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\sruth\OneDrive\Desktop\BreastCancerPrediction.csv")
df
```

Out[2]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothı
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 × 32 columns

In [3]:

```
df.head()
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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 × 32 columns

In [4]:

```
df.tail()
```

Out[4]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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	

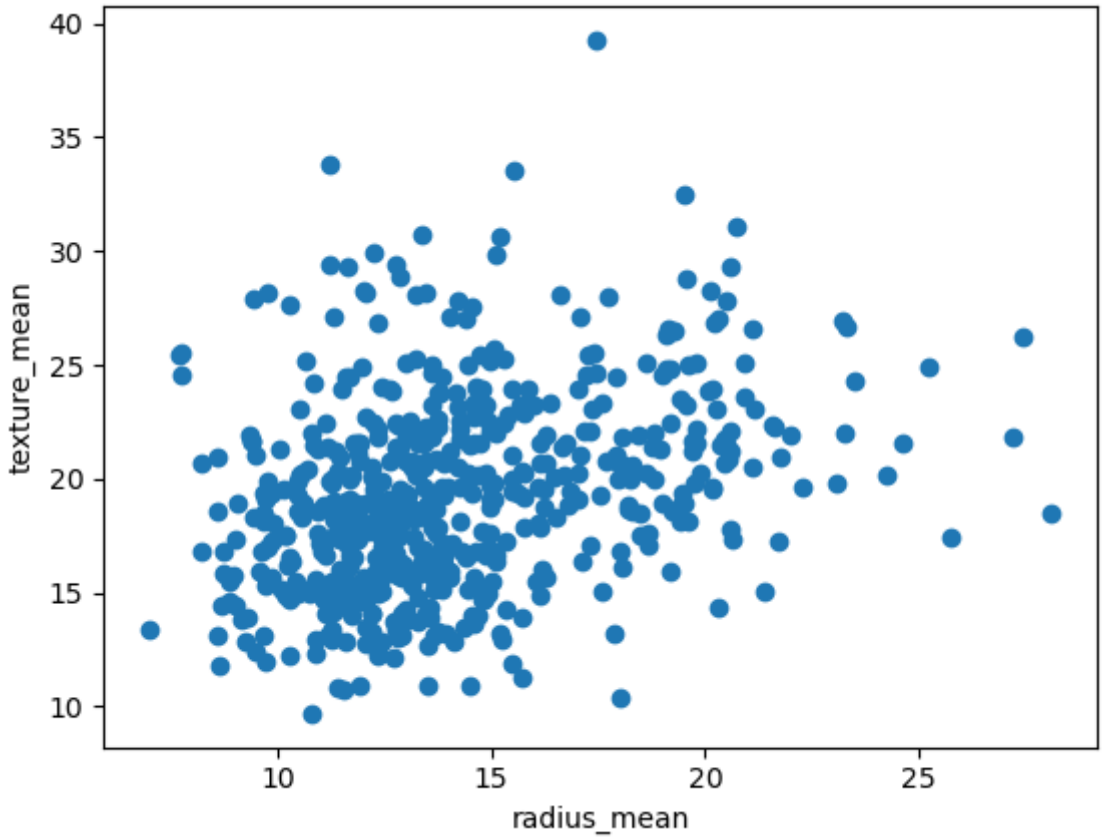
5 rows × 32 columns

In [6]:

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

Out[6]:

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



In [7]:

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

Out[7]:

```
KMeans()
```

In [8]:

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

```
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
0: FutureWarning: The default value of `n_init` will change from 10 to 'a
uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
2: UserWarning: KMeans is known to have a memory leak on Windows with MK
L, when there are less chunks than available threads. You can avoid it by
setting the environment variable OMP_NUM_THREADS=3.
  warnings.warn(
```

Out[8]:

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

In [9]:

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

Out[9]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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	

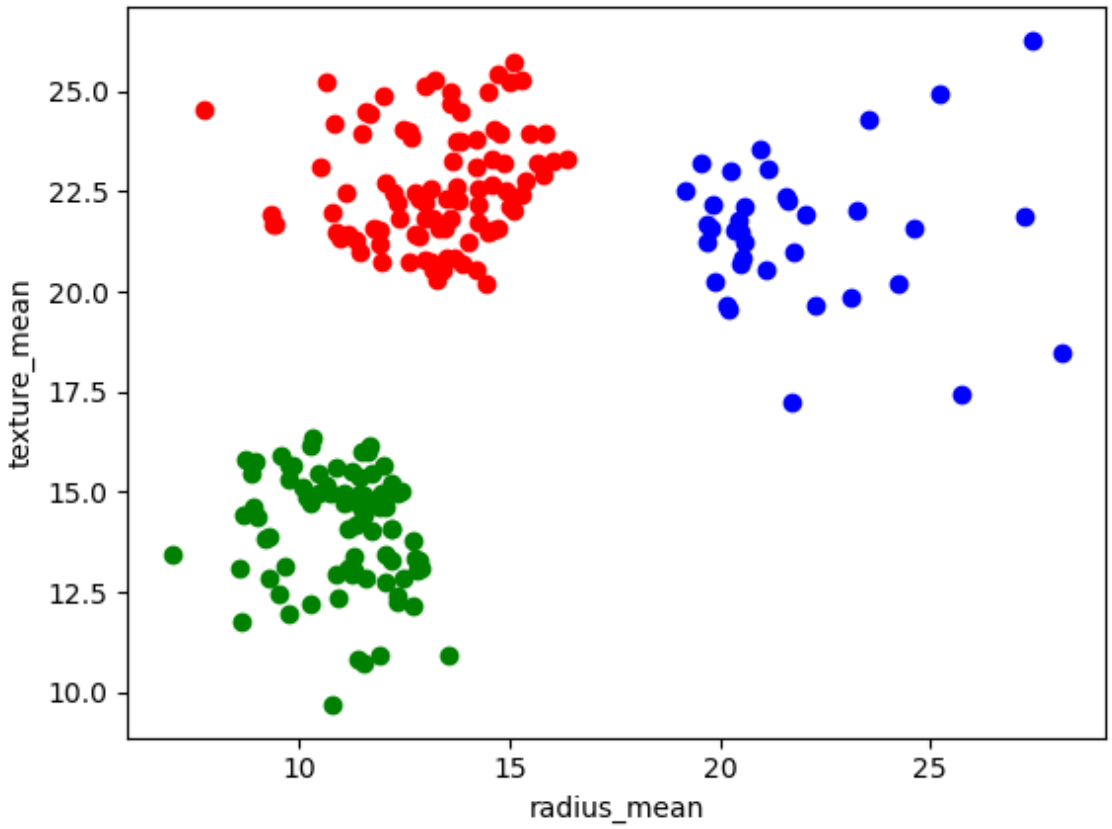
5 rows × 33 columns

In [10]:

```
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[10]:

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



In [11]:

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

Out[11]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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 × 33 columns

In [12]:

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

Out[12]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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 × 33 columns

In [13]:

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

```
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
0: FutureWarning: The default value of `n_init` will change from 10 to 'a
uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
2: UserWarning: KMeans is known to have a memory leak on Windows with MK
L, when there are less chunks than available threads. You can avoid it by
setting the environment variable OMP_NUM_THREADS=3.
  warnings.warn(
```

Out[13]:

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

In [14]:

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

Out[14]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothnes
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	

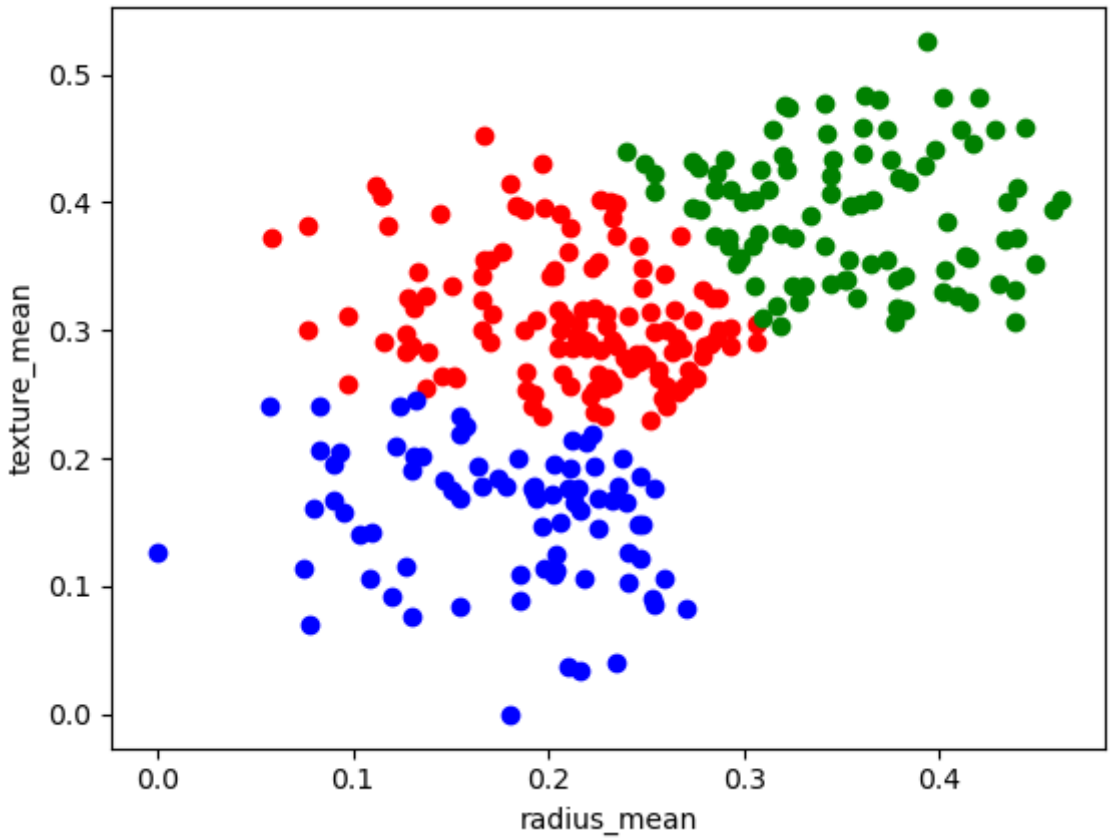
5 rows × 34 columns

In [15]:

```
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[15]:

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



In [16]:

```
km.cluster_centers_
```

Out[16]:

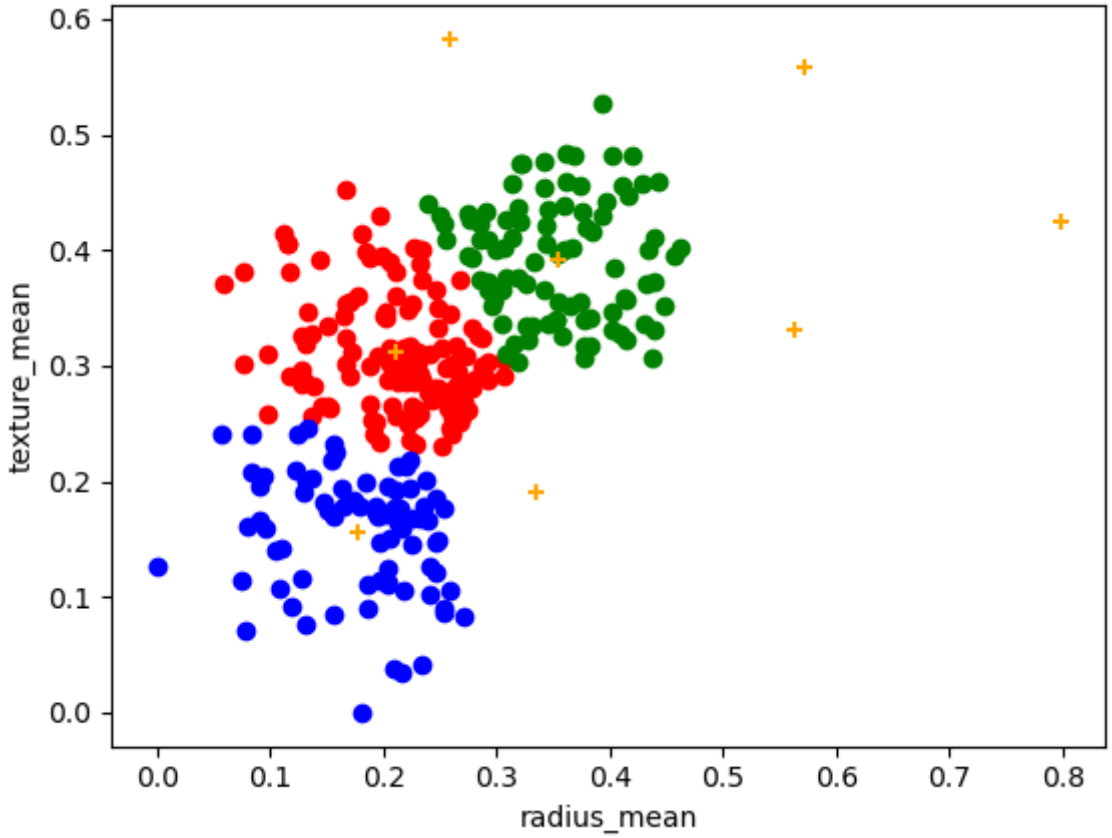
```
array([[0.21015104, 0.31104952],
       [0.35396344, 0.39182538],
       [0.17694105, 0.15527139],
       [0.57132058, 0.55893025],
       [0.56287997, 0.33184226],
       [0.33394211, 0.1901238 ],
       [0.2590623 , 0.58293879],
       [0.79840767, 0.42469846]])
```

In [17]:

```
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[17]:

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



In [18]:

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

In [19]:

```
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\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
0: FutureWarning: The default value of `n_init` will change from 10 to 'a
uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
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L, when there are less chunks than available threads. You can avoid it by
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
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```

```
setting the environment variable OMP_NUM_THREADS=3.
  warnings.warn(
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
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C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:87
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uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\sruth\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:138
2: UserWarning: KMeans is known to have a memory leak on Windows with MK
L, when there are less chunks than available threads. You can avoid it by
setting the environment variable OMP_NUM_THREADS=3.
  warnings.warn(

[27.81750759504307, 14.872032958271172, 10.252751496105196, 8.48722093012
24, 7.030202097311372, 6.05116105065793, 5.119648842468623, 4.44281347648
1737, 3.994936343555257]
```
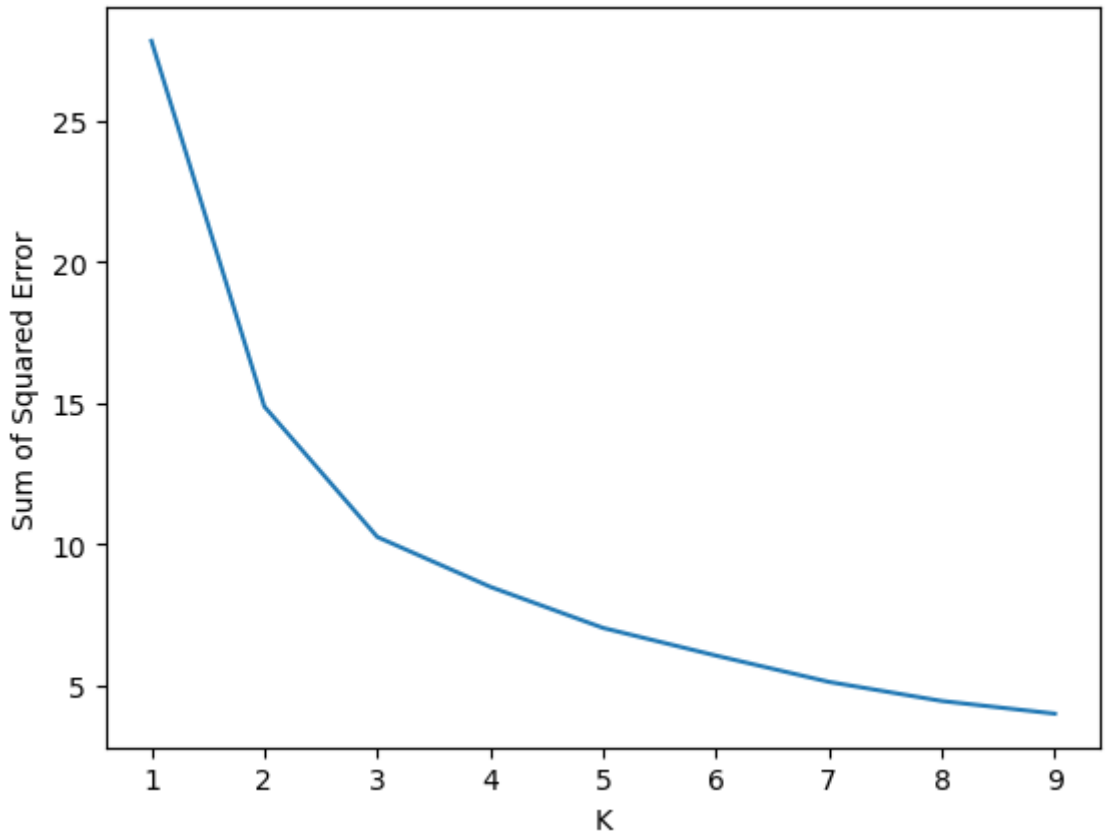

Out[19]:

```
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 [ ]:

```
```