In [1]:

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

In [2]:

```
df=pd.read_csv(r"C:\Users\sweet\Downloads\BreastCancerPrediction (1).csv")
df
```

Out[2]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	poin
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.30010	
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.08690	
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.19740	
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.24140	
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.19800	
...	...	...	...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	0.11100	0.11590	0.24390	
565	926682	M	20.13	28.25	131.20	1261.0	0.09780	0.10340	0.14400	
566	926954	M	16.60	28.08	108.30	858.1	0.08455	0.10230	0.09251	
567	927241	M	20.60	29.33	140.10	1265.0	0.11780	0.27700	0.35140	
568	92751	B	7.76	24.54	47.92	181.0	0.05263	0.04362	0.00000	

569 rows × 33 columns

```
In [3]: df.head()
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points_
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 33 columns

```
In [4]: df.tail()
```

Out[4]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points_
564	926424	M	21.56	22.39	142.00	1479.0	0.11100	0.11590	0.24390	0
565	926682	M	20.13	28.25	131.20	1261.0	0.09780	0.10340	0.14400	0
566	926954	M	16.60	28.08	108.30	858.1	0.08455	0.10230	0.09251	0
567	927241	M	20.60	29.33	140.10	1265.0	0.11780	0.27700	0.35140	0
568	92751	B	7.76	24.54	47.92	181.0	0.05263	0.04362	0.00000	0

5 rows × 33 columns

In [5]:

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

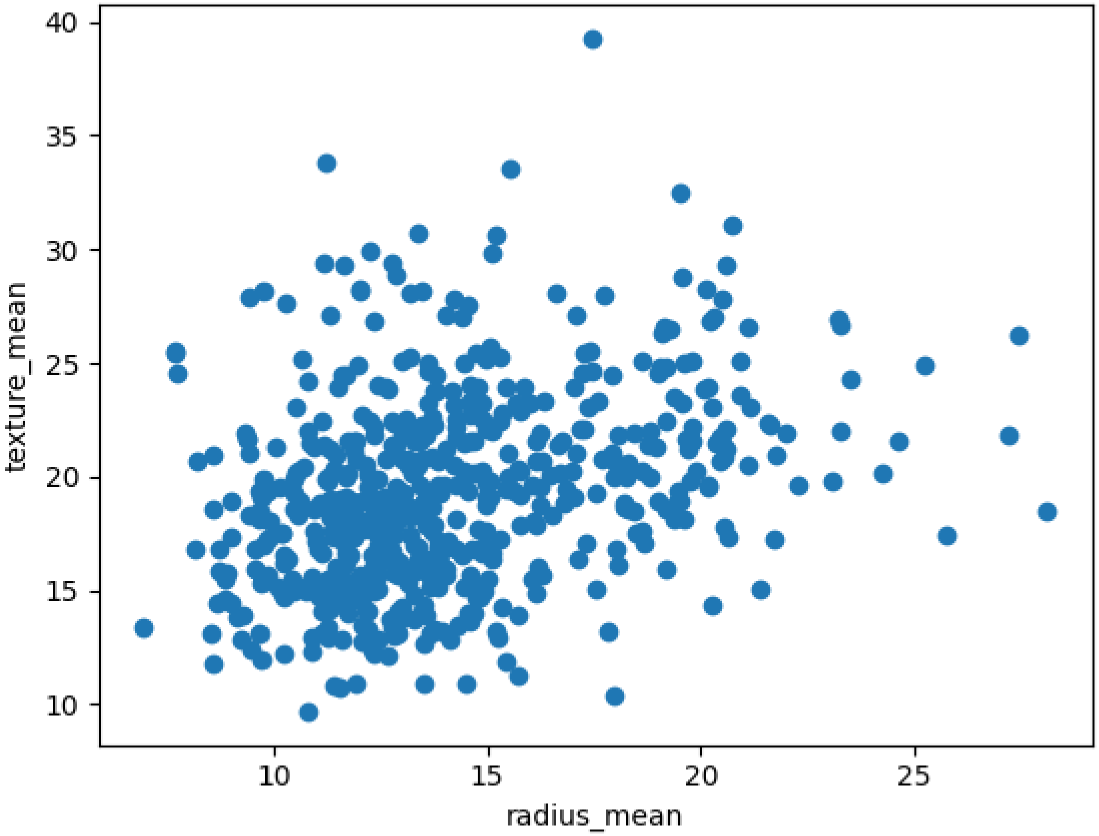
Out[5]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	poin
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.30010	
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.08690	
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.19740	
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.24140	
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.19800	
...	...	...	...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	0.11100	0.11590	0.24390	
565	926682	M	20.13	28.25	131.20	1261.0	0.09780	0.10340	0.14400	
566	926954	M	16.60	28.08	108.30	858.1	0.08455	0.10230	0.09251	
567	927241	M	20.60	29.33	140.10	1265.0	0.11780	0.27700	0.35140	
568	92751	B	7.76	24.54	47.92	181.0	0.05263	0.04362	0.00000	

569 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

KMeans()
```

In [8]:

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

```
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
```

Out[8]:

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

In [9]:

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

Out[9]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points_
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.1980	0

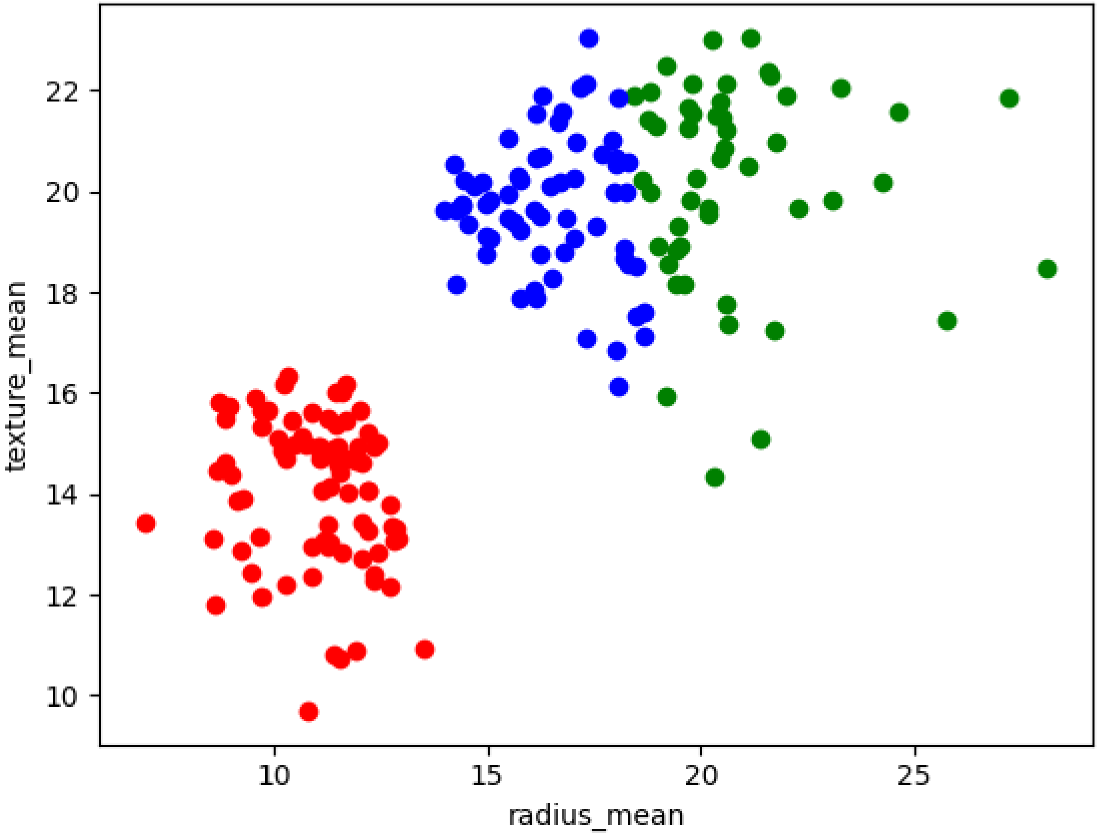
5 rows × 34 columns

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	smoothness_mean	compactness_mean	concavity_mean	co points_
0	842302	M	17.99	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 34 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	smoothness_mean	compactness_mean	concavity_mean	co points_
0	842302	M	0.521037	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	0.643144	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	0.210090	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 34 columns

In [13]:

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

```
C:\Users\SASIDHAR ROYAL\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
```

Out[13]:

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

In [14]:

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

Out[14]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points_
0	842302	M	0.521037	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	0.643144	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	0.210090	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

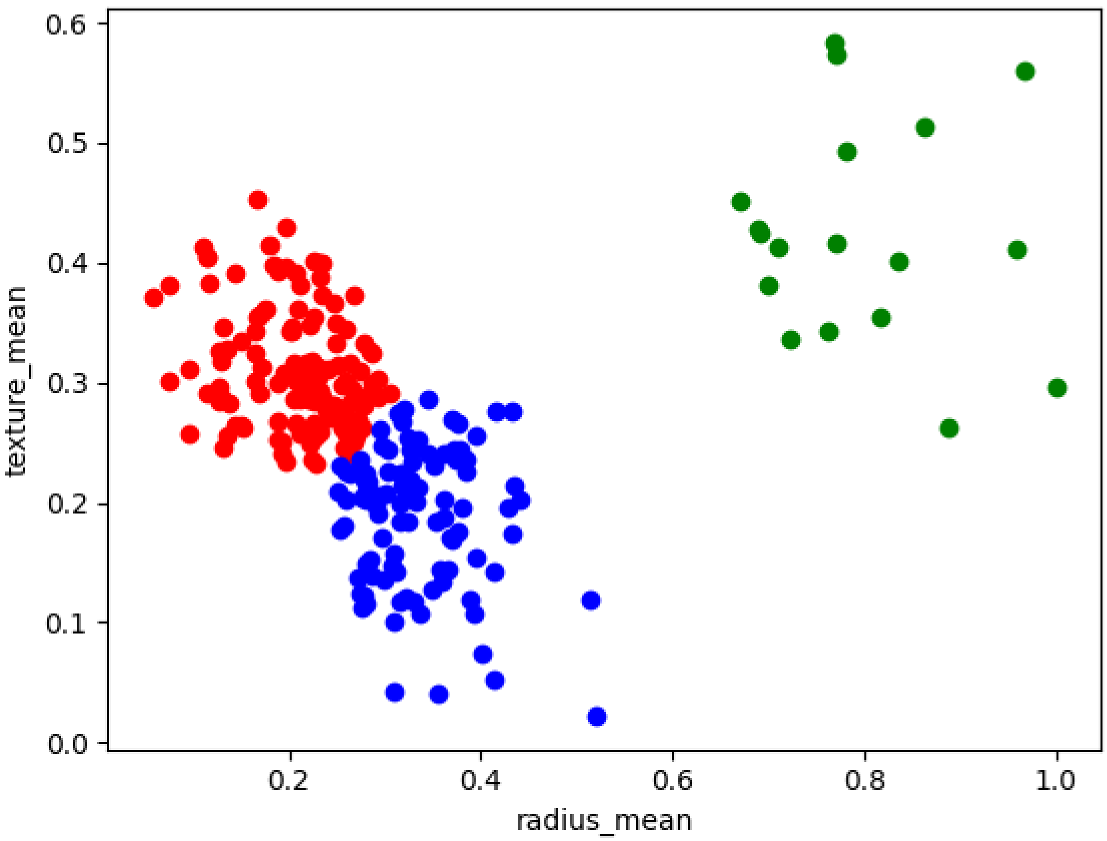
5 rows × 35 columns

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_
```

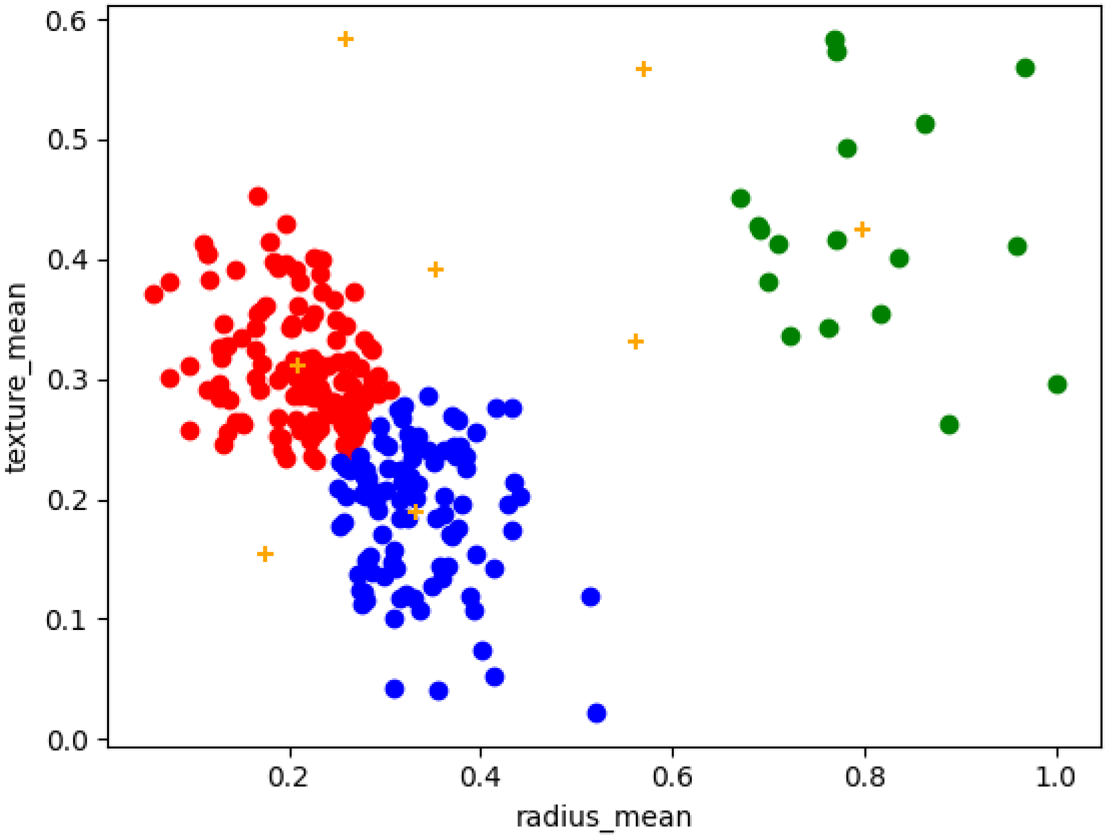
Out[16]:
```
array([[0.20878924, 0.31058452],
       [0.79840767, 0.42469846],
       [0.3331624 , 0.18999839],
       [0.56287997, 0.33184226],
       [0.2590623 , 0.58293879],
       [0.17652977, 0.15382448],
       [0.57132058, 0.55893025],
       [0.3534653 , 0.39091896]])
```

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_)
```

```
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
C:\Users\sweet\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\cluster\_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitl
y to suppress the warning
  warnings.warn(
```

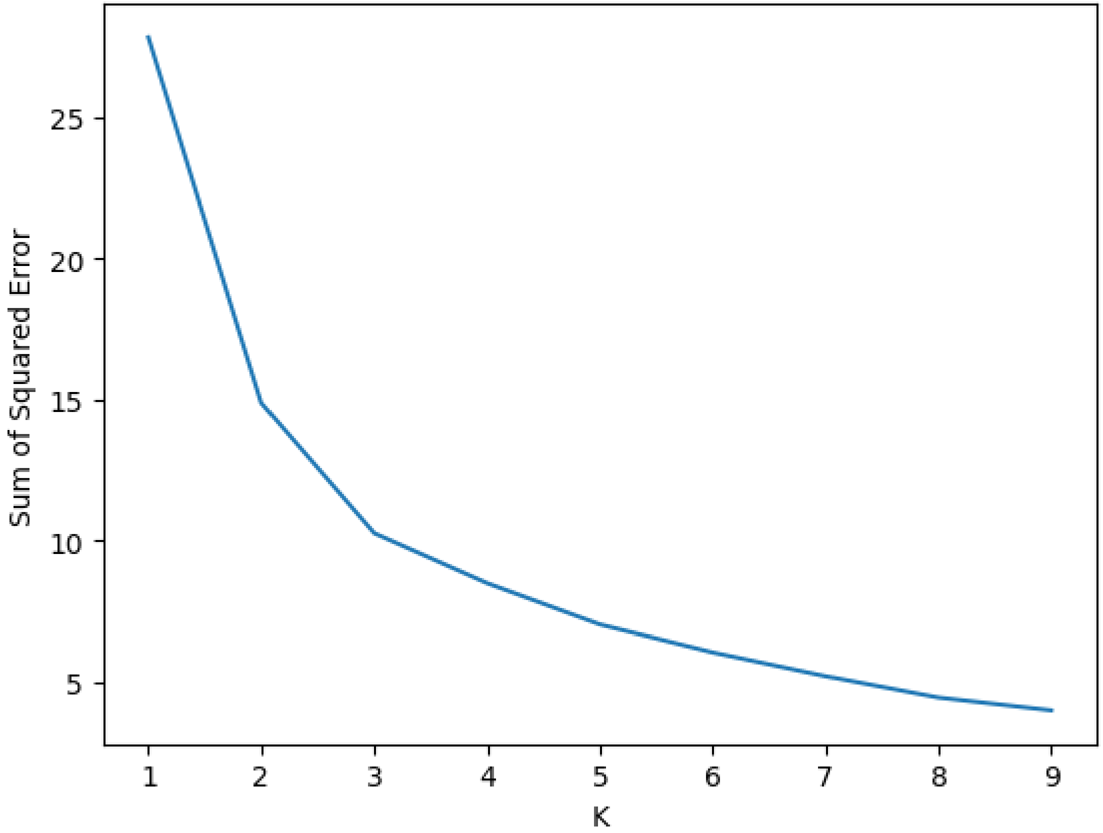
In [20]:

```
print(sse)
plt.plot(k_rng,sse)
plt.xlabel("K")
plt.ylabel("Sum of Squared Error")
```

```
[27.817507595043075, 14.87203295827117, 10.252751496105198, 8.484725277027607, 7.027303957640527, 6.039305768835715,
5.199953930194845, 4.44439527370828, 3.9915411403216825]
```

Out[20]:

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



Conclusion:- In Above DataSet we can use any models to get different accuracies.But by usin clustering technique we can get best accuracy

for the Dataset.Therefore we can conclude that breast Cancer prediction DataSet is best fit for "k-Means clustering Model