In [1]:
```
import pandas as pd
import numpy as np
from sklearn.cluster import KMeans
import matplotlib.pyplot as plt
```

In [2]:
```
df=pd.read_csv('student_marks.csv')
df
```

Out[2]:

	number_courses	time_study	Marks
0	3	4.508	19.202
1	4	0.096	7.734
2	4	3.133	13.811
3	6	7.909	53.018
4	8	7.811	55.299
...	...	...	...
95	6	3.561	19.128
96	3	0.301	5.609
97	4	7.163	41.444
98	7	0.309	12.027
99	3	6.335	32.357

100 rows × 3 columns

In [3]:
```
df.head(4)
```

Out[3]:

	number_courses	time_study	Marks
0	3	4.508	19.202
1	4	0.096	7.734
2	4	3.133	13.811
3	6	7.909	53.018

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

Out[4]:

	number_courses	time_study	Marks
95	6	3.561	19.128
96	3	0.301	5.609
97	4	7.163	41.444
98	7	0.309	12.027
99	3	6.335	32.357

In [5]:
```
marks=df.iloc[:,1:4]
marks
```

Out[5]:

	time_study	Marks
0	4.508	19.202
1	0.096	7.734
2	3.133	13.811
3	7.909	53.018
4	7.811	55.299
...	...	...
95	3.561	19.128
96	0.301	5.609
97	7.163	41.444
98	0.309	12.027
99	6.335	32.357

100 rows × 2 columns

In [6]:
```
distortion=[]
distortion
```

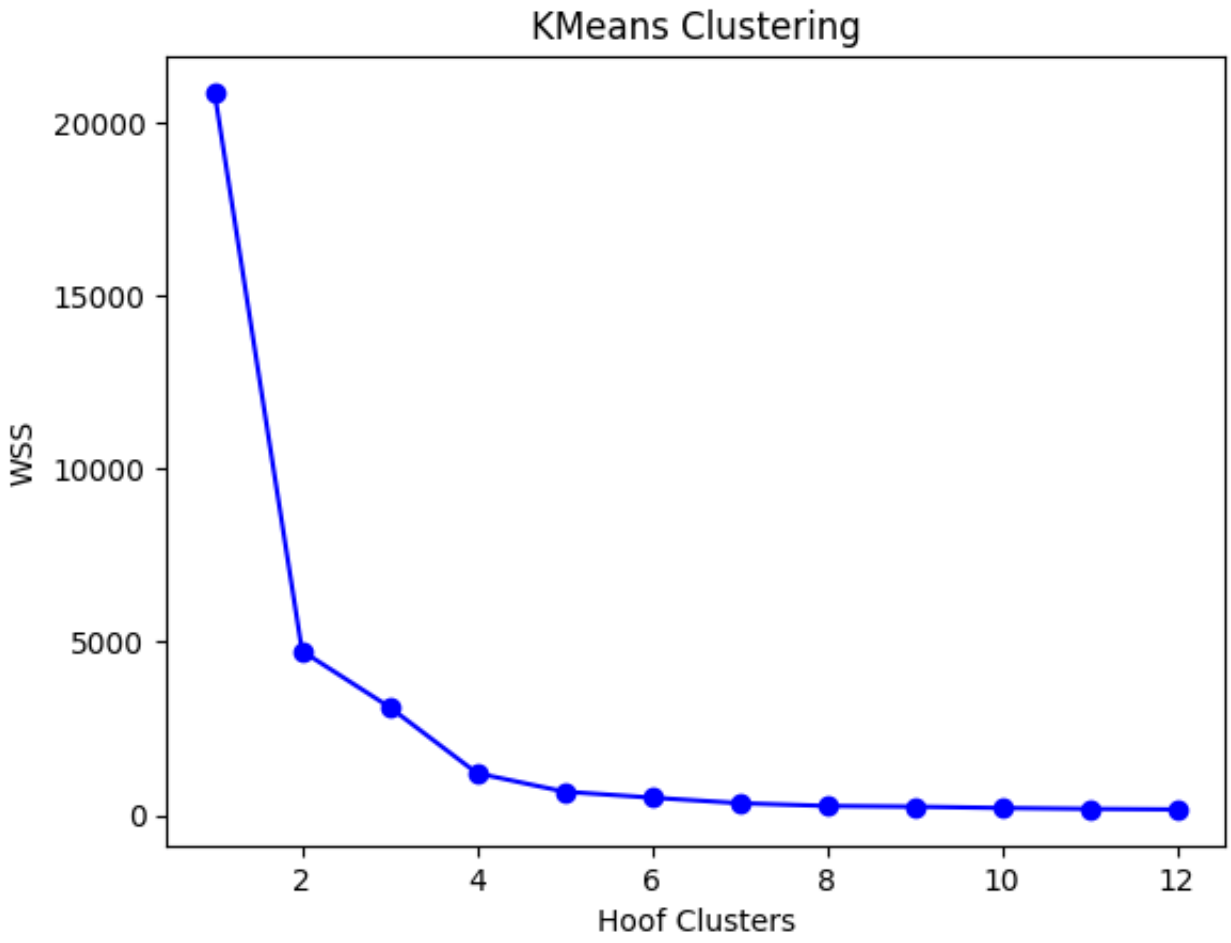
Out[6]:
```
[]
```

In [7]:
```
k=range(1,13)
k
```

Out[7]:
```
range(1, 13)
```

In [8]:
```
for i in k:
    kmeansmodel=KMeans(n_clusters=i,max_iter=25)
    kmeansmodel.fit(marks)
    distortion.append(kmeansmodel.inertia_)
```

In [9]:
```
plt.plot(figure=(13,0))
plt.plot(k,distortion,'bo-')
plt.xlabel('Hoof Clusters')
plt.ylabel('WSS')
plt.title('KMeans Clustering')
plt.show()
```



In [10]:
```
kmeandmodelfinal=KMeans(n_clusters=3,max_iter=25)
kmeandmodelfinal.fit(marks)
```

Out[10]:
```
KMeans(max_iter=25, n_clusters=3)
```

In [11]:
```
kmeandmodelfinal.cluster_centers_
```

Out[11]:
```
array([[ 4.25065854, 22.14697561],
       [ 7.04318519, 44.89455556],
       [ 1.35221875, 10.0496875 ]])
```

In [12]:
```
kmeandmodelfinal.labels_
```

Out[12]:
```
array([0, 2, 2, 1, 1, 0, 0, 0, 0, 0, 1, 2, 0, 0, 2, 0, 0, 1, 1, 0, 0, 1,
       2, 0, 0, 2, 2, 0, 2, 2, 0, 2, 2, 1, 0, 1, 2, 1, 1, 1, 2, 2, 0, 2,
       2, 2, 0, 0, 0, 0, 1, 0, 2, 1, 1, 0, 1, 1, 0, 1, 2, 2, 0, 0, 2, 2,
       0, 2, 2, 0, 0, 2, 0, 2, 1, 2, 1, 1, 1, 2, 1, 0, 1, 0, 0, 1, 0, 2,
       2, 1, 0, 0, 0, 1, 0, 0, 2, 1, 2, 0], dtype=int32)
```

In [ ]: