [1]:

```
import pandas as pd
from matplotlib import pyplot as plt
%matplotlib inline
```

In [2]:

```
df=pd.read_csv(r"C:\Users\Dheepack\OneDrive\Desktop\Project\BreastCancerPrediction.csv")
df
```

Out[2]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothne
0	842302	M	17.99	10.38	122.80	1001.0	
1	842517	M	20.57	17.77	132.90	1326.0	
2	84300903	M	19.69	21.25	130.00	1203.0	
3	84348301	M	11.42	20.38	77.58	386.1	
4	84358402	M	20.29	14.34	135.10	1297.0	
...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	
565	926682	M	20.13	28.25	131.20	1261.0	
566	926954	M	16.60	28.08	108.30	858.1	
567	927241	M	20.60	29.33	140.10	1265.0	
568	92751	B	7.76	24.54	47.92	181.0	

569 rows × 33 columns

In [3]:

```
df.head()
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
0	842302	M	17.99	10.38	122.80	1001.0	
1	842517	M	20.57	17.77	132.90	1326.0	
2	84300903	M	19.69	21.25	130.00	1203.0	
3	84348301	M	11.42	20.38	77.58	386.1	
4	84358402	M	20.29	14.34	135.10	1297.0	

5 rows × 33 columns

In [4]:

```
df.tail()
```

Out[4]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
564	926424	M	21.56	22.39	142.00	1479.0	
565	926682	M	20.13	28.25	131.20	1261.0	
566	926954	M	16.60	28.08	108.30	858.1	
567	927241	M	20.60	29.33	140.10	1265.0	
568	92751	B	7.76	24.54	47.92	181.0	

5 rows × 33 columns

In [19]:

```
df.drop(['Unnamed: 32'],axis=1)
```

Out[19]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothne
0	842302	M	0.521037	0.022658	122.80	1001.0	
1	842517	M	0.643144	0.272574	132.90	1326.0	
2	84300903	M	0.601496	0.390260	130.00	1203.0	
3	84348301	M	0.210090	0.360839	77.58	386.1	
4	84358402	M	0.629893	0.156578	135.10	1297.0	
...	...	...	...	...	...	...	
564	926424	M	0.690000	0.428813	142.00	1479.0	
565	926682	M	0.622320	0.626987	131.20	1261.0	
566	926954	M	0.455251	0.621238	108.30	858.1	
567	927241	M	0.644564	0.663510	140.10	1265.0	
568	92751	B	0.036869	0.501522	47.92	181.0	

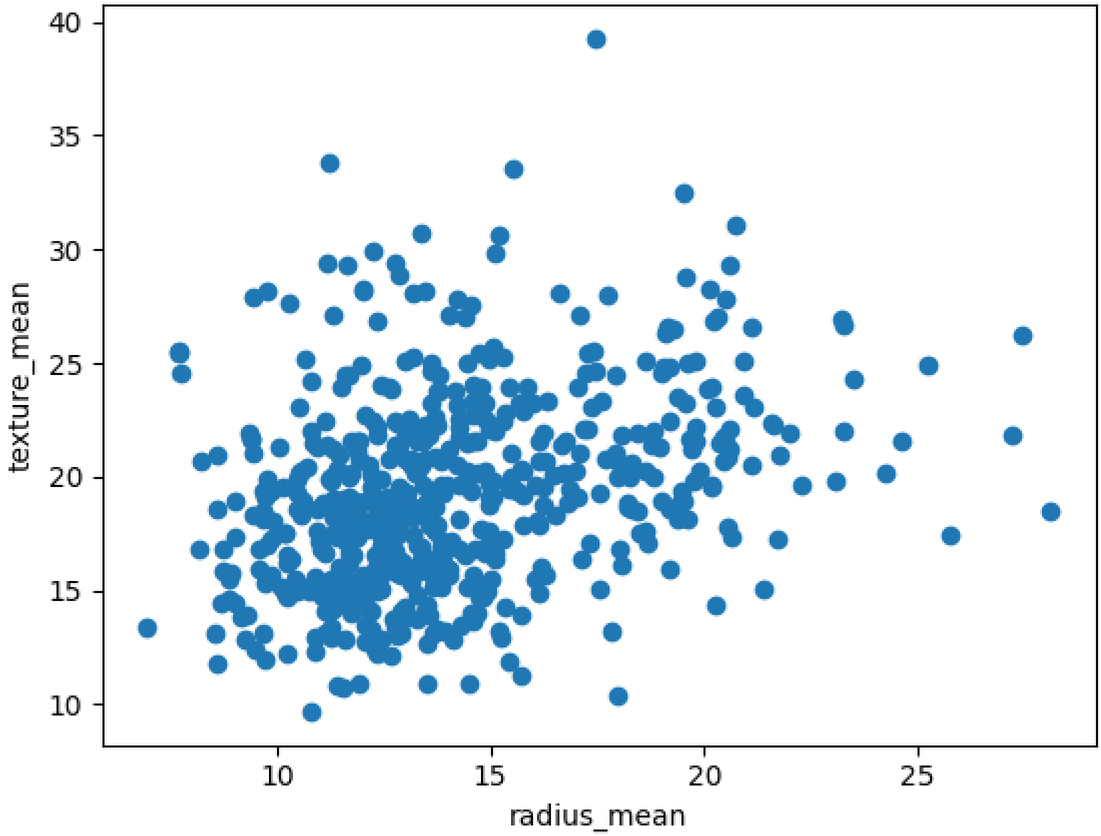
569 rows × 34 columns

In [5]:

```
plt.scatter(df["radius_mean"],df["texture_mean"])
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[5]:

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



In [6]:

```
from sklearn.cluster import KMeans
km=KMeans()
km
```

Out[6]:

```
▾ KMeans
KMeans()
```

In [7]:

```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
```

Out[7]:

```
array([6, 4, 4, 5, 4, 6, 3, 2, 2, 2, 2, 3, 1, 2, 2, 7, 3, 3, 4, 6, 6, 0,
       6, 4, 3, 3, 2, 4, 2, 6, 1, 5, 1, 1, 3, 3, 2, 5, 2, 2, 2, 2, 1, 2,
       2, 3, 0, 5, 0, 2, 2, 6, 5, 3, 2, 5, 4, 2, 5, 0, 0, 5, 2, 0, 2, 2,
       5, 5, 5, 6, 4, 0, 1, 6, 5, 3, 6, 3, 1, 5, 2, 6, 1, 1, 0, 3, 2, 1,
       2, 6, 2, 2, 6, 5, 3, 4, 5, 5, 0, 3, 2, 0, 5, 5, 5, 6, 5, 5, 4, 2,
       5, 2, 3, 5, 0, 2, 0, 6, 2, 3, 0, 3, 4, 6, 6, 6, 2, 4, 6, 1, 0, 3,
       3, 6, 4, 2, 5, 0, 3, 0, 0, 3, 5, 6, 0, 0, 5, 3, 6, 5, 2, 5, 0, 0,
       6, 5, 3, 3, 0, 0, 5, 3, 4, 2, 4, 3, 0, 3, 1, 6, 0, 5, 6, 0, 0, 0,
       5, 3, 2, 6, 4, 1, 3, 0, 2, 0, 3, 5, 5, 6, 2, 2, 5, 7, 2, 6, 2, 3,
       4, 3, 5, 3, 1, 2, 5, 6, 5, 3, 2, 6, 4, 5, 4, 1, 2, 6, 5, 5, 4, 1,
       6, 6, 5, 3, 6, 6, 0, 6, 2, 2, 3, 7, 7, 1, 0, 2, 1, 4, 7, 7, 6, 6,
       5, 2, 1, 5, 5, 6, 2, 0, 1, 5, 4, 3, 4, 6, 1, 3, 2, 7, 1, 1, 3, 3,
       3, 1, 5, 2, 6, 5, 6, 0, 4, 0, 1, 5, 0, 4, 5, 6, 1, 0, 4, 3, 6, 5,
       2, 6, 5, 5, 3, 3, 6, 5, 6, 6, 0, 5, 3, 2, 4, 5, 1, 5, 5, 2, 6, 0,
       6, 6, 5, 6, 6, 0, 5, 5, 0, 3, 5, 5, 0, 4, 6, 4, 0, 5, 6, 5, 3, 3,
       6, 5, 5, 0, 5, 3, 6, 4, 5, 1, 6, 5, 0, 4, 0, 0, 5, 6, 0, 0, 5, 3,
       4, 2, 0, 5, 5, 6, 0, 5, 5, 2, 5, 3, 6, 4, 1, 5, 4, 4, 2, 6, 4, 4,
       6, 6, 5, 7, 6, 5, 0, 0, 2, 5, 6, 2, 0, 6, 0, 1, 0, 0, 3, 4, 5, 6,
       5, 5, 0, 5, 3, 0, 5, 6, 6, 5, 6, 2, 3, 5, 5, 5, 2, 2, 7, 2, 2, 3,
       0, 2, 5, 6, 0, 5, 5, 5, 0, 2, 5, 5, 2, 5, 4, 4, 6, 3, 5, 6, 5, 6,
       5, 1, 6, 5, 3, 2, 1, 3, 3, 4, 2, 1, 7, 6, 5, 7, 7, 2, 2, 7, 1, 1,
       7, 5, 5, 5, 2, 5, 1, 5, 5, 7, 6, 7, 0, 6, 2, 6, 0, 3, 5, 5, 6, 5,
       6, 6, 6, 4, 0, 3, 2, 6, 3, 0, 2, 3, 5, 5, 3, 4, 6, 2, 6, 4, 0, 0,
       5, 5, 6, 2, 0, 6, 2, 6, 3, 5, 3, 4, 5, 5, 0, 4, 5, 5, 0, 0, 5, 0,
       6, 0, 5, 5, 6, 4, 5, 4, 2, 2, 7, 7, 0, 2, 2, 7, 2, 2, 0, 5, 5, 2,
       2, 2, 7, 2, 7, 7, 5, 7, 2, 2, 7, 7, 7, 1, 4, 1, 1, 1, 2])
```

In [8]:

```
df["cluster"]=y_predicted
df.head()
```

Out[8]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
0	842302	M	17.99	10.38	122.80	1001.0	(
1	842517	M	20.57	17.77	132.90	1326.0	(
2	84300903	M	19.69	21.25	130.00	1203.0	(
3	84348301	M	11.42	20.38	77.58	386.1	(
4	84358402	M	20.29	14.34	135.10	1297.0	(

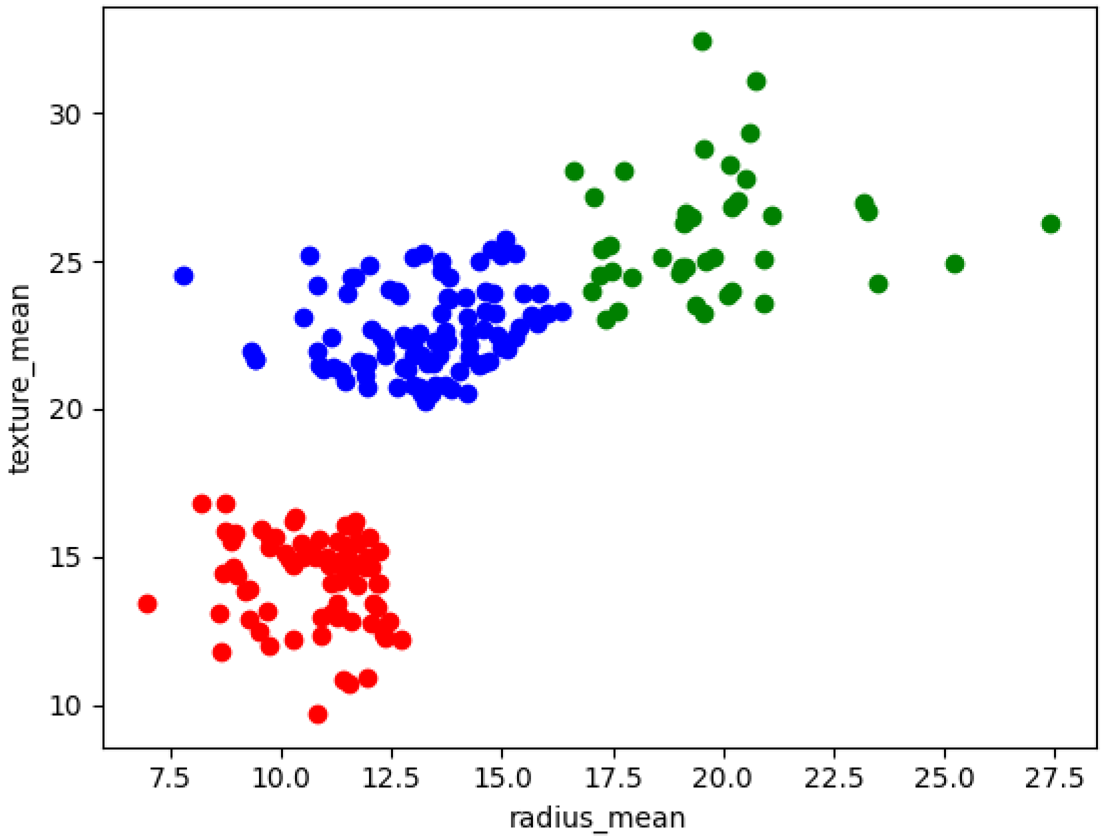
5 rows × 34 columns

In [9]:

```
df1=df[df.cluster==0]
df2=df[df.cluster==1]
df3=df[df.cluster==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[9]:

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



In [10]:

```
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler()
scaler.fit(df[["texture_mean"]])
df["texture_mean"]=scaler.transform(df[["texture_mean"]])
df.head()
```

Out[10]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
0	842302	M	17.99	0.022658	122.80	1001.0	(
1	842517	M	20.57	0.272574	132.90	1326.0	(
2	84300903	M	19.69	0.390260	130.00	1203.0	(
3	84348301	M	11.42	0.360839	77.58	386.1	(
4	84358402	M	20.29	0.156578	135.10	1297.0	(

5 rows × 34 columns

In [11]:

```
scaler.fit(df[["radius_mean"]])
df["radius_mean"]=scaler.transform(df[["radius_mean"]])
df.head()
```

Out[11]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
0	842302	M	0.521037	0.022658	122.80	1001.0	(
1	842517	M	0.643144	0.272574	132.90	1326.0	(
2	84300903	M	0.601496	0.390260	130.00	1203.0	(
3	84348301	M	0.210090	0.360839	77.58	386.1	(
4	84358402	M	0.629893	0.156578	135.10	1297.0	(

5 rows × 34 columns

In [12]:

```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
```

Out[12]:

```
array([1, 5, 5, 7, 5, 1, 5, 6, 6, 0, 6, 1, 3, 6, 6, 0, 6, 6, 5, 1, 1, 4,
       1, 2, 6, 5, 6, 5, 6, 5, 3, 7, 3, 3, 1, 6, 6, 7, 0, 6, 6, 7, 3, 6,
       6, 5, 4, 7, 4, 6, 7, 1, 7, 5, 6, 7, 5, 6, 7, 4, 4, 7, 6, 4, 0, 6,
       7, 7, 7, 1, 5, 4, 3, 1, 7, 6, 1, 5, 3, 7, 7, 1, 2, 3, 4, 5, 6, 3,
       6, 1, 6, 6, 1, 7, 6, 3, 7, 7, 4, 6, 0, 4, 7, 7, 7, 1, 7, 7, 2, 7,
       4, 7, 6, 7, 4, 7, 4, 1, 6, 5, 4, 5, 2, 1, 1, 1, 0, 5, 1, 3, 4, 6,
       6, 1, 5, 6, 7, 4, 1, 4, 4, 1, 7, 1, 4, 4, 7, 6, 1, 1, 6, 7, 4, 4,
       1, 7, 5, 5, 4, 4, 7, 5, 5, 6, 2, 6, 4, 5, 3, 1, 4, 6, 1, 4, 4, 4,
       7, 6, 6, 1, 2, 3, 6, 4, 6, 4, 5, 7, 7, 1, 6, 6, 7, 0, 6, 1, 6, 5,
       5, 6, 7, 5, 2, 6, 7, 1, 7, 5, 6, 1, 5, 7, 2, 3, 6, 1, 7, 7, 5, 3,
       1, 1, 7, 6, 1, 1, 4, 1, 0, 6, 5, 0, 0, 3, 4, 6, 2, 5, 0, 3, 1, 1,
       7, 6, 3, 7, 1, 1, 0, 4, 3, 7, 5, 5, 5, 1, 3, 1, 6, 0, 3, 3, 5, 6,
       5, 3, 7, 6, 1, 7, 1, 4, 2, 4, 3, 7, 4, 5, 1, 1, 3, 4, 5, 6, 1, 7,
       7, 1, 7, 7, 6, 6, 1, 7, 1, 1, 4, 7, 1, 7, 5, 7, 3, 7, 7, 0, 1, 4,
       1, 1, 7, 1, 1, 4, 7, 7, 4, 5, 7, 7, 4, 5, 1, 5, 4, 7, 1, 7, 6, 6,
       1, 7, 7, 4, 7, 5, 1, 5, 7, 2, 1, 4, 4, 5, 4, 4, 7, 1, 4, 4, 7, 6,
       2, 0, 4, 7, 7, 1, 4, 7, 7, 6, 7, 5, 1, 5, 3, 7, 5, 2, 6, 1, 5, 5,
       1, 1, 7, 0, 1, 7, 4, 4, 6, 7, 1, 6, 4, 1, 4, 3, 4, 4, 6, 2, 7, 1,
       6, 7, 4, 7, 5, 4, 7, 1, 4, 7, 1, 6, 5, 7, 7, 7, 7, 6, 0, 7, 7, 6,
       4, 7, 7, 1, 4, 6, 7, 7, 4, 7, 7, 7, 6, 7, 5, 5, 1, 6, 7, 1, 6, 1,
       7, 3, 1, 7, 5, 0, 3, 1, 6, 5, 7, 3, 0, 1, 7, 0, 0, 0, 0, 0, 3, 2,
       0, 7, 7, 6, 6, 7, 3, 7, 7, 0, 1, 0, 4, 1, 6, 1, 4, 6, 7, 6, 1, 1,
       1, 1, 1, 5, 4, 5, 6, 1, 5, 4, 6, 6, 7, 7, 5, 5, 1, 0, 1, 2, 4, 4,
       7, 7, 1, 6, 4, 1, 6, 1, 6, 7, 5, 5, 7, 1, 4, 2, 7, 6, 4, 4, 7, 4,
       1, 4, 7, 7, 1, 5, 7, 5, 6, 0, 0, 0, 4, 0, 0, 0, 6, 6, 4, 4, 7, 0,
       7, 7, 0, 7, 0, 0, 7, 0, 6, 0, 0, 0, 0, 3, 2, 3, 3, 3, 0])
```

In [13]:

```
df["New Cluster"]=y_predicted
df.head()
```

Out[13]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness
0	842302	M	0.521037	0.022658	122.80	1001.0	(
1	842517	M	0.643144	0.272574	132.90	1326.0	(
2	84300903	M	0.601496	0.390260	130.00	1203.0	(
3	84348301	M	0.210090	0.360839	77.58	386.1	(
4	84358402	M	0.629893	0.156578	135.10	1297.0	(

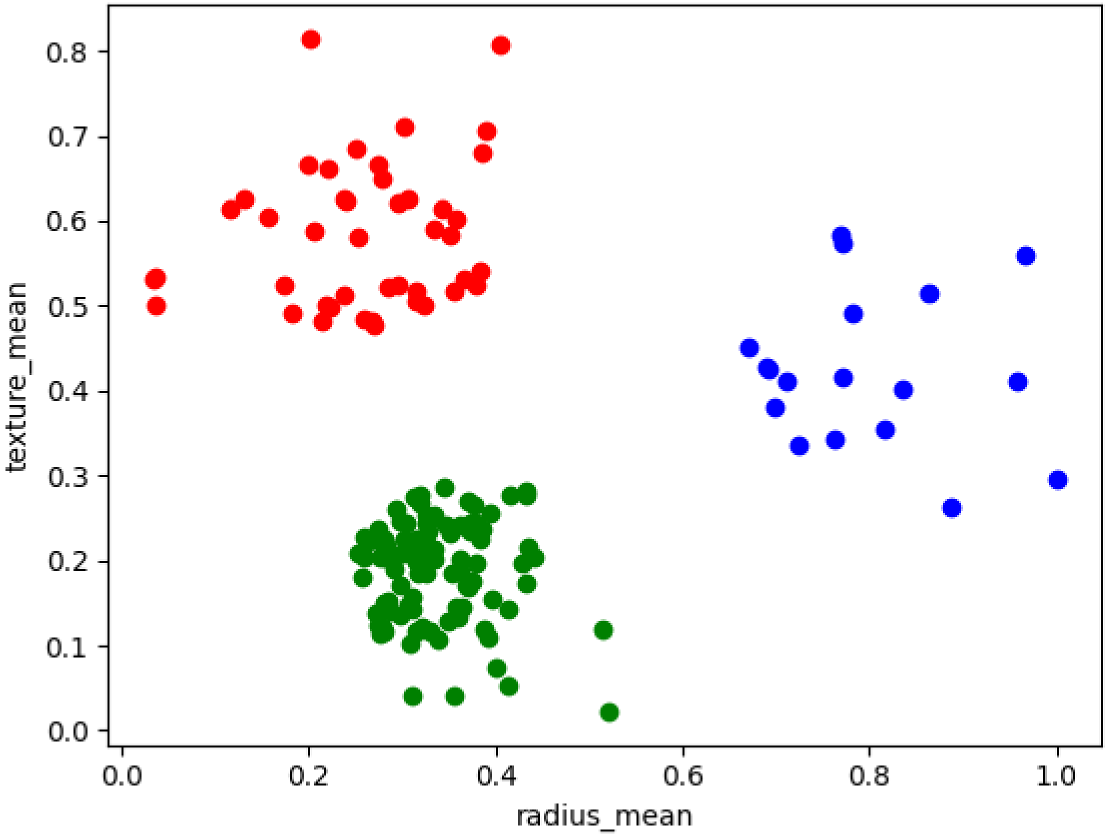
5 rows × 35 columns

In [14]:

```
df1=df[df["New Cluster"]==0]
df2=df[df["New Cluster"]==1]
df3=df[df["New Cluster"]==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[14]:

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



In [15]:

```
km.cluster_centers_
```

Out[15]:

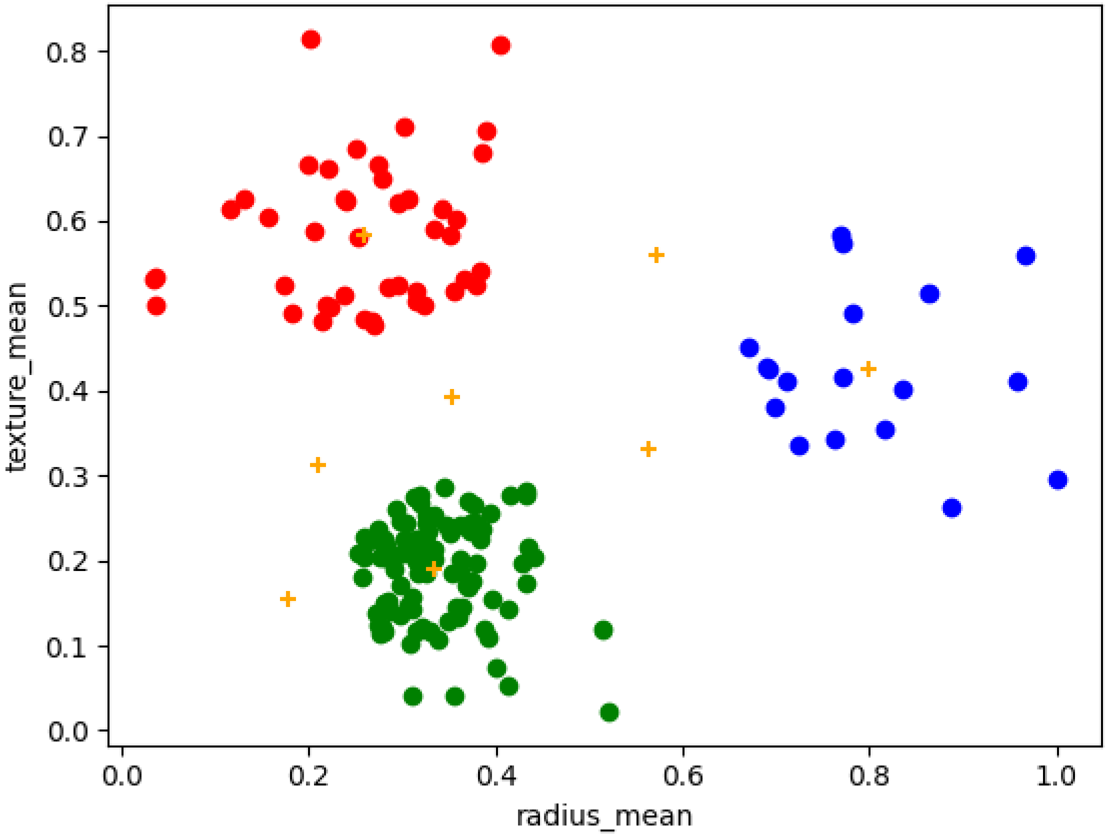
```
array([[0.2590623 , 0.58293879],
       [0.33394211, 0.1901238 ],
       [0.79840767, 0.42469846],
       [0.57132058, 0.55893025],
       [0.17694105, 0.15527139],
       [0.56287997, 0.33184226],
       [0.35396344, 0.39182538],
       [0.21015104, 0.31104952]])
```

In [16]:

```
df1=df[df["New Cluster"]==0]
df2=df[df["New Cluster"]==1]
df3=df[df["New Cluster"]==2]
plt.scatter(df1["radius_mean"],df1["texture_mean"],color="red")
plt.scatter(df2["radius_mean"],df2["texture_mean"],color="green")
plt.scatter(df3["radius_mean"],df3["texture_mean"],color="blue")
plt.scatter(km.cluster_centers_[:,0],km.cluster_centers_[:,1],color="orange",marker="+")
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[16]:

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



In [17]:

```
k_rng=range(1,10)
sse=[]
```

In [18]:

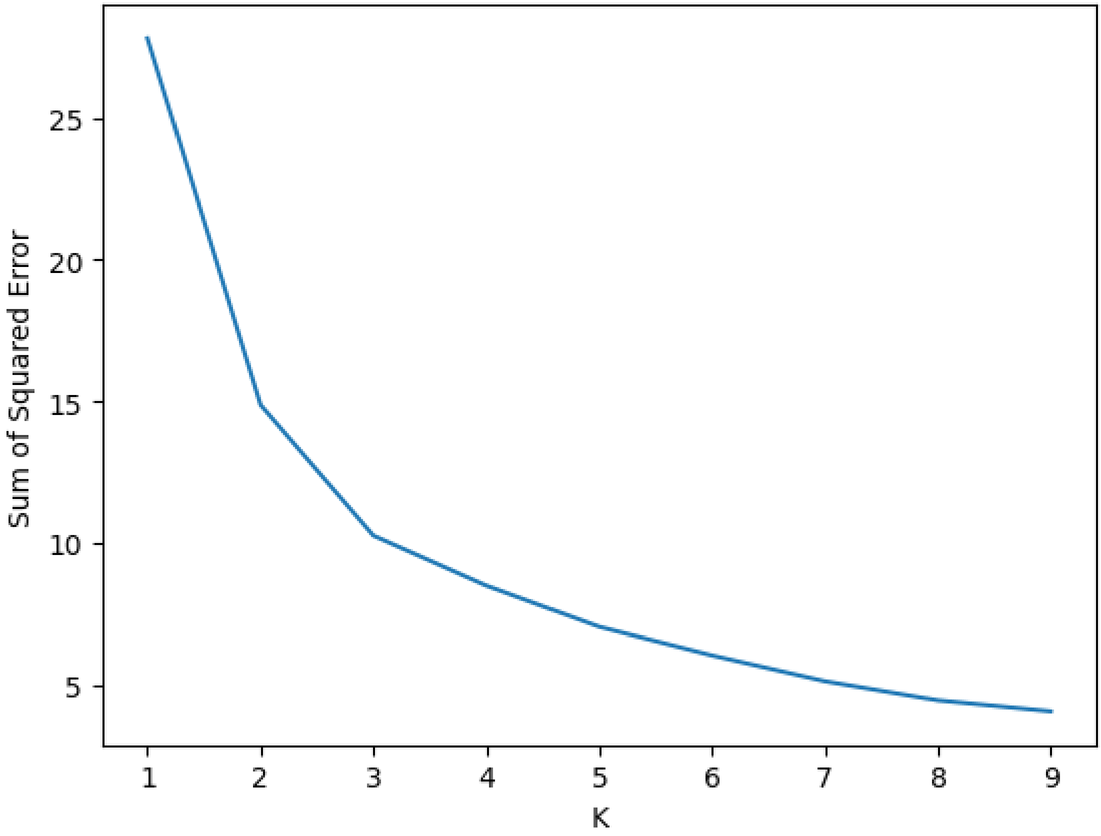
```
for k in k_rng:
    km=KMeans(n_clusters=k)
    km.fit(df[["radius_mean","texture_mean"]])
    sse.append(km.inertia_)
#km.inertia_ will give you the value of sum of square error
print(sse)
plt.plot(k_rng,sse)
plt.xlabel("K")
plt.ylabel("Sum of Squared Error")
```

```
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(
C:\Users\krish\AppData\Local\Programs\Python\Python310\lib\site-packages\s
klearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init
` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicit
ly to suppress the warning
  warnings.warn(

[27.81750759504307, 14.872032958271172, 10.252751496105198, 8.487319889528
589, 7.035012847498983, 6.0259120955991055, 5.117379110317932, 4.443015700
25843, 4.054829545754369]
```

```
Out[18]:

Text(0, 0.5, 'Sum of Squared Error')
```



CONCLUSION

for the given dataset we can use multiple models,for that models we get different types of accuracies but that accuracies is not good so,that's why we will take it as a clustering and done with K-Means Clustering

```
In [ ]:
```