In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
df = pd.read_excel("MIDMARKS-MINOR1-EXAM.xlsx")
```

In [2]:
```
df
```

Out[2]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12 | 0 | 17 | 9 | 19 | 15 |
| **1** | 2 | ALPHA | 19 | 12 | 16 | 16 | 18 | 3 |
| **2** | 3 | ALPHA | 18 | 14 | 18 | 18 | 18 | 16 |
| **3** | 4 | ALPHA | 15 | 9 | 19 | 17 | 19 | 15 |
| **4** | 5 | ALPHA | 18 | 17 | 19 | 19 | 20 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **475** | 476 | NaN | 18 | 2 | 12 | 3 | 17 | 15 |
| **476** | 477 | NaN | 20 | 6 | 16 | 11 | 20 | 14 |
| **477** | 478 | NaN | 20 | NaN | 18 | 13 | 20 | 18 |
| **478** | 479 | NaN | 20 | 20 | 5 | 19 | 18 | 14 |
| **479** | 480 | NaN | 20 | 16 | 18 | 19 | 20 | 19 |

480 rows × 8 columns

In [3]:
```
df.info
```

Out[3]:
```
<bound method DataFrame.info of      S.NO SECTION  DV M-II  PP BEEE  FL FIMS
0       1   ALPHA  12    0  17    9  19   15
1       2   ALPHA  19   12  16   16  18    3
2       3   ALPHA  18   14  18   18  18   16
3       4   ALPHA  15    9  19   17  19   15
4       5   ALPHA  18   17  19   19  20   18
..    ...     ...  ..  ...  ..  ...  ..  ...
475   476     NaN  18    2  12    3  17   15
476   477     NaN  20    6  16   11  20   14
477   478     NaN  20  NaN  18   13  20   18
478   479     NaN  20   20   5   19  18   14
479   480     NaN  20   16  18   19  20   19

[480 rows x 8 columns]>
```

In [4]:
```
df['SECTION'] = df['SECTION'].fillna('ZETA')
df
```

Out[4]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12 | 0 | 17 | 9 | 19 | 15 |
| **1** | 2 | ALPHA | 19 | 12 | 16 | 16 | 18 | 3 |
| **2** | 3 | ALPHA | 18 | 14 | 18 | 18 | 18 | 16 |
| **3** | 4 | ALPHA | 15 | 9 | 19 | 17 | 19 | 15 |
| **4** | 5 | ALPHA | 18 | 17 | 19 | 19 | 20 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **475** | 476 | ZETA | 18 | 2 | 12 | 3 | 17 | 15 |
| **476** | 477 | ZETA | 20 | 6 | 16 | 11 | 20 | 14 |
| **477** | 478 | ZETA | 20 | NaN | 18 | 13 | 20 | 18 |
| **478** | 479 | ZETA | 20 | 20 | 5 | 19 | 18 | 14 |
| **479** | 480 | ZETA | 20 | 16 | 18 | 19 | 20 | 19 |

480 rows × 8 columns

In [ ]:
```
```

In [5]:
```
df['SECTION'].value_counts()
```

Out[5]:
```
ALPHA      60
BETA       60
DELTA      60
ZETA       60
EPSILON    60
GAMMA      60
OMEGA      60
SIGMA      60
Name: SECTION, dtype: int64
```

In [ ]:
```
```

In [6]:
```
df['DV'].value_counts()
```

Out[6]:
```
17    53
20    53
18    48
16    48
15    45
19    38
11    31
12    27
13    25
14    24
10    22
9     14
8     10
6      9
5      8
7      6
A      6
2      4
1      3
4      3
3      1
MP     1
Name: DV, dtype: int64
```

In [7]:
```
df['DV'] = df['DV'].replace('MP',0)
df
```

Out[7]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12 | 0 | 17 | 9 | 19 | 15 |
| **1** | 2 | ALPHA | 19 | 12 | 16 | 16 | 18 | 3 |
| **2** | 3 | ALPHA | 18 | 14 | 18 | 18 | 18 | 16 |
| **3** | 4 | ALPHA | 15 | 9 | 19 | 17 | 19 | 15 |
| **4** | 5 | ALPHA | 18 | 17 | 19 | 19 | 20 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **475** | 476 | ZETA | 18 | 2 | 12 | 3 | 17 | 15 |
| **476** | 477 | ZETA | 20 | 6 | 16 | 11 | 20 | 14 |
| **477** | 478 | ZETA | 20 | NaN | 18 | 13 | 20 | 18 |
| **478** | 479 | ZETA | 20 | 20 | 5 | 19 | 18 | 14 |
| **479** | 480 | ZETA | 20 | 16 | 18 | 19 | 20 | 19 |

480 rows × 8 columns

In [8]:
```
df['DV'] = df['DV'].replace('A',0)
df
```

Out[8]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0 | 17 | 9 | 19 | 15 |
| **1** | 2 | ALPHA | 19.0 | 12 | 16 | 16 | 18 | 3 |
| **2** | 3 | ALPHA | 18.0 | 14 | 18 | 18 | 18 | 16 |
| **3** | 4 | ALPHA | 15.0 | 9 | 19 | 17 | 19 | 15 |
| **4** | 5 | ALPHA | 18.0 | 17 | 19 | 19 | 20 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **475** | 476 | ZETA | 18.0 | 2 | 12 | 3 | 17 | 15 |
| **476** | 477 | ZETA | 20.0 | 6 | 16 | 11 | 20 | 14 |
| **477** | 478 | ZETA | 20.0 | NaN | 18 | 13 | 20 | 18 |
| **478** | 479 | ZETA | 20.0 | 20 | 5 | 19 | 18 | 14 |
| **479** | 480 | ZETA | 20.0 | 16 | 18 | 19 | 20 | 19 |

480 rows × 8 columns

In [9]:
```
df['DV'].value_counts()
```

Out[9]:
```
17.0    53
20.0    53
18.0    48
16.0    48
15.0    45
19.0    38
11.0    31
12.0    27
13.0    25
14.0    24
10.0    22
9.0     14
8.0     10
6.0      9
5.0      8
0.0      7
7.0      6
2.0      4
4.0      3
1.0      3
3.0      1
Name: DV, dtype: int64
```

In [10]:
```
df = df.replace('MP',0)
df = df.replace('A',0)
df = df.replace('AB',0)
df = df.replace('o',0)
df = df.replace('II',11)
df = df.replace('I',1)
```

In [11]:
```
df['PP'].value_counts()
```

Out[11]:
```
20    70
18    35
19    35
17    31
12    29
11    28
14    28
16    28
15    27
9     24
10    19
6     18
13    15
5     15
3     13
2     13
0     13
8     12
4     10
7     10
1      7
Name: PP, dtype: int64
```

In [12]:
```
df['BEEE'].value_counts()
```

Out[12]:
```
20.0    76
17.0    46
19.0    42
11.0    31
18.0    31
15.0    28
16.0    23
14.0    21
12.0    21
10.0    20
9.0     19
0.0     15
7.0     15
6.0     15
3.0     14
13.0    14
8.0     13
4.0     12
5.0     10
2.0      9
1.0      3
Name: BEEE, dtype: int64
```

In [13]:
```
df['M-II'].value_counts()
```

Out[13]:
```
20.0    44
0.0     34
3.0     34
17.0    32
8.0     29
11.0    25
12.0    24
15.0    24
18.0    23
5.0     23
4.0     22
10.0    20
13.0    18
6.0     18
1.0     18
9.0     17
14.0    17
16.0    16
7.0     14
2.0     13
19.0    12
Name: M-II, dtype: int64
```

In [14]:
```
df['FIMS'].value_counts()
```

Out[14]:
```
18    62
15    57
16    50
17    41
14    40
13    36
19    35
9     28
11    22
12    20
10    19
0     15
20    12
8     11
3      6
5      5
4      5
7      5
6      5
2      3
1      3
Name: FIMS, dtype: int64
```

In [15]:
```
df['FL'].value_counts()
```

Out[15]:
```
20.0    121
15.0     85
18.0     59
10.0     55
13.0     50
19.0     34
16.0     15
14.0     11
11.0     10
17.0      9
0.0       9
12.0      8
8.0       6
9.0       3
6.0       2
7.0       2
Name: FL, dtype: int64
```

In [16]:
```
df.isnull().sum()
```

Out[16]:
```
S.NO       0
SECTION    0
DV         1
M-II       3
PP         0
BEEE       2
FL         1
FIMS       0
dtype: int64
```

In [17]:
```
df[df['DV'].isnull()]
```

Out[17]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **389** | 390 | OMEGA | NaN | 17.0 | 17 | 19.0 | 20.0 | 17 |

In [ ]:
```

```

In [18]:
```
df['S.NO'] = range(1, len(df) + 1)
df
```

Out[18]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 |
| **477** | 478 | ZETA | 20.0 | NaN | 18 | 13.0 | 20.0 | 18 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 |

480 rows × 8 columns

In [19]:
```
df['FL'] = df['FL'].fillna(0)
df=df.dropna()
```

In [20]:
```
df
```

Out[20]:

| | S.NO | SECTION | DV | M-II | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 |

474 rows × 8 columns

In [21]:
```
df.info
```

Out[21]:
```
<bound method DataFrame.info of      S.NO SECTION    DV  M-II  PP  BEEE    FL  FIMS
0       1   ALPHA  12.0   0.0  17   9.0  19.0    15
1       2   ALPHA  19.0  12.0  16  16.0  18.0     3
2       3   ALPHA  18.0  14.0  18  18.0  18.0    16
3       4   ALPHA  15.0   9.0  19  17.0  19.0    15
4       5   ALPHA  18.0  17.0  19  19.0  20.0    18
..    ...     ...   ...   ...  ..   ...   ...   ...
474   475    ZETA  11.0   4.0   2   2.0   8.0    10
475   476    ZETA  18.0   2.0  12   3.0  17.0    15
476   477    ZETA  20.0   6.0  16  11.0  20.0    14
478   479    ZETA  20.0  20.0   5  19.0  18.0    14
479   480    ZETA  20.0  16.0  18  19.0  20.0    19

[474 rows x 8 columns]>
```

In [22]:
```
df.isnull().sum()
```

Out[22]:
```
S.NO       0
SECTION    0
DV         0
M-II       0
PP         0
BEEE       0
FL         0
FIMS       0
dtype: int64
```

In [ ]:
```

```

# Mid Marks Data

In [23]:
```
df.rename(columns={'M-II':'M2'},inplace=True)
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\82161249.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df.rename(columns={'M-II':'M2'},inplace=True)
```

# Renaming M-II as M2

In [24]:
```
df
```

Out[24]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS |
|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 |

474 rows × 8 columns

In [25]:
```
df['DV'] = pd.to_numeric(df['DV'], errors='coerce')
df['M2'] = pd.to_numeric(df['M2'], errors='coerce')
df['PP'] = pd.to_numeric(df['PP'], errors='coerce')
df['BEEE'] = pd.to_numeric(df['BEEE'], errors='coerce')
df['FL'] = pd.to_numeric(df['FL'], errors='coerce')
df['FIMS'] = pd.to_numeric(df['FIMS'], errors='coerce')
df.fillna(0, inplace=True)
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['DV'] = pd.to_numeric(df['DV'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['M2'] = pd.to_numeric(df['M2'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['PP'] = pd.to_numeric(df['PP'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['BEEE'] = pd.to_numeric(df['BEEE'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:5: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['FL'] = pd.to_numeric(df['FL'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['FIMS'] = pd.to_numeric(df['FIMS'], errors='coerce')
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1473698917.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df.fillna(0, inplace=True)
```

# Converting into numeric

In [26]:
```
df['Total'] = df['DV'] + df['M2'] + df['PP'] + df['BEEE'] + df['FL'] + df['FIMS']

df
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\4026183173.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['Total'] = df['DV'] + df['M2'] + df['PP'] + df['BEEE'] + df['FL'] + df['FIMS']
```

Out[26]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 |

474 rows × 9 columns

# Calculating total

In [27]:
```
df["Percentage"] = (df['Total']/120)*100
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\3999239091.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df["Percentage"] = (df['Total']/120)*100
```

In [28]:
```
df
```

Out[28]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60.000000 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70.000000 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85.000000 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78.333333 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92.500000 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 30.833333 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 55.833333 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72.500000 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80.000000 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93.333333 |

474 rows × 10 columns

In [29]:
```
df['Percentage'] = df['Percentage'].round().astype(int)
df
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1999675392.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['Percentage'] = df['Percentage'].round().astype(int)
```

Out[29]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 |

474 rows × 10 columns

In [30]:
```
def assign_grade(percentage):
    if percentage >= 90:
        return 'A'
    elif percentage >= 80:
        return 'B+'
    elif percentage >= 70:
        return 'B'
    elif percentage >= 60:
        return 'C+'
    elif percentage >=50:
        return 'C'
    elif percentage >=40:
        return 'D'
    else:
        return 'F'
df['Grade'] = df['Percentage'].apply(assign_grade)
df
```

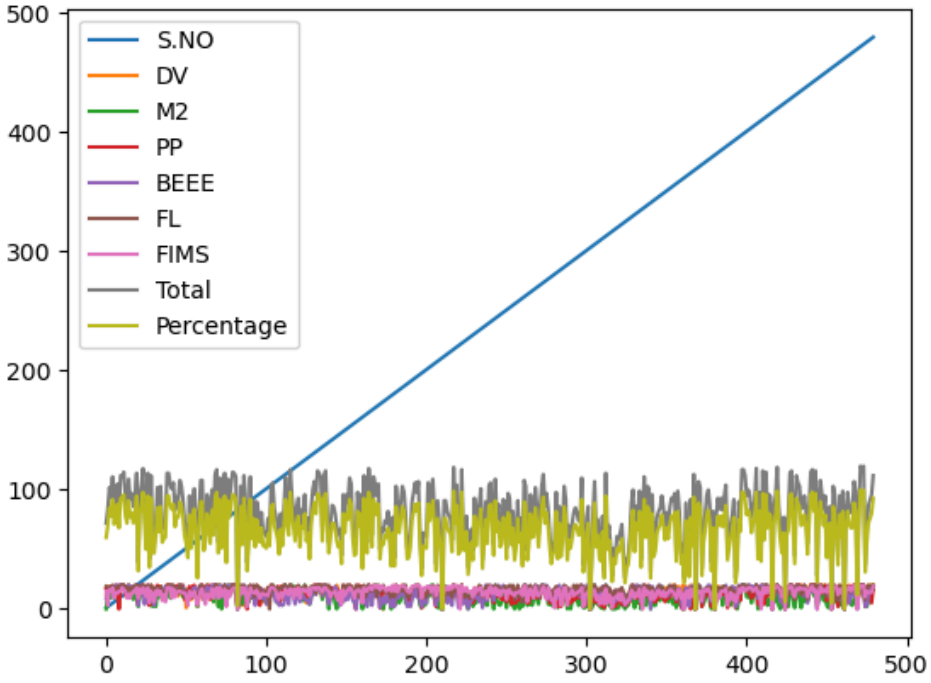
```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\2453317957.py:16: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['Grade'] = df['Percentage'].apply(assign_grade)
```

Out[30]:

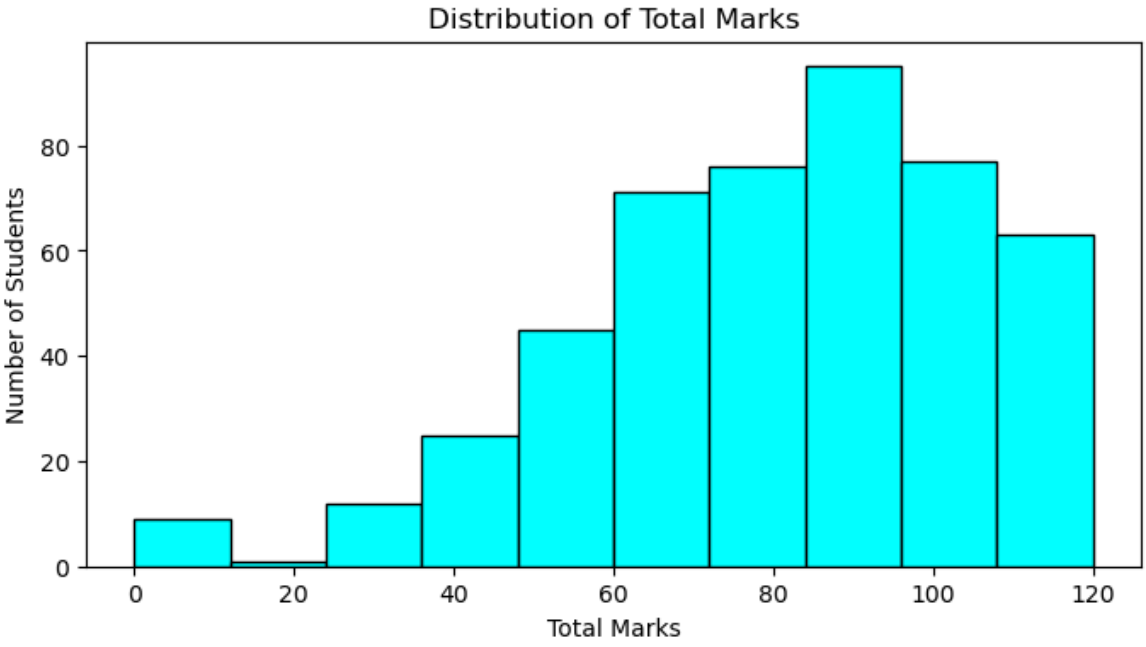
| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A |

474 rows × 11 columns

In [31]:
```
df.plot()
plt.show()
```



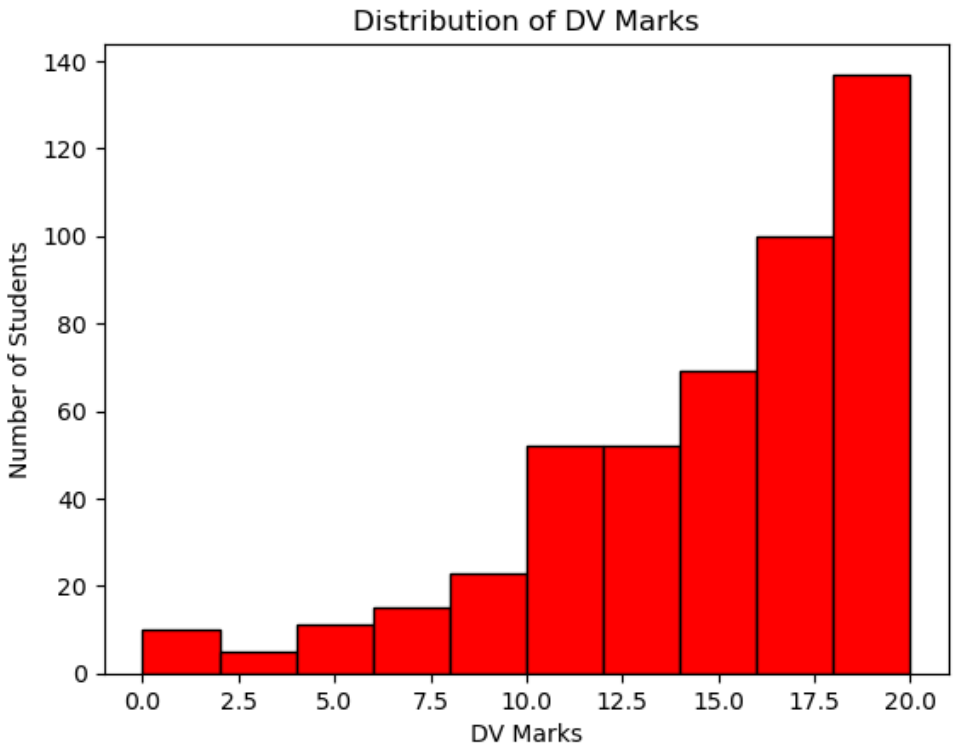

In [32]:
```
plt.figure(figsize=[8, 4])
plt.hist(df['Total'], color='cyan', bins=10, edgecolor='black')
plt.title("Distribution of Total Marks")
plt.xlabel("Total Marks")
plt.ylabel("Number of Students")
plt.show()
```




# Distribution of Total marks in Histogram

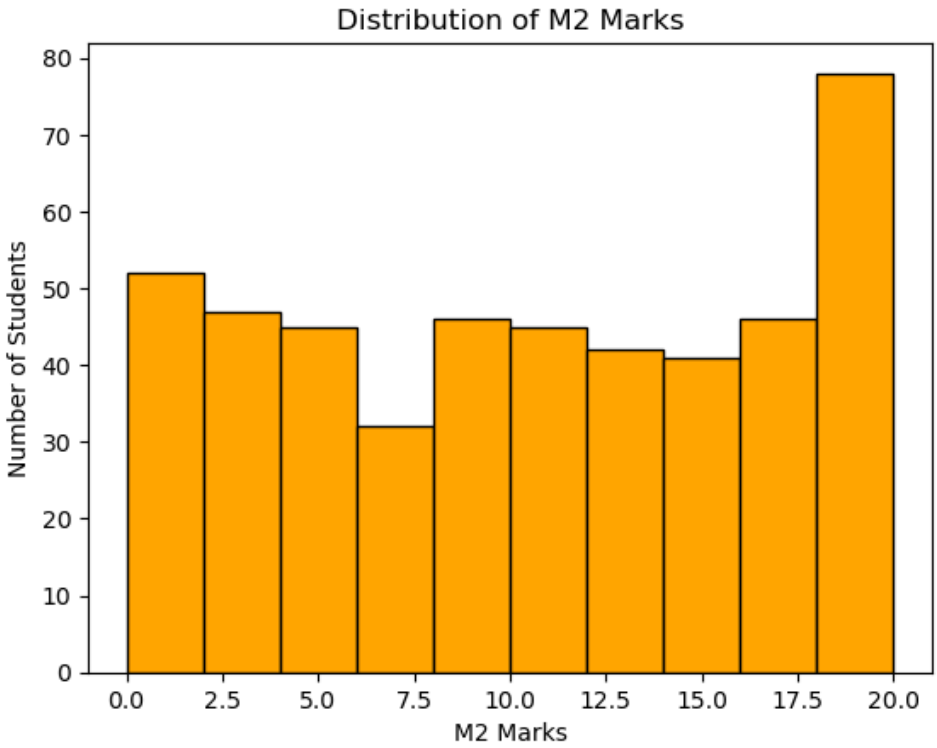
In [33]:
```
df['DV'] = pd.to_numeric(df['DV'], errors='coerce')
df = df.dropna(subset=['DV'])
plt.hist(df['DV'], bins=10, color='red', edgecolor='black')
plt.title("Distribution of DV Marks")
plt.xlabel("DV Marks")
plt.ylabel("Number of Students")
plt.show()
```

```
C:\Users\khsbh\AppData\Local\Temp\ipykernel_26360\1854147094.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  df['DV'] = pd.to_numeric(df['DV'], errors='coerce')
```



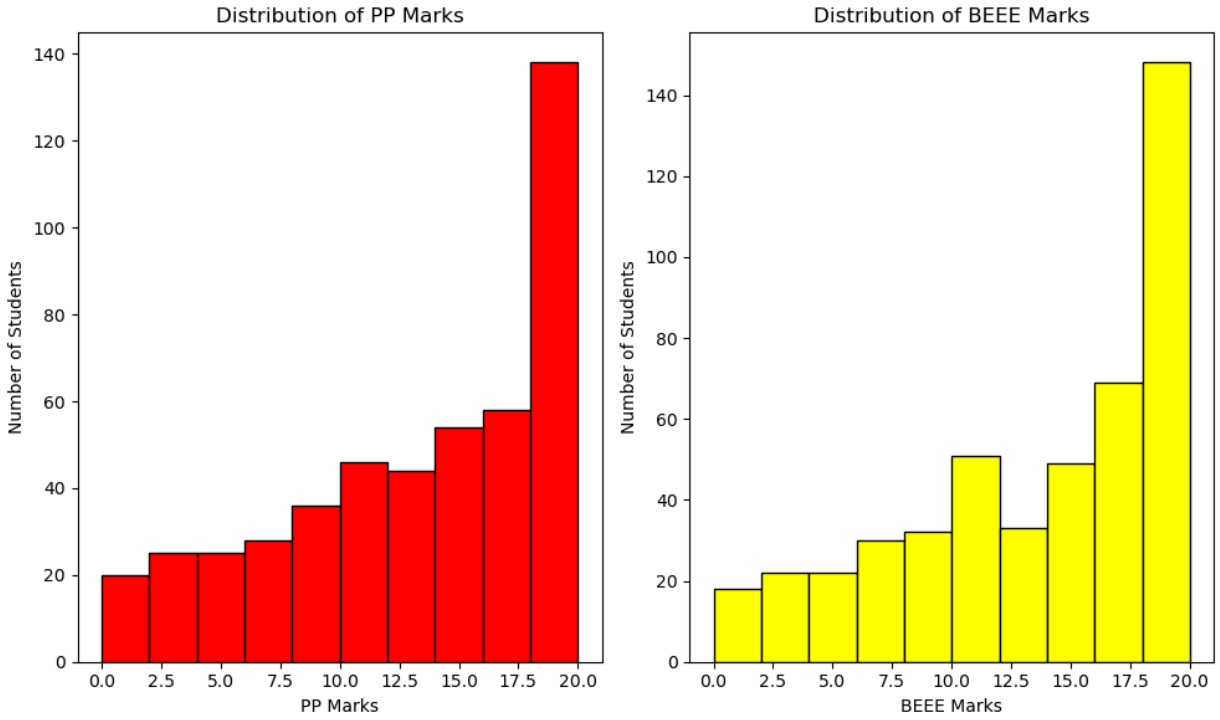

# Distribution of DV Marks

In [34]:
```
df['M2'] = pd.to_numeric(df['M2'], errors='coerce')
df = df.dropna(subset=['M2'])
plt.hist(df['M2'], bins=10, color='orange', edgecolor='black')
plt.title("Distribution of M2 Marks")
plt.xlabel("M2 Marks")
plt.ylabel("Number of Students")
plt.show()
```



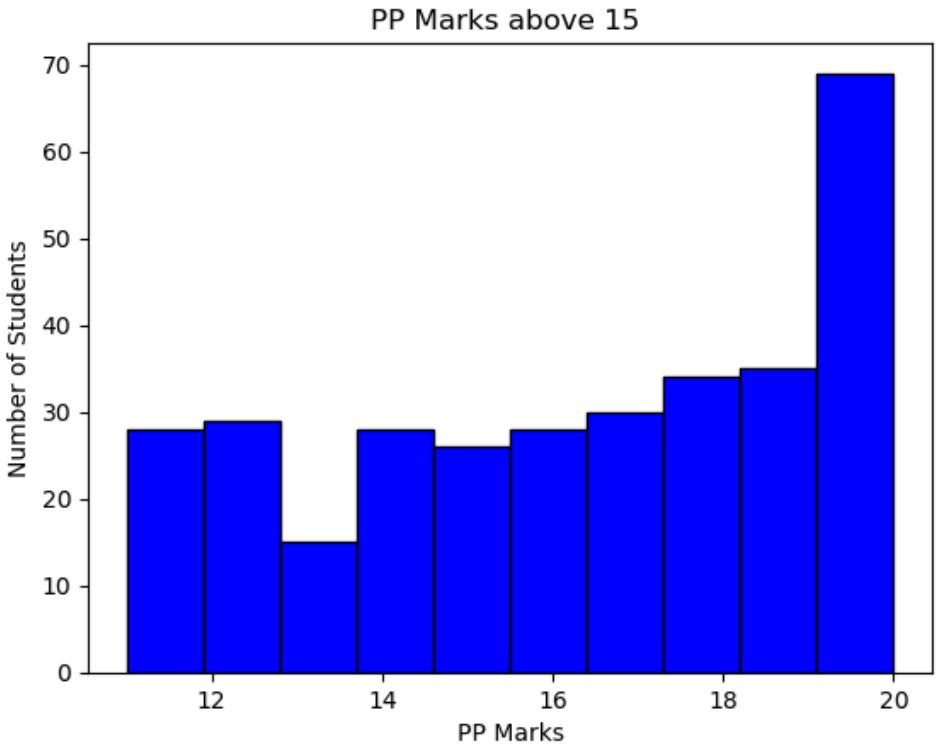

# Distribution of M2 Marks

In [35]:
```
df['PP'] = pd.to_numeric(df['PP'], errors='coerce')
df['BEEE'] = pd.to_numeric(df['BEEE'], errors='coerce')
df_clean = df.dropna(subset=['PP', 'BEEE'])

plt.figure(figsize=[10, 6])

plt.subplot(1, 2, 1)
plt.hist(df_clean['PP'], bins=10, color='red', edgecolor='black')
plt.title("Distribution of PP Marks")
plt.xlabel("PP Marks")
plt.ylabel("Number of Students")

plt.subplot(1, 2, 2)
plt.hist(df_clean['BEEE'], bins=10, color='yellow', edgecolor='black')
plt.title("Distribution of BEEE Marks")
plt.xlabel("BEEE Marks")
plt.ylabel("Number of Students")

plt.tight_layout()
plt.show()
```



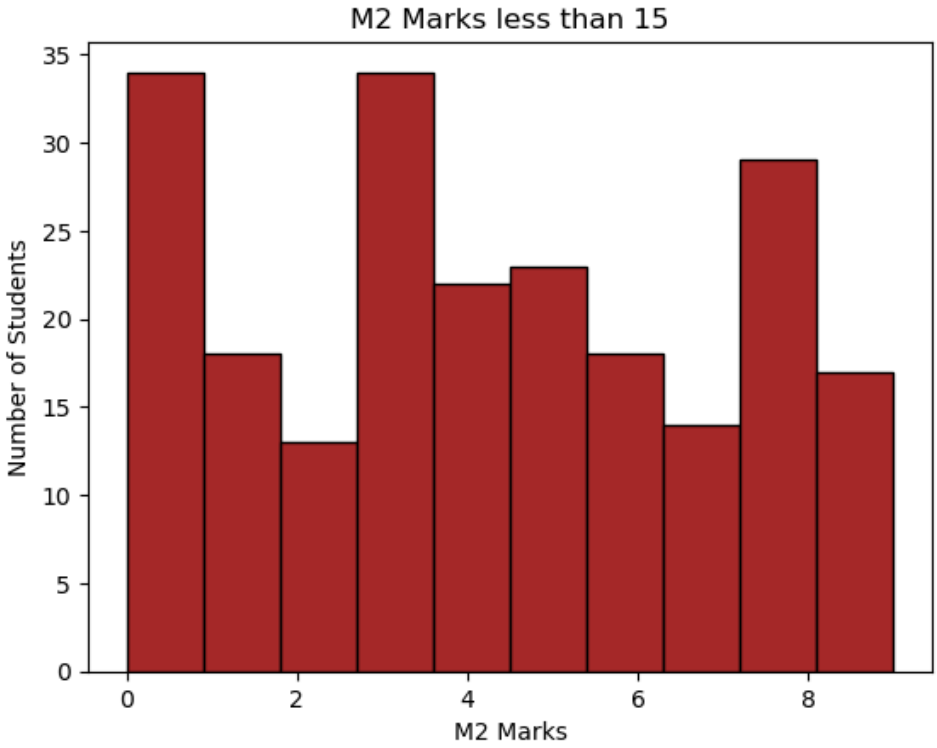

# Comparision of PP marks and BEEE marks

In [36]:
```
filtered_df = df[df['PP'] > 10]
plt.hist(filtered_df['PP'], bins=10, color='blue', edgecolor='black')
plt.title("PP Marks above 15 ")
plt.xlabel("PP Marks")
plt.ylabel("Number of Students")
plt.show()
```



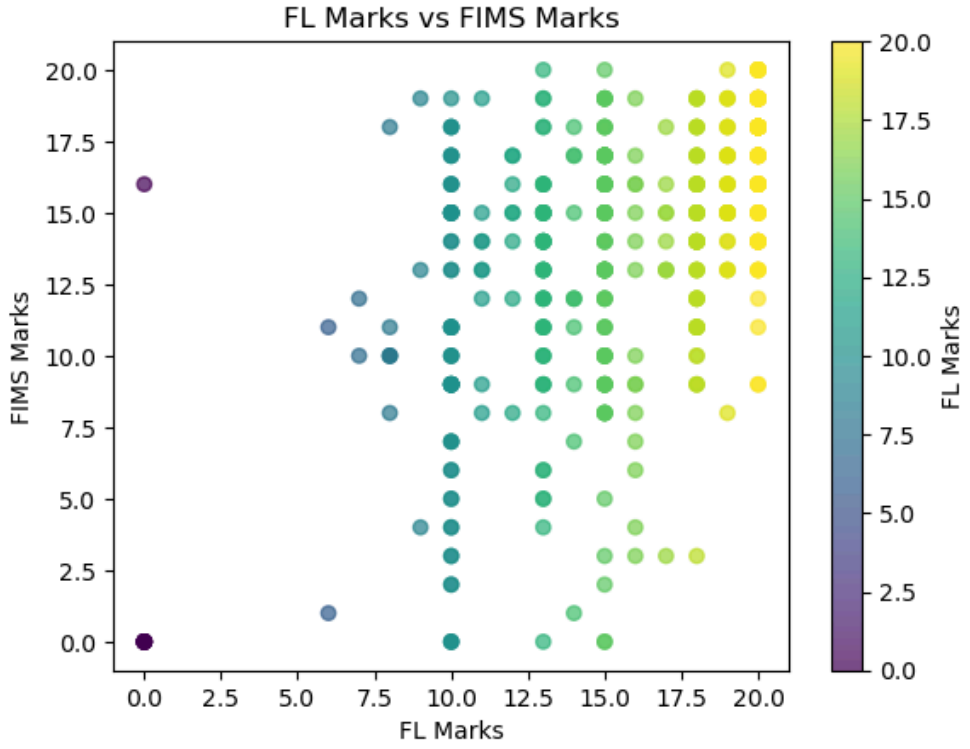

## PP Marks who got more than 10

In [37]:
```
filtered_df = df[df['M2'] < 10]

plt.hist(filtered_df['M2'], bins=10, color='brown', edgecolor='black')
plt.title("M2 Marks less than 15")
plt.xlabel("M2 Marks")
plt.ylabel("Number of Students")
plt.show()
```



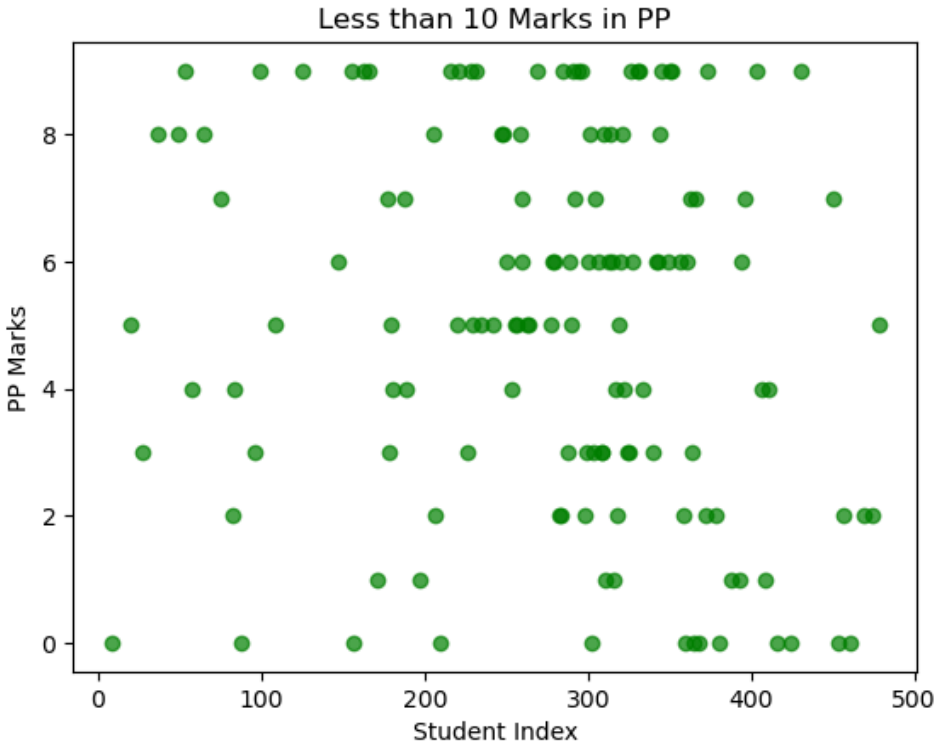

# M2 Marks Who got less than 10

In [38]:
```
plt.scatter(df['FL'], df['FIMS'], c=df['FL'], cmap='viridis', alpha=0.7)
plt.title("FL Marks vs FIMS Marks")
plt.xlabel("FL Marks")
plt.ylabel("FIMS Marks")
plt.colorbar(label='FL Marks')
plt.show()
```



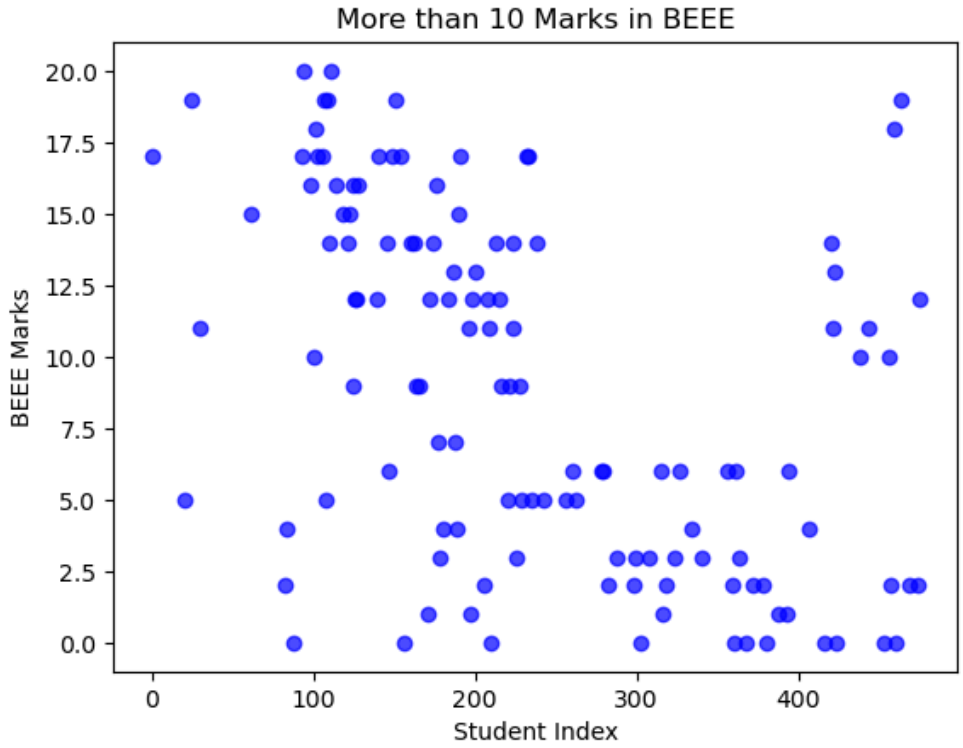

## Scatter plot of FL VS FIMS Marks

In [39]:
```
filtered_df = df[df['PP'] < 10]

plt.scatter(filtered_df.index, filtered_df['PP'], alpha=0.7, color='green')
plt.title("Less than 10 Marks in PP")
plt.xlabel("Student Index")
plt.ylabel("PP Marks")
plt.show()
```



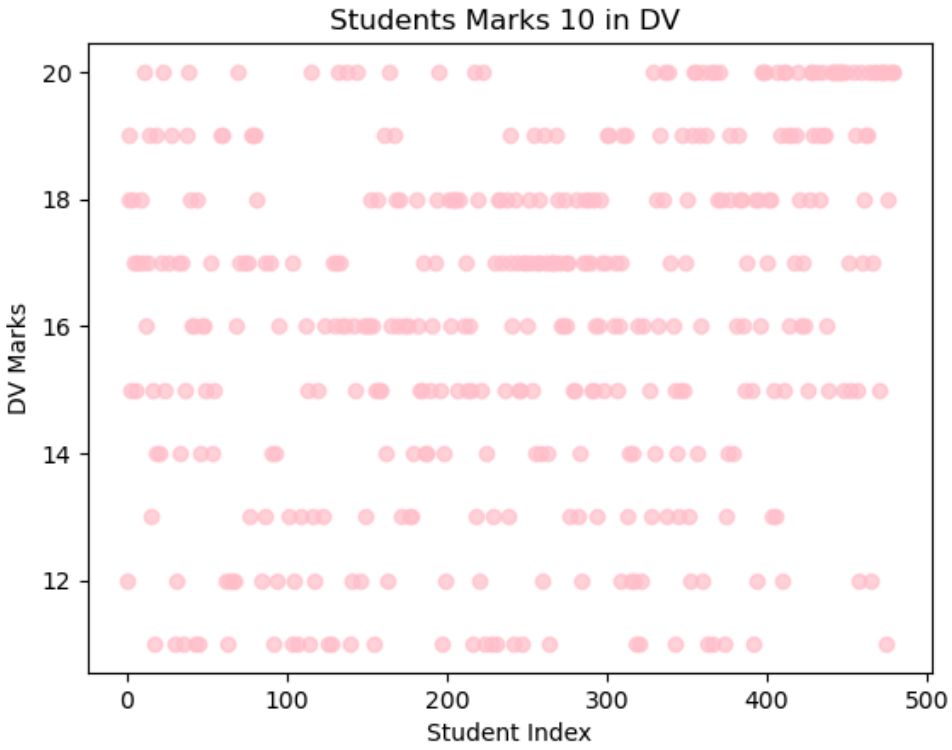

## Scoring of PP Marks Less than 10

In [40]:
```
filtered_df = df[df['BEEE'] < 10]

plt.scatter(filtered_df.index, filtered_df['PP'], alpha=0.7, color='blue')
plt.title("More than 10 Marks in BEEE")
plt.xlabel("Student Index")
plt.ylabel("BEEE Marks")
plt.show()
```



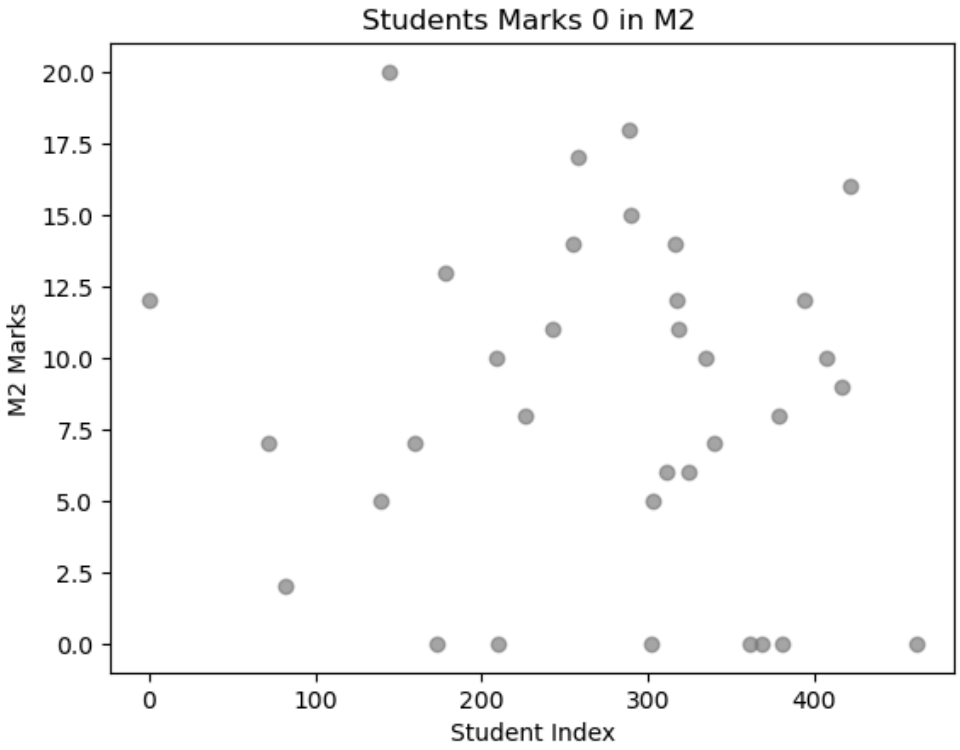

## Scoring of BEEE Marks More than 15

In [41]:
```
filtered_df = df[df['DV'] > 10]
plt.scatter(filtered_df.index, filtered_df['DV'], alpha=0.7, color='pink')
plt.title("Students Marks 10 in DV ")
plt.xlabel("Student Index")
plt.ylabel("DV Marks")
plt.show()
```



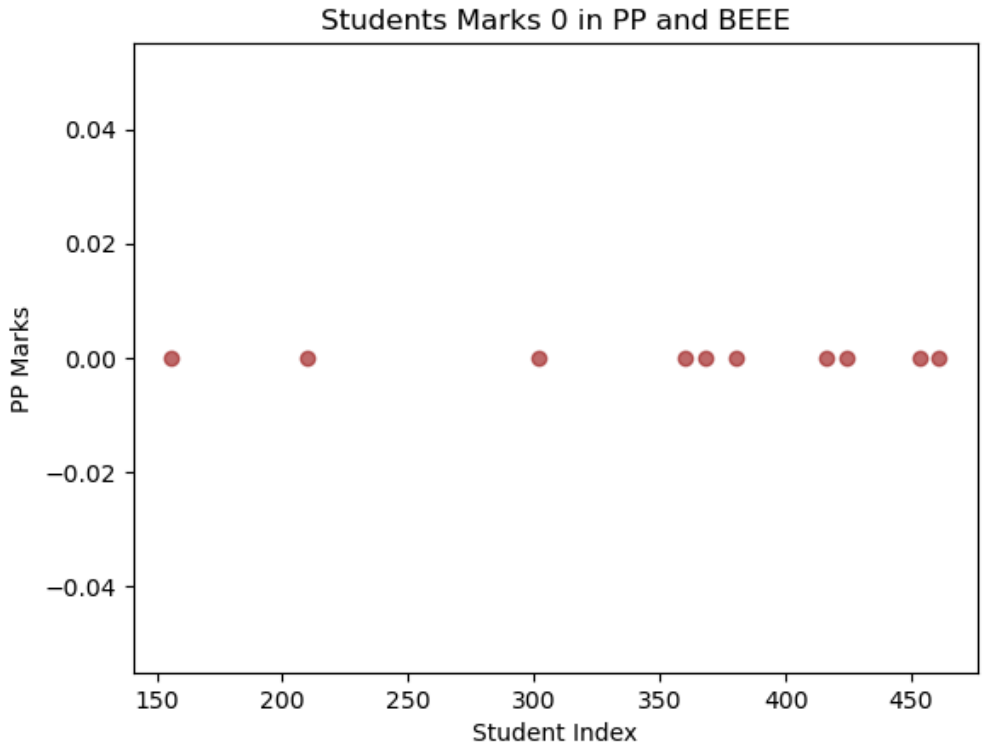

## Students who scored 10 marks in DV

In [42]:
```
filtered_df = df[df['M2'] == 0]
plt.scatter(filtered_df.index, filtered_df['DV'], alpha=0.7, color='grey')
plt.title("Students Marks 0 in M2 ")
plt.xlabel("Student Index")
plt.ylabel("M2 Marks")
plt.show()
```



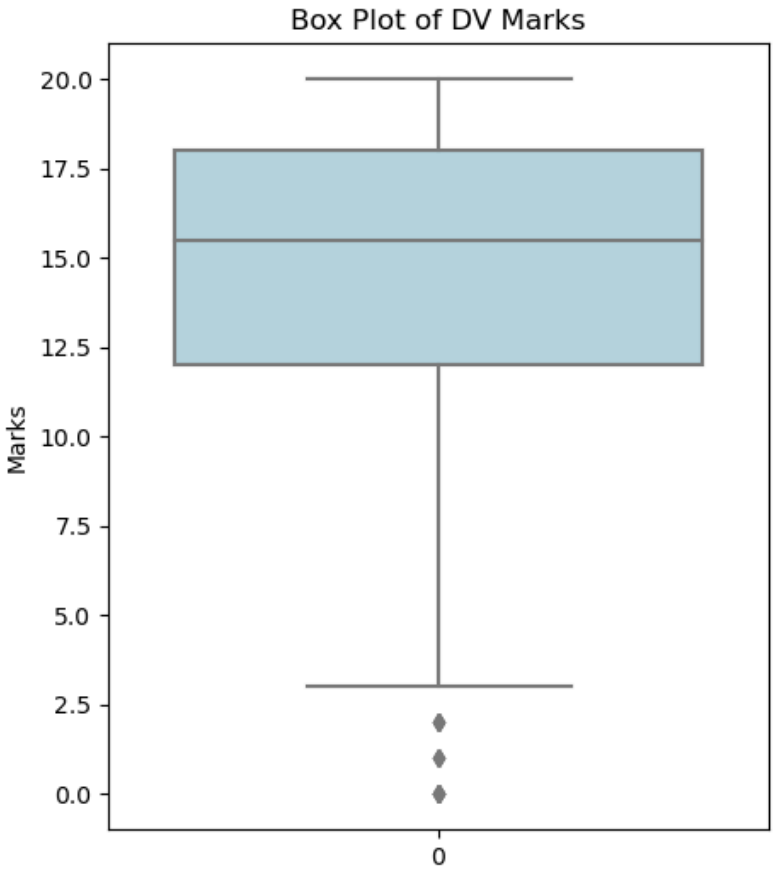

## Students who scored 0 Marks in M2

In [43]:
```
filtered_df = df[(df['PP'] == 0) & (df['BEEE'] == 0)]
plt.scatter(filtered_df.index, filtered_df['PP'], alpha=0.7, color='brown')
plt.title("Students Marks 0 in PP and BEEE")
plt.xlabel("Student Index")
plt.ylabel("PP Marks")
plt.show()
```



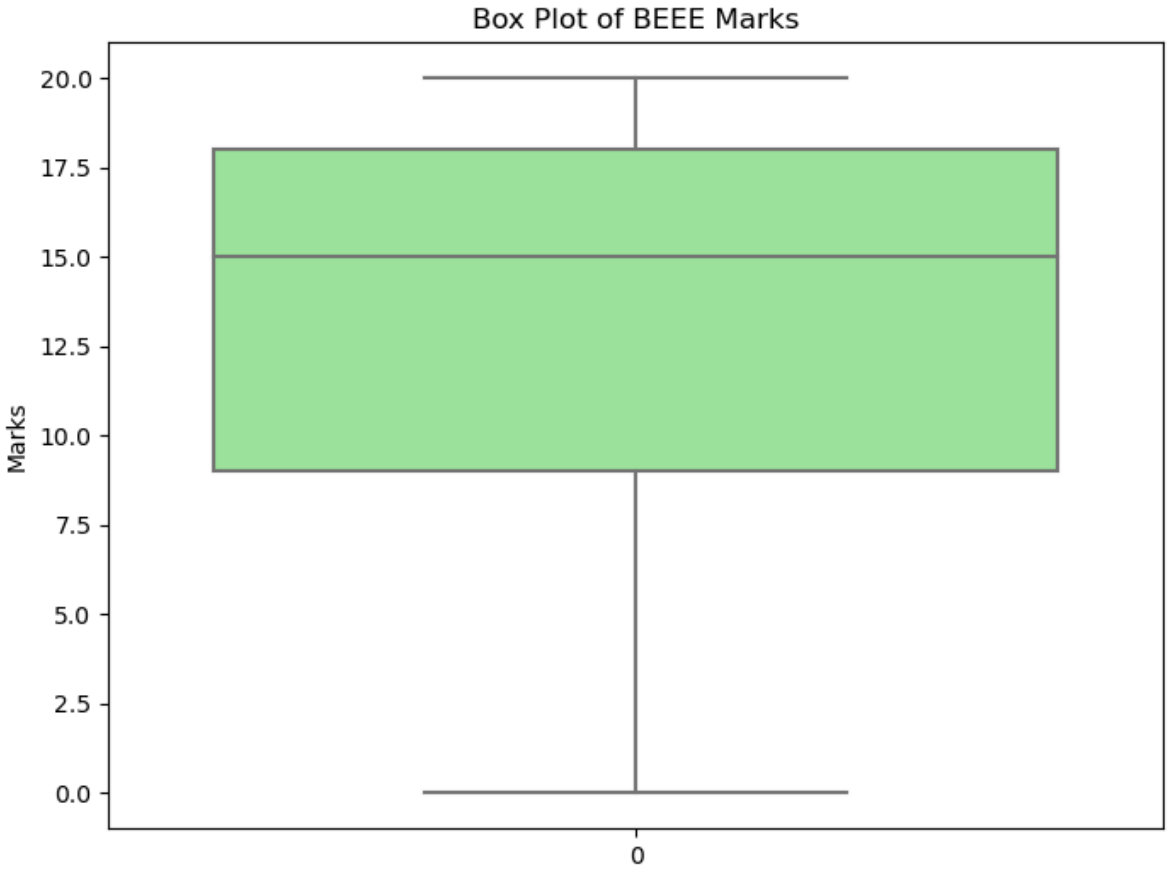

## Students scored 0 Marks in PP and BEEE

In [44]:
```
plt.figure(figsize=(5, 6))
sns.boxplot(data=df['DV'], color='lightblue')
plt.title("Box Plot of DV Marks")
plt.ylabel("Marks")
plt.show()
```



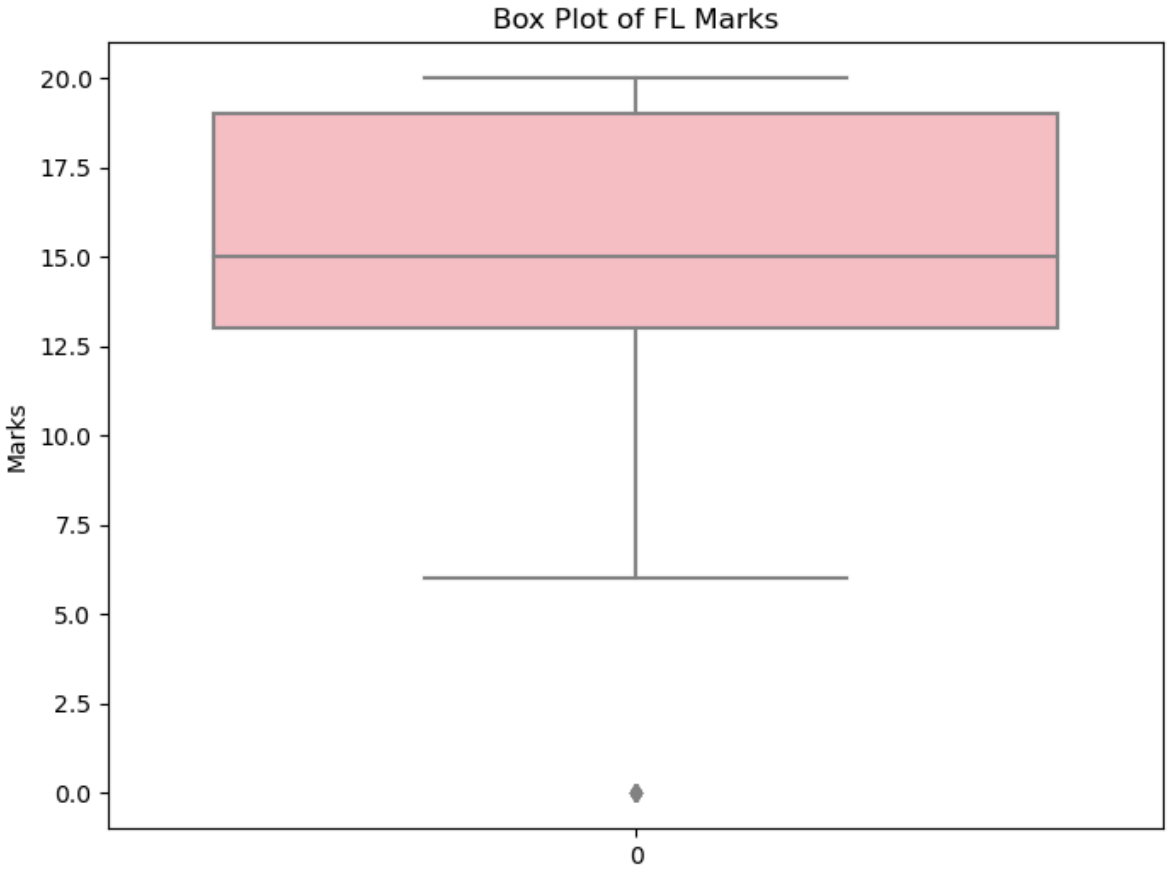

# Box plot for the DV Marks

In [45]:
```
plt.figure(figsize=(8, 6))
sns.boxplot(data=df['BEEE'], color='lightgreen')
plt.title("Box Plot of BEEE Marks")
plt.ylabel("Marks")
plt.show()
```




# Box plot of BEEE Marks

In [46]:
```
plt.figure(figsize=(8, 6))
sns.boxplot(data=df['FL'], color='lightpink')
plt.title("Box Plot of FL Marks")
plt.ylabel("Marks")
plt.show()
```




# Box plot for the FL Marks

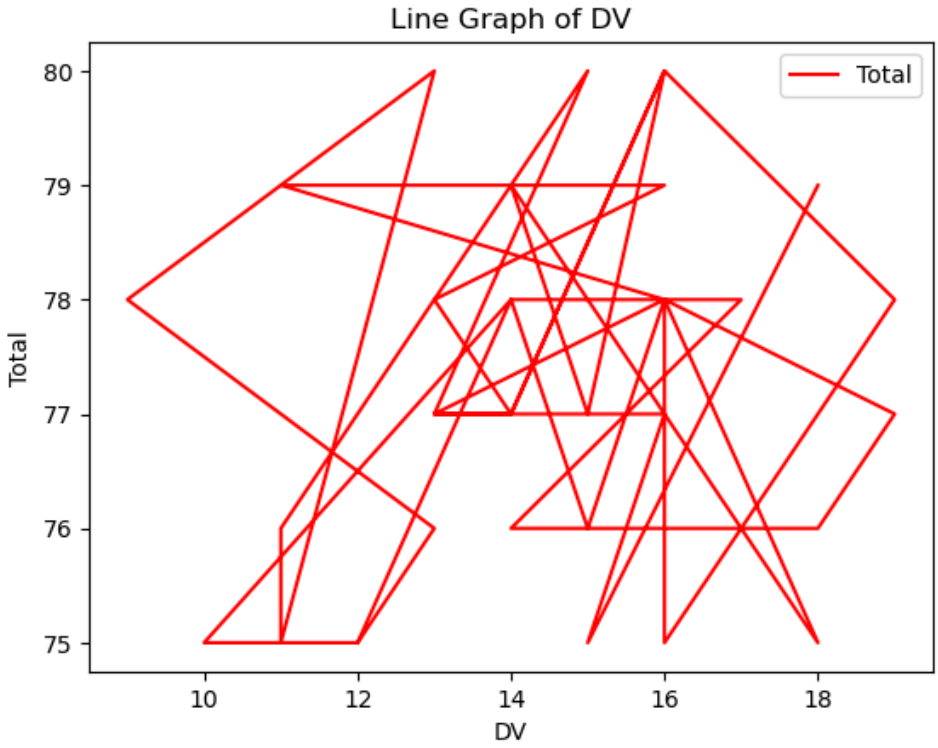
In [47]:
```
a=df.loc[(df['Total'] >= 75) & (df['Total'] <= 80)]
a=a.reset_index()
a
```

Out[47]:

| | index | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 31 | 32 | ALPHA | 12.0 | 2.0 | 17 | 11.0 | 18.0 | 15 | 75.0 | 62 | C+ |
| **1** | 33 | 34 | ALPHA | 14.0 | 10.0 | 17 | 12.0 | 13.0 | 12 | 78.0 | 65 | C+ |
| **2** | 56 | 57 | ALPHA | 10.0 | 17.0 | 12 | 17.0 | 10.0 | 9 | 75.0 | 62 | C+ |
| **3** | 67 | 68 | BETA | 12.0 | 6.0 | 13 | 20.0 | 15.0 | 9 | 75.0 | 62 | C+ |
| **4** | 101 | 102 | BETA | 13.0 | 12.0 | 18 | 4.0 | 18.0 | 11 | 76.0 | 63 | C+ |
| **5** | 106 | 107 | BETA | 9.0 | 13.0 | 17 | 6.0 | 18.0 | 15 | 78.0 | 65 | C+ |
| **6** | 109 | 110 | BETA | 13.0 | 12.0 | 19 | 4.0 | 18.0 | 14 | 80.0 | 67 | C+ |
| **7** | 114 | 115 | BETA | 11.0 | 14.0 | 16 | 4.0 | 18.0 | 12 | 75.0 | 62 | C+ |
| **8** | 126 | 127 | DELTA | 11.0 | 14.0 | 12 | 7.0 | 15.0 | 17 | 76.0 | 63 | C+ |
| **9** | 143 | 144 | DELTA | 15.0 | 5.0 | 16 | 19.0 | 10.0 | 15 | 80.0 | 67 | C+ |
| **10** | 149 | 150 | DELTA | 13.0 | 16.0 | 17 | 7.0 | 13.0 | 11 | 77.0 | 64 | C+ |
| **11** | 179 | 180 | DELTA | 14.0 | 13.0 | 5 | 12.0 | 13.0 | 20 | 77.0 | 64 | C+ |
| **12** | 182 | 183 | EPSILON | 16.0 | 8.0 | 18 | 11.0 | 13.0 | 14 | 80.0 | 67 | C+ |
| **13** | 183 | 184 | EPSILON | 15.0 | 5.0 | 12 | 9.0 | 18.0 | 18 | 77.0 | 64 | C+ |
| **14** | 187 | 188 | EPSILON | 14.0 | 5.0 | 13 | 9.0 | 20.0 | 18 | 79.0 | 66 | C+ |
| **15** | 208 | 209 | EPSILON | 18.0 | 6.0 | 12 | 8.0 | 15.0 | 16 | 75.0 | 62 | C+ |
| **16** | 214 | 215 | EPSILON | 16.0 | 6.0 | 14 | 13.0 | 13.0 | 16 | 78.0 | 65 | C+ |
| **17** | 215 | 216 | EPSILON | 15.0 | 6.0 | 12 | 9.0 | 15.0 | 19 | 76.0 | 63 | C+ |
| **18** | 225 | 226 | EPSILON | 14.0 | 8.0 | 12 | 13.0 | 13.0 | 18 | 78.0 | 65 | C+ |
| **19** | 244 | 245 | GAMMA | 17.0 | 8.0 | 11 | 15.0 | 15.0 | 12 | 78.0 | 65 | C+ |
| **20** | 259 | 260 | GAMMA | 14.0 | 9.0 | 7 | 14.0 | 16.0 | 16 | 76.0 | 63 | C+ |
| **21** | 296 | 297 | GAMMA | 18.0 | 4.0 | 9 | 10.0 | 20.0 | 15 | 76.0 | 63 | C+ |
| **22** | 300 | 301 | OMEGA | 19.0 | 2.0 | 6 | 20.0 | 17.0 | 13 | 77.0 | 64 | C+ |
| **23** | 304 | 305 | OMEGA | 16.0 | 3.0 | 7 | 16.0 | 20.0 | 16 | 78.0 | 65 | C+ |
| **24** | 307 | 308 | OMEGA | 16.0 | 4.0 | 12 | 17.0 | 15.0 | 11 | 75.0 | 62 | C+ |
| **25** | 310 | 311 | OMEGA | 19.0 | 1.0 | 8 | 19.0 | 18.0 | 13 | 78.0 | 65 | C+ |
| **26** | 332 | 333 | SIGMA | 16.0 | 5.0 | 10 | 20.0 | 18.0 | 11 | 80.0 | 67 | C+ |
| **27** | 344 | 345 | SIGMA | 14.0 | 9.0 | 8 | 18.0 | 13.0 | 15 | 77.0 | 64 | C+ |
| **28** | 374 | 375 | ZETA | 13.0 | 8.0 | 11 | 17.0 | 13.0 | 16 | 78.0 | 65 | C+ |
| **29** | 381 | 382 | OMEGA | 16.0 | 14.0 | 11 | 18.0 | 15.0 | 5 | 79.0 | 66 | C+ |
| **30** | 391 | 392 | OMEGA | 11.0 | 15.0 | 11 | 19.0 | 15.0 | 8 | 79.0 | 66 | C+ |
| **31** | 396 | 397 | OMEGA | 16.0 | 11.0 | 7 | 17.0 | 13.0 | 14 | 78.0 | 65 | C+ |
| **32** | 403 | 404 | OMEGA | 13.0 | 5.0 | 9 | 18.0 | 15.0 | 17 | 77.0 | 64 | C+ |
| **33** | 423 | 424 | SIGMA | 16.0 | 12.0 | 13 | 4.0 | 15.0 | 17 | 77.0 | 64 | C+ |
| **34** | 425 | 426 | SIGMA | 15.0 | 4.0 | 15 | 11.0 | 11.0 | 19 | 75.0 | 62 | C+ |
| **35** | 426 | 427 | SIGMA | 18.0 | 2.0 | 12 | 18.0 | 12.0 | 17 | 79.0 | 66 | C+ |

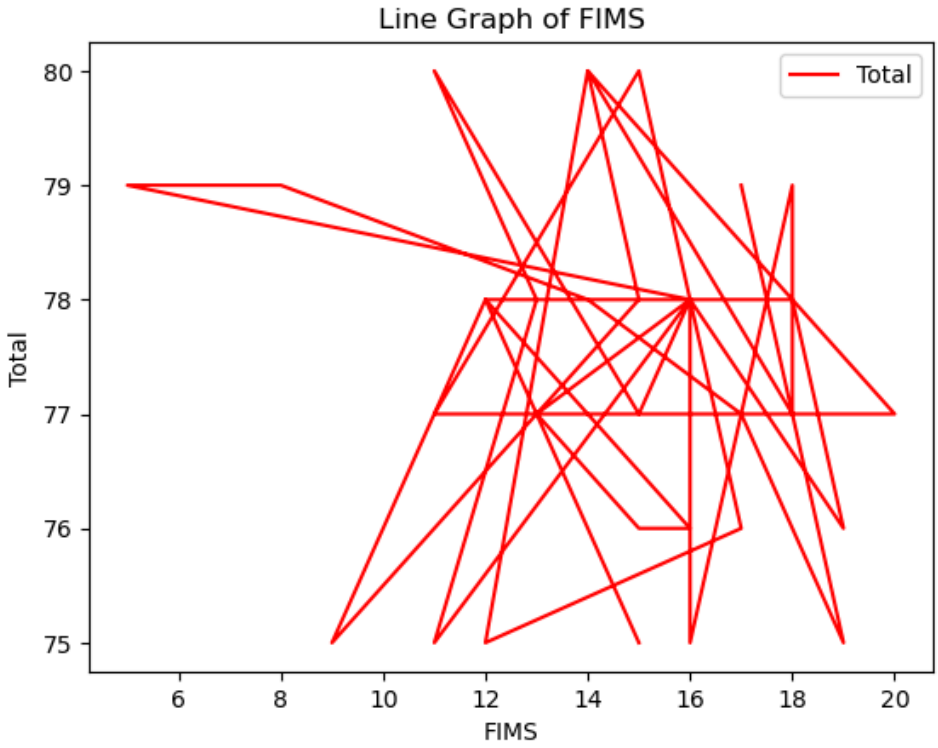
# Total marks between 75 to 80

In [48]:
```
a.plot.line(x='DV',y='Total',color='red')
plt.title("Line Graph of DV")
plt.ylabel("Total")
plt.show()
```



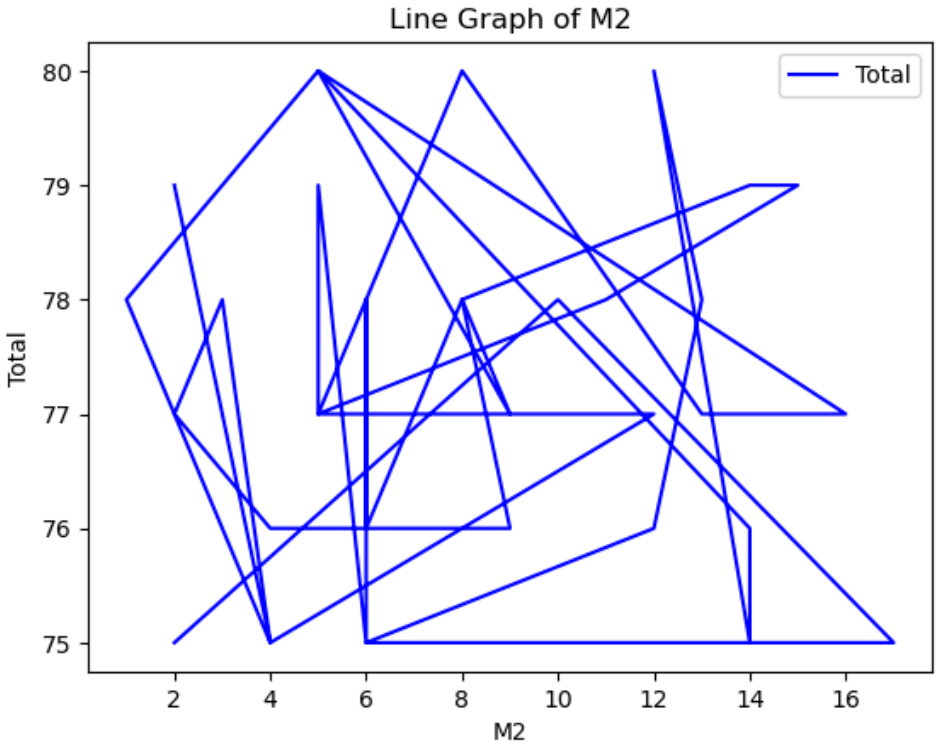

# Lineplot for total and DV

In [49]:
```
a.plot.line(x='FIMS',y='Total',color='red')
plt.title("Line Graph of FIMS")
plt.ylabel("Total")
plt.show()
```



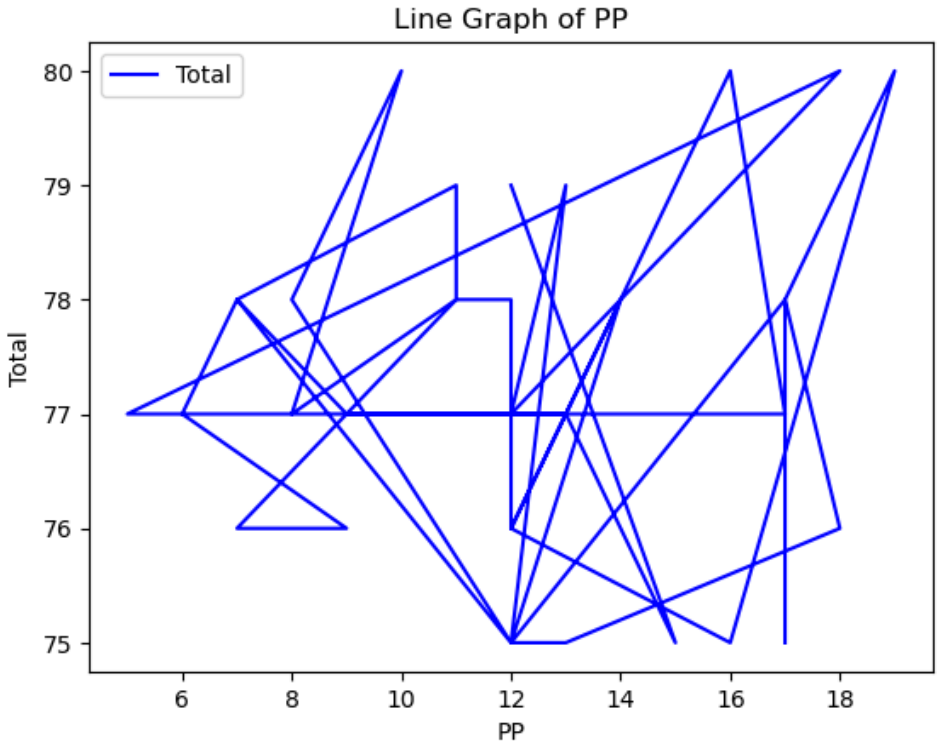

## Lineplot for total and FIMS

In [50]:
```
a.plot.line(x='M2',y='Total',color='blue')
plt.title("Line Graph of M2")
plt.ylabel("Total")
plt.show()
```



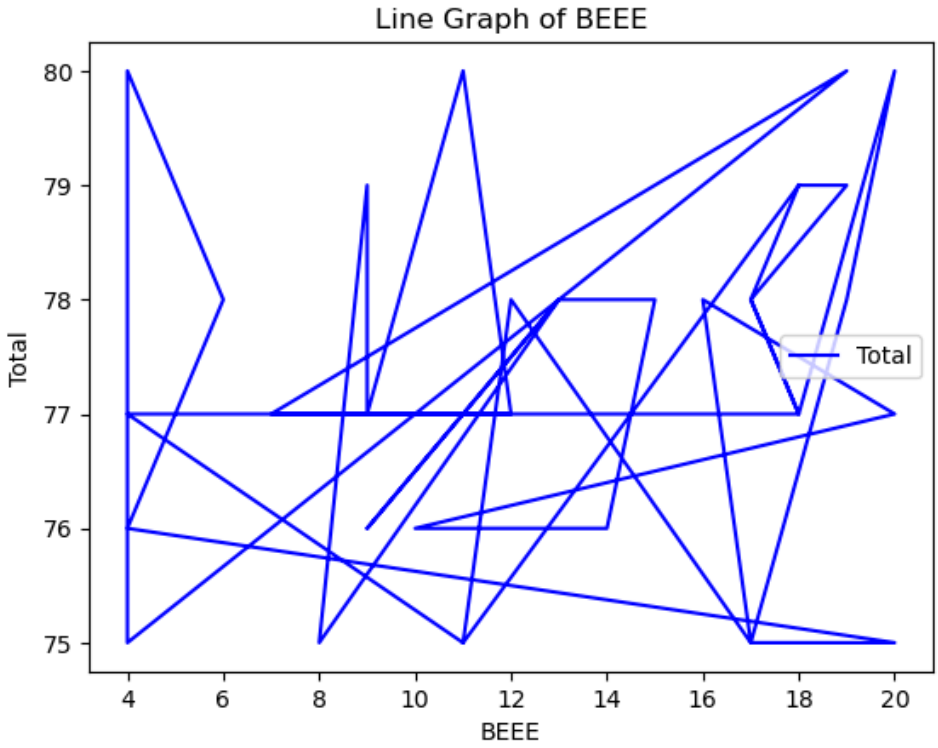

# Lineplot for total and M2

In [51]:
```
a.plot.line(x='PP',y='Total',color='blue')
plt.title("Line Graph of PP")
plt.ylabel("Total")
plt.show()
```




## Lineplot for total and M2

In [52]:
```
a.plot.line(x='BEEE',y='Total',color='blue')
plt.title("Line Graph of BEEE")
plt.ylabel("Total")
plt.show()
```




# Lineplot for total and BEEE

In [53]:
```
b=df.loc[(df['Total'] >= 115) & (df['Total'] <= 120)]
b=b.reset_index()
b
```

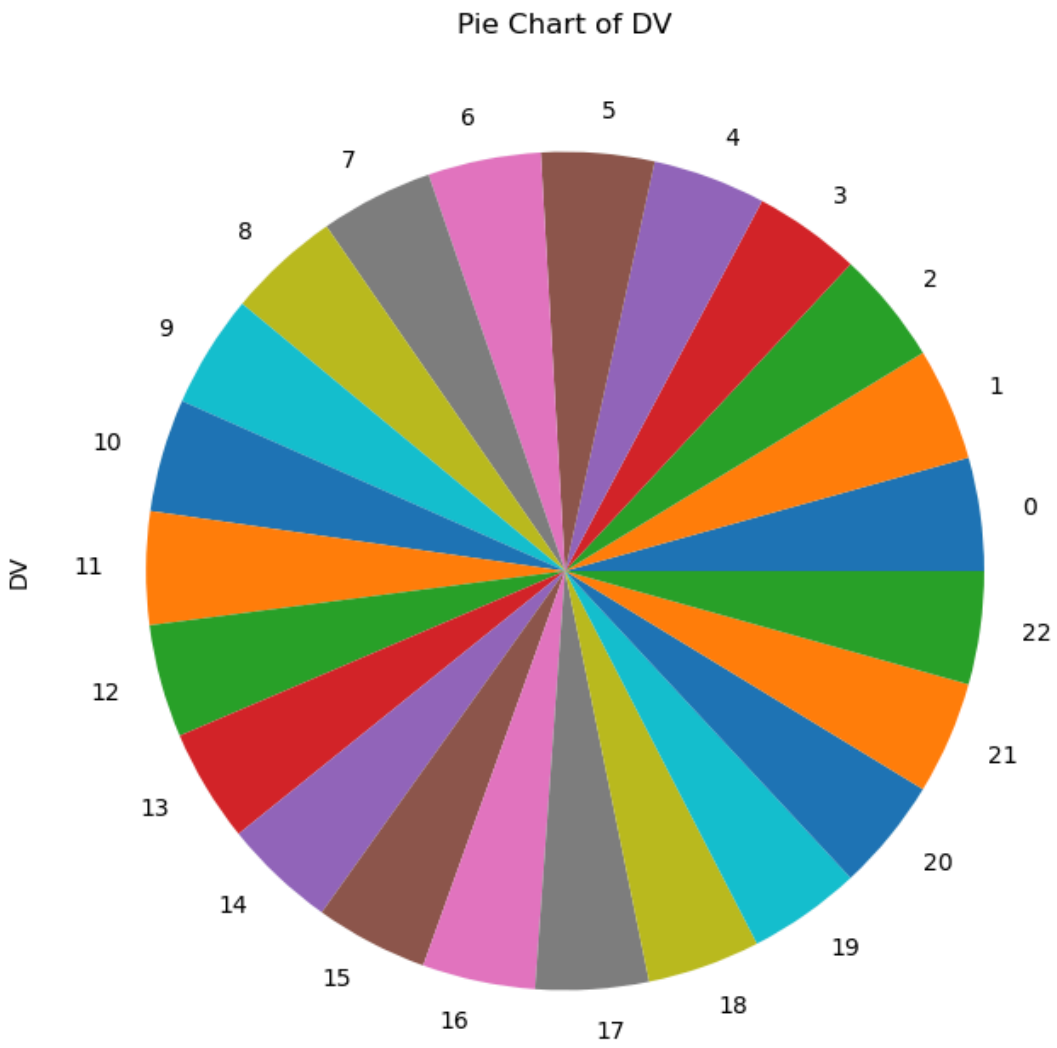
Out[53]:

| | index | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 11 | 12 | ALPHA | 20.0 | 20.0 | 20 | 20.0 | 19.0 | 16 | 115.0 | 96 | A |
| **1** | 23 | 24 | ALPHA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **2** | 69 | 70 | BETA | 20.0 | 20.0 | 20 | 19.0 | 20.0 | 18 | 117.0 | 98 | A |
| **3** | 79 | 80 | BETA | 19.0 | 20.0 | 20 | 19.0 | 20.0 | 17 | 115.0 | 96 | A |
| **4** | 115 | 116 | BETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 17 | 117.0 | 98 | A |
| **5** | 132 | 133 | DELTA | 20.0 | 18.0 | 20 | 20.0 | 20.0 | 18 | 116.0 | 97 | A |
| **6** | 137 | 138 | DELTA | 20.0 | 20.0 | 20 | 20.0 | 18.0 | 18 | 116.0 | 97 | A |
| **7** | 164 | 165 | DELTA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **8** | 217 | 218 | EPSILON | 20.0 | 20.0 | 20 | 19.0 | 20.0 | 20 | 119.0 | 99 | A |
| **9** | 222 | 223 | EPSILON | 20.0 | 20.0 | 20 | 17.0 | 20.0 | 20 | 117.0 | 98 | A |
| **10** | 397 | 398 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 20.0 | 18 | 117.0 | 98 | A |
| **11** | 398 | 399 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 20.0 | 18 | 117.0 | 98 | A |
| **12** | 406 | 407 | OMEGA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **13** | 410 | 411 | OMEGA | 20.0 | 20.0 | 20 | 20.0 | 18.0 | 18 | 116.0 | 97 | A |
| **14** | 412 | 413 | OMEGA | 20.0 | 20.0 | 17 | 20.0 | 20.0 | 18 | 115.0 | 96 | A |
| **15** | 419 | 420 | SIGMA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 19 | 119.0 | 99 | A |
| **16** | 428 | 429 | SIGMA | 20.0 | 17.0 | 20 | 20.0 | 20.0 | 19 | 116.0 | 97 | A |
| **17** | 440 | 441 | ZETA | 20.0 | 18.0 | 20 | 19.0 | 20.0 | 18 | 115.0 | 96 | A |
| **18** | 441 | 442 | ZETA | 20.0 | 19.0 | 20 | 19.0 | 20.0 | 19 | 117.0 | 98 | A |
| **19** | 443 | 444 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 16 | 116.0 | 97 | A |
| **20** | 471 | 472 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 20 | 120.0 | 100 | A |
| **21** | 472 | 473 | ZETA | 20.0 | 18.0 | 20 | 20.0 | 20.0 | 19 | 117.0 | 98 | A |
| **22** | 473 | 474 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 20 | 120.0 | 100 | A |

# students between 115 and 120

In [54]:
```
b['DV'].plot(kind='pie',subplots=True,figsize=(8,8))
plt.title("Pie Chart of DV")
```

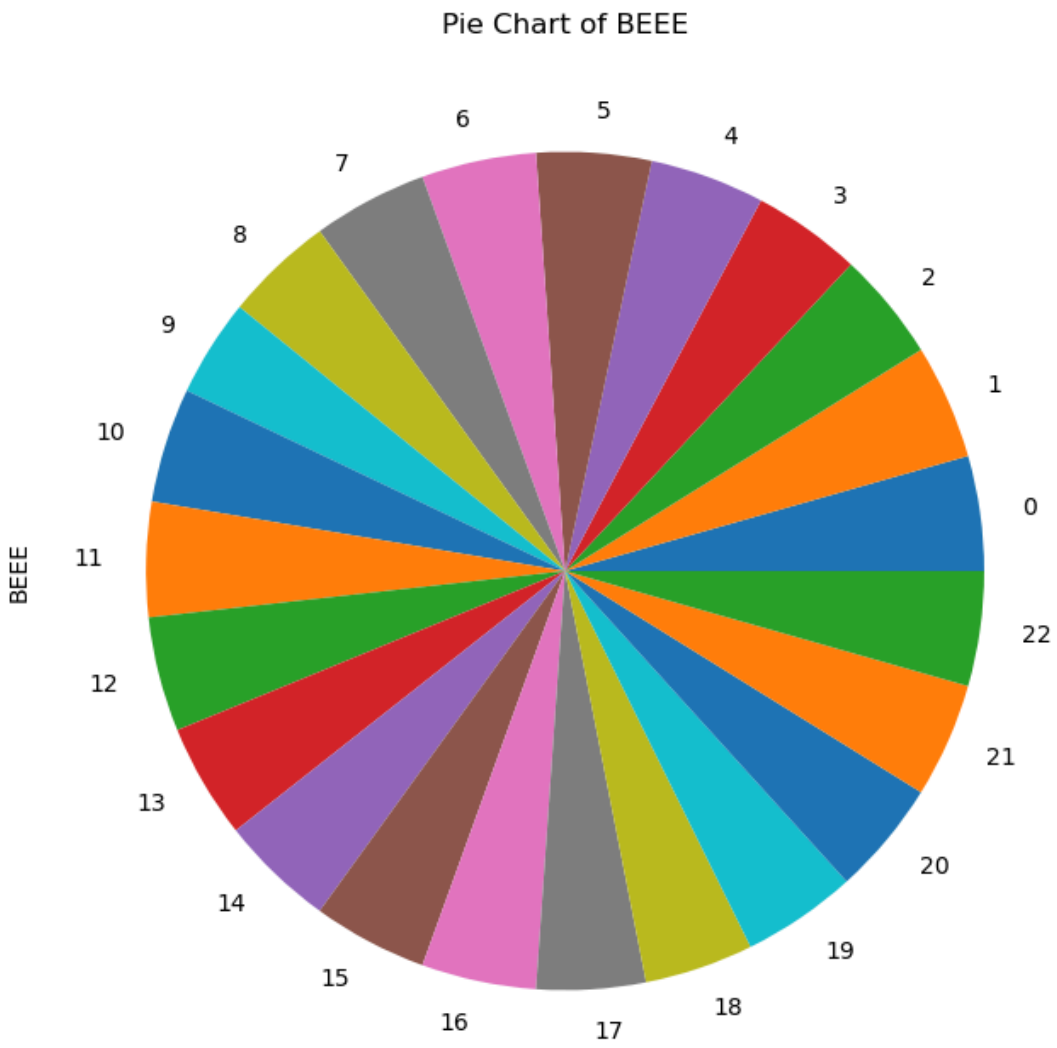
Out[54]:
```
Text(0.5, 1.0, 'Pie Chart of DV')
```




# PIE Chart of DV for 32 students

In [55]:
```
b['BEEE'].plot(kind='pie',subplots=True,figsize=(8,8))
plt.title("Pie Chart of BEEE")
```

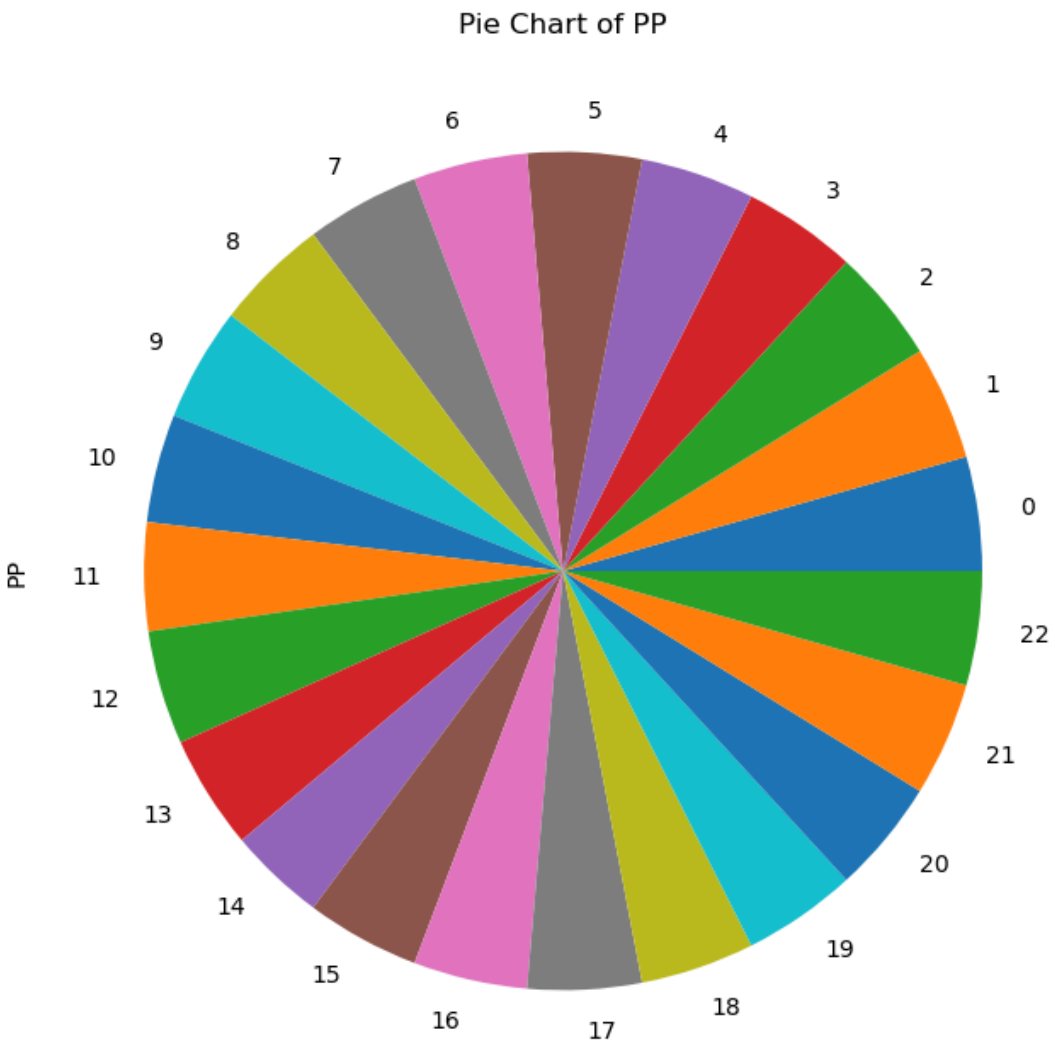
Out[55]:
```
Text(0.5, 1.0, 'Pie Chart of BEEE')
```




# PIE Chart of BEEE for 32 students

In [56]:
```
b['PP'].plot(kind='pie',subplots=True,figsize=(8,8))
plt.title("Pie Chart of PP")
```

Out[56]:
```
Text(0.5, 1.0, 'Pie Chart of PP')
```




# PIE Chart of PP for 32 students

In [57]:
```
df.sort_values('Total').tail(10)
```

Out[57]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **441** | 442 | ZETA | 20.0 | 19.0 | 20 | 19.0 | 20.0 | 19 | 117.0 | 98 | A |
| **397** | 398 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 20.0 | 18 | 117.0 | 98 | A |
| **472** | 473 | ZETA | 20.0 | 18.0 | 20 | 20.0 | 20.0 | 19 | 117.0 | 98 | A |
| **23** | 24 | ALPHA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **164** | 165 | DELTA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **406** | 407 | OMEGA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **419** | 420 | SIGMA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 19 | 119.0 | 99 | A |
| **217** | 218 | EPSILON | 20.0 | 20.0 | 20 | 19.0 | 20.0 | 20 | 119.0 | 99 | A |
| **473** | 474 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 20 | 120.0 | 100 | A |
| **471** | 472 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 20 | 120.0 | 100 | A |

In [58]:
```
df.sort_values('DV').tail(20)
```

Out[58]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **39** | 40 | ALPHA | 20.0 | 17.0 | 20 | 19.0 | 20.0 | 18 | 114.0 | 95 | A |
| **365** | 366 | ZETA | 20.0 | 18.0 | 0 | 19.0 | 18.0 | 17 | 92.0 | 77 | B |
| **367** | 368 | ZETA | 20.0 | 20.0 | 19 | 20.0 | 18.0 | 16 | 113.0 | 94 | A |
| **440** | 441 | ZETA | 20.0 | 18.0 | 20 | 19.0 | 20.0 | 18 | 115.0 | 96 | A |
| **434** | 435 | SIGMA | 20.0 | 1.0 | 17 | 17.0 | 12.0 | 17 | 84.0 | 70 | B |
| **431** | 432 | SIGMA | 20.0 | 19.0 | 20 | 20.0 | 16.0 | 17 | 112.0 | 93 | A |
| **428** | 429 | SIGMA | 20.0 | 17.0 | 20 | 20.0 | 20.0 | 19 | 116.0 | 97 | A |
| **427** | 428 | SIGMA | 20.0 | 16.0 | 20 | 20.0 | 19.0 | 19 | 114.0 | 95 | A |
| **11** | 12 | ALPHA | 20.0 | 20.0 | 20 | 20.0 | 19.0 | 16 | 115.0 | 96 | A |
| **419** | 420 | SIGMA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 19 | 119.0 | 99 | A |
| **412** | 413 | OMEGA | 20.0 | 20.0 | 17 | 20.0 | 20.0 | 18 | 115.0 | 96 | A |
| **410** | 411 | OMEGA | 20.0 | 20.0 | 20 | 20.0 | 18.0 | 18 | 116.0 | 97 | A |
| **406** | 407 | OMEGA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **399** | 400 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 18.0 | 15 | 112.0 | 93 | A |
| **398** | 399 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 20.0 | 18 | 117.0 | 98 | A |
| **397** | 398 | OMEGA | 20.0 | 20.0 | 19 | 20.0 | 20.0 | 18 | 117.0 | 98 | A |
| **23** | 24 | ALPHA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A |
| **370** | 371 | ZETA | 20.0 | 17.0 | 16 | 20.0 | 20.0 | 14 | 107.0 | 89 | B+ |
| **442** | 443 | ZETA | 20.0 | 11.0 | 18 | 14.0 | 20.0 | 15 | 98.0 | 82 | B+ |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A |

In [59]:
```
df.sort_values('DV').head(50)
```

Out[59]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **361** | 362 | ZETA | 0.0 | 0.0 | 6 | 7.0 | 13.0 | 0 | 26.0 | 22 | F |
| **173** | 174 | DELTA | 0.0 | 0.0 | 16 | 10.0 | 20.0 | 19 | 65.0 | 54 | C |
| **461** | 462 | ZETA | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F |
| **368** | 369 | ZETA | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F |
| **380** | 381 | OMEGA | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F |
| **302** | 303 | OMEGA | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F |
| **210** | 211 | EPSILON | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F |
| **469** | 470 | ZETA | 1.0 | 1.0 | 2 | 0.0 | 10.0 | 0 | 14.0 | 12 | F |
| **50** | 51 | ALPHA | 1.0 | 16.0 | 15 | 13.0 | 10.0 | 11 | 66.0 | 55 | C |
| **453** | 454 | ZETA | 1.0 | 5.0 | 0 | 0.0 | 0.0 | 0 | 6.0 | 5 | F |
| **57** | 58 | ALPHA | 2.0 | 2.0 | 4 | 10.0 | 10.0 | 3 | 31.0 | 26 | F |
| **82** | 83 | BETA | 2.0 | 0.0 | 2 | 0.0 | 0.0 | 0 | 4.0 | 3 | F |
| **88** | 89 | BETA | 2.0 | 17.0 | 0 | 3.0 | 15.0 | 2 | 39.0 | 32 | F |
| **393** | 394 | OMEGA | 2.0 | 5.0 | 1 | 2.0 | 10.0 | 6 | 26.0 | 22 | F |
| **85** | 86 | BETA | 3.0 | 4.0 | 14 | 13.0 | 18.0 | 13 | 65.0 | 54 | C |
| **189** | 190 | EPSILON | 4.0 | 15.0 | 4 | 5.0 | 10.0 | 14 | 52.0 | 43 | D |
| **70** | 71 | BETA | 4.0 | 2.0 | 16 | 10.0 | 15.0 | 9 | 56.0 | 47 | D |
| **20** | 21 | ALPHA | 4.0 | 2.0 | 5 | 3.0 | 16.0 | 9 | 39.0 | 32 | F |
| **75** | 76 | BETA | 5.0 | 8.0 | 7 | 15.0 | 10.0 | 2 | 47.0 | 39 | F |
| **326** | 327 | SIGMA | 5.0 | 3.0 | 9 | 10.0 | 10.0 | 7 | 44.0 | 37 | F |
| **27** | 28 | ALPHA | 5.0 | 4.0 | 3 | 12.0 | 13.0 | 5 | 42.0 | 35 | F |
| **139** | 140 | DELTA | 5.0 | 0.0 | 12 | 4.0 | 20.0 | 15 | 56.0 | 47 | D |
| **303** | 304 | OMEGA | 5.0 | 0.0 | 3 | 11.0 | 7.0 | 10 | 36.0 | 30 | F |
| **364** | 365 | ZETA | 5.0 | 3.0 | 3 | 2.0 | 10.0 | 9 | 32.0 | 27 | F |
| **125** | 126 | DELTA | 5.0 | 16.0 | 9 | 7.0 | 18.0 | 14 | 69.0 | 57 | C |
| **444** | 445 | ZETA | 5.0 | 2.0 | 11 | 0.0 | 10.0 | 0 | 28.0 | 23 | F |
| **430** | 431 | SIGMA | 6.0 | 1.0 | 9 | 11.0 | 8.0 | 10 | 45.0 | 38 | F |
| **311** | 312 | OMEGA | 6.0 | 0.0 | 1 | 11.0 | 9.0 | 4 | 31.0 | 26 | F |
| **25** | 26 | ALPHA | 6.0 | 10.0 | 10 | 11.0 | 13.0 | 10 | 60.0 | 50 | C |
| **206** | 207 | EPSILON | 6.0 | 6.0 | 2 | 3.0 | 10.0 | 11 | 38.0 | 32 | F |
| **424** | 425 | SIGMA | 6.0 | 1.0 | 0 | 0.0 | 0.0 | 0 | 7.0 | 6 | F |
| **324** | 325 | SIGMA | 6.0 | 0.0 | 3 | 3.0 | 10.0 | 4 | 26.0 | 22 | F |
| **450** | 451 | ZETA | 6.0 | 3.0 | 7 | 11.0 | 11.0 | 14 | 52.0 | 43 | D |
| **98** | 99 | BETA | 6.0 | 7.0 | 16 | 9.0 | 13.0 | 13 | 64.0 | 53 | C |
| **51** | 52 | ALPHA | 6.0 | 12.0 | 10 | 11.0 | 10.0 | 3 | 52.0 | 43 | D |
| **72** | 73 | BETA | 7.0 | 0.0 | 15 | 10.0 | 18.0 | 11 | 61.0 | 51 | C |
| **188** | 189 | EPSILON | 7.0 | 10.0 | 7 | 2.0 | 10.0 | 15 | 51.0 | 42 | D |
| **340** | 341 | SIGMA | 7.0 | 0.0 | 3 | 0.0 | 13.0 | 8 | 31.0 | 26 | F |
| **127** | 128 | DELTA | 7.0 | 4.0 | 12 | 4.0 | 13.0 | 11 | 51.0 | 42 | D |
| **160** | 161 | DELTA | 7.0 | 0.0 | 14 | 5.0 | 10.0 | 5 | 41.0 | 34 | F |
| **372** | 373 | ZETA | 7.0 | 2.0 | 2 | 6.0 | 10.0 | 7 | 34.0 | 28 | F |
| **378** | 379 | ZETA | 8.0 | 0.0 | 2 | 6.0 | 15.0 | 8 | 39.0 | 32 | F |

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **121** | 122 | DELTA | 8.0 | 11.0 | 14 | 6.0 | 15.0 | 9 | 63.0 | 52 | C |
| **29** | 30 | ALPHA | 8.0 | 2.0 | 11 | 10.0 | 13.0 | 12 | 56.0 | 47 | D |
| **53** | 54 | ALPHA | 8.0 | 13.0 | 9 | 11.0 | 10.0 | 10 | 61.0 | 51 | C |
| **226** | 227 | EPSILON | 8.0 | 0.0 | 3 | 0.0 | 10.0 | 14 | 35.0 | 29 | F |
| **61** | 62 | BETA | 8.0 | 8.0 | 15 | 9.0 | 10.0 | 9 | 59.0 | 49 | D |
| **110** | 111 | BETA | 8.0 | 11.0 | 14 | 3.0 | 18.0 | 10 | 64.0 | 53 | C |
| **97** | 98 | BETA | 8.0 | 16.0 | 14 | 17.0 | 13.0 | 13 | 81.0 | 68 | C+ |
| **96** | 97 | BETA | 8.0 | 17.0 | 3 | 12.0 | 18.0 | 9 | 67.0 | 56 | C |

In [60]:
```
h = df[
    (df['DV'] < 10.0) |
    (df['PP'] < 10.0) |
    (df['M2'] < 10.0) |
    (df['BEEE'] < 10.0) |
    (df['FL'] < 10.0) |
    (df['FIMS'] < 10.0)
]
h['SECTION'].value_counts()
```

Out[60]:
```
SIGMA      44
GAMMA      42
ZETA       40
OMEGA      40
EPSILON    38
DELTA      35
BETA       32
ALPHA      26
Name: SECTION, dtype: int64
```

In [61]:
```
df['backlogs'] = (df[['DV', 'M2', 'PP', 'BEEE', 'FL', 'FIMS']] < 10).sum(axis=1)
df
```

Out[61]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 |

In [62]:
```
j=df.sort_values('backlogs')
j
```

Out[62]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 |
| **164** | 165 | DELTA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 18 | 118.0 | 98 | A | 0 |
| **165** | 166 | DELTA | 16.0 | 14.0 | 18 | 18.0 | 15.0 | 19 | 100.0 | 83 | B+ | 0 |
| **167** | 168 | DELTA | 19.0 | 18.0 | 20 | 16.0 | 19.0 | 19 | 111.0 | 92 | A | 0 |
| **168** | 169 | DELTA | 18.0 | 17.0 | 18 | 11.0 | 20.0 | 20 | 104.0 | 87 | B+ | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **82** | 83 | BETA | 2.0 | 0.0 | 2 | 0.0 | 0.0 | 0 | 4.0 | 3 | F | 6 |
| **416** | 417 | OMEGA | 9.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 9.0 | 8 | F | 6 |
| **453** | 454 | ZETA | 1.0 | 5.0 | 0 | 0.0 | 0.0 | 0 | 6.0 | 5 | F | 6 |
| **210** | 211 | EPSILON | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F | 6 |
| **302** | 303 | OMEGA | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | F | 6 |

474 rows × 12 columns

In [63]:
```
j.value_counts('backlogs')
```

Out[63]:
```
backlogs
0    177
1    122
2     77
3     46
4     31
5     12
6      9
dtype: int64
```

In [64]:
```
df["BC"]=None
```

In [65]:
```
df
```

Out[65]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | None |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | None |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | None |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | None |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | None |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | None |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | None |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | None |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | None |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | None |

474 rows × 13 columns

In [66]:
```
j.value_counts('backlogs')
```

Out[66]:
```
backlogs
0    177
1    122
2     77
3     46
4     31
5     12
6      9
dtype: int64
```

# Backlogs couunt

In [67]:
```
a = df[df['BC']==6]
a.value_counts('SECTION')
```

Out[67]:
```
Series([], dtype: int64)
```

# Students belongs to section who got 6 backlogs

# backlogs count for each subject in each section

In [68]:
```
a = df[df['DV']<10]
a.value_counts('SECTION').sum()
a = df[df['DV']<10]
a.value_counts('SECTION')
```

Out[68]:
```
SECTION
BETA       15
DELTA      11
ZETA       11
ALPHA       9
EPSILON     6
OMEGA       6
SIGMA       6
dtype: int64
```

In [69]:
```
a = df[df['M2']<10]
a.value_counts('SECTION').sum()
a = df[df['M2']<10]
a.value_counts('SECTION')
```

Out[69]:
```
SECTION
GAMMA      39
SIGMA      38
ZETA       37
OMEGA      35
EPSILON    29
DELTA      21
BETA       13
ALPHA      10
dtype: int64
```

In [70]:
```
a = df[df['PP']<10]
a.value_counts('SECTION').sum()
a = df[df['PP']<10]
a.value_counts('SECTION')
```

Out[70]:
```
SECTION
GAMMA      28
OMEGA      27
SIGMA      22
ZETA       18
EPSILON    14
DELTA      10
BETA        8
ALPHA       7
dtype: int64
```

In [71]:
```
a = df[df['BEEE']<10]
a.value_counts('SECTION').sum()
a = df[df['BEEE']<10]
a.value_counts('SECTION')
```

Out[71]:
```
SECTION
EPSILON    28
DELTA      25
BETA       18
ZETA       17
OMEGA      11
SIGMA      11
GAMMA      10
ALPHA       4
dtype: int64
```

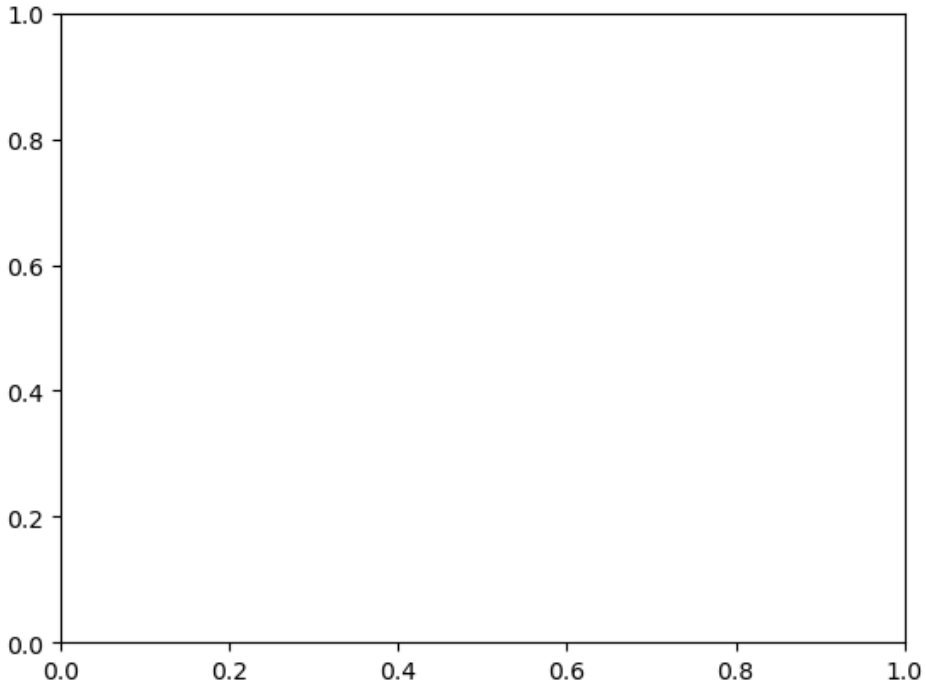
In [72]:
```
a = df[df['FL']<10]
a.value_counts('SECTION').sum()
a = df[df['FL']<10]
a.value_counts('SECTION')
```

Out[72]:
```
SECTION
ZETA       7
OMEGA      6
GAMMA      4
SIGMA      3
BETA       2
EPSILON    1
dtype: int64
```

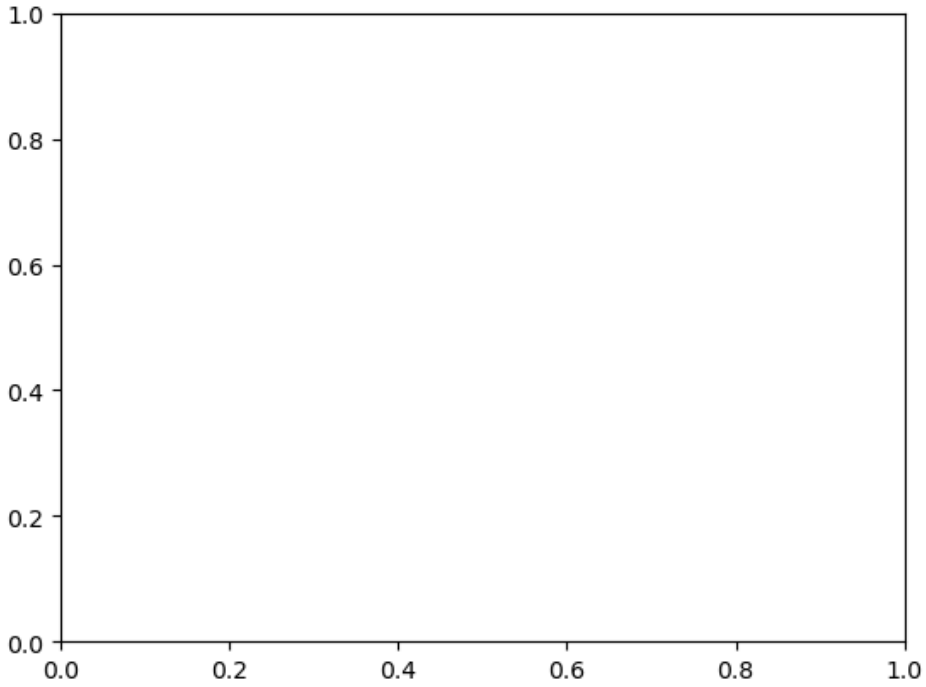
In [73]:
```
a = df[df['FIMS']<10]
a.value_counts('SECTION').sum()
a = df[df['FIMS']<10]
a.value_counts('SECTION')
```

Out[73]:
```
SECTION
OMEGA      17
ALPHA      13
BETA       13
SIGMA      12
GAMMA      11
ZETA        9
DELTA       6
EPSILON     4
dtype: int64
```

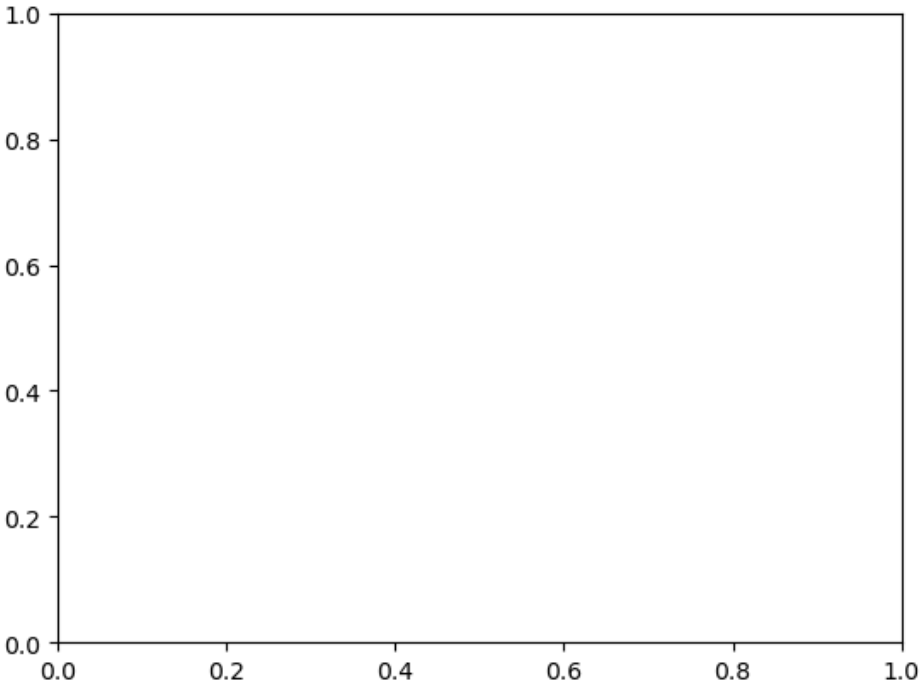
In [74]:
```
sns.scatterplot(x='BC', y='DV', data=df,color = 'red')
plt.show()
```



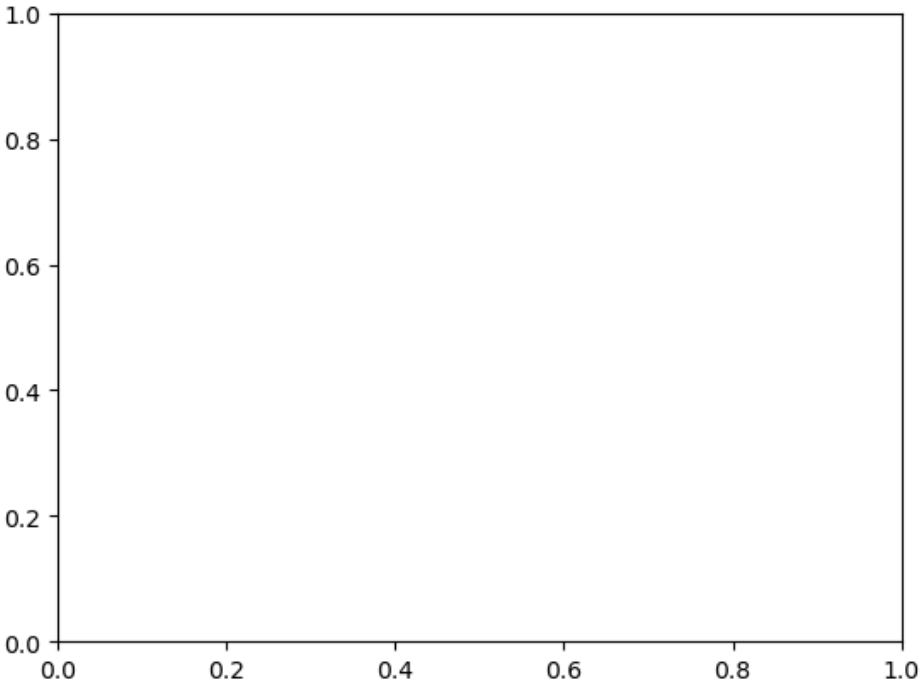

In [75]:
```
sns.scatterplot(x='BC', y='PP', data=df , color = 'green')
plt.show()
```



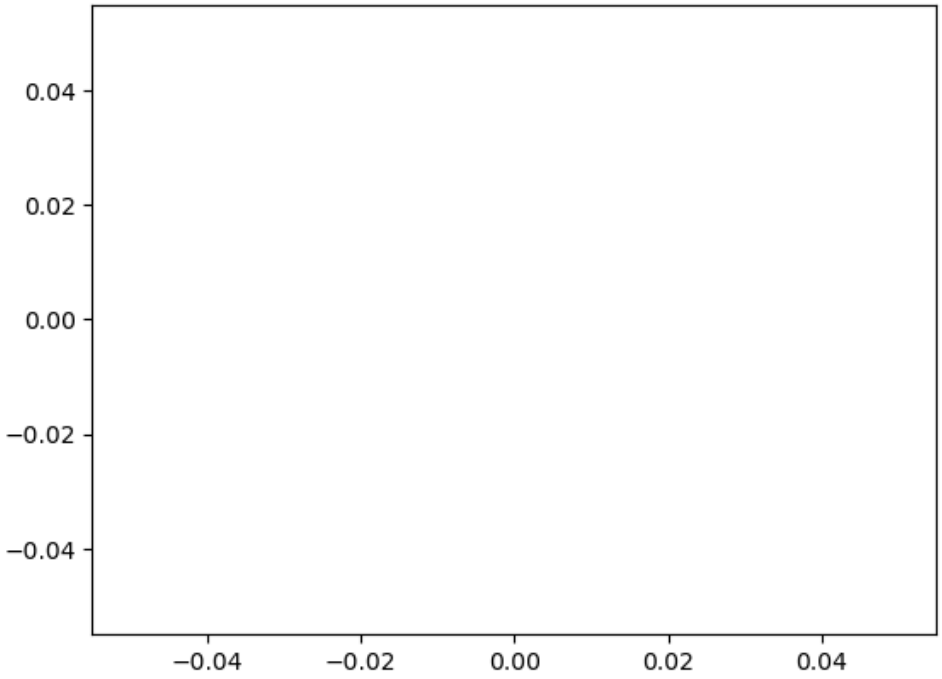
In [76]:
```
sns.scatterplot(x='BC', y='BEEE', data=df, color = 'yellow')
plt.show()
```



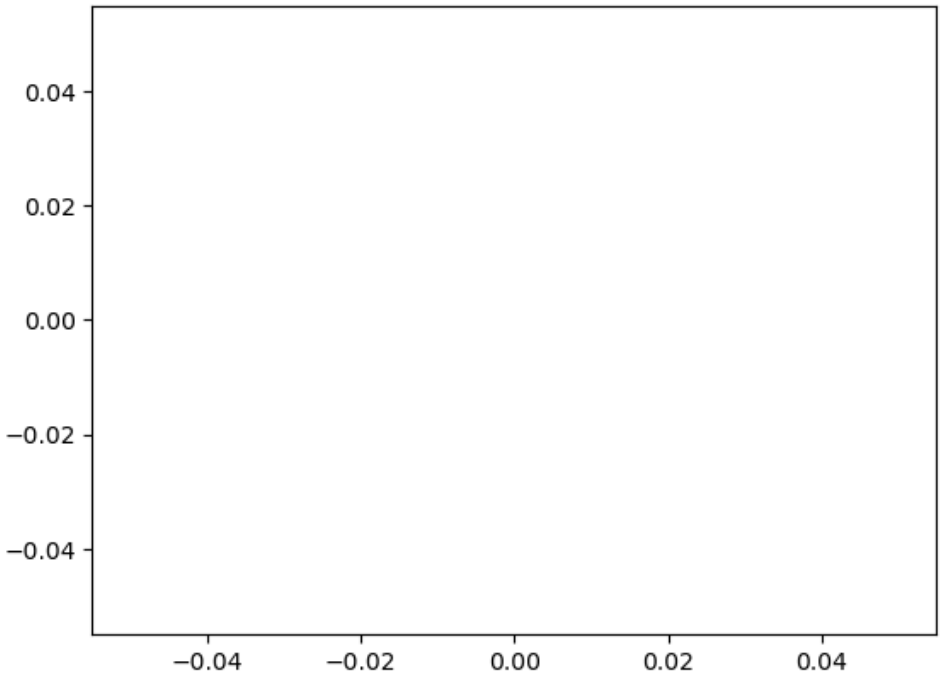

In [77]:
```
sns.scatterplot(x='BC', y='M2', data=df,color = 'blue')
plt.show()
```



In [78]:
```
sns.scatterplot(x='BC', y='FL', data=df)
plt.show()
```



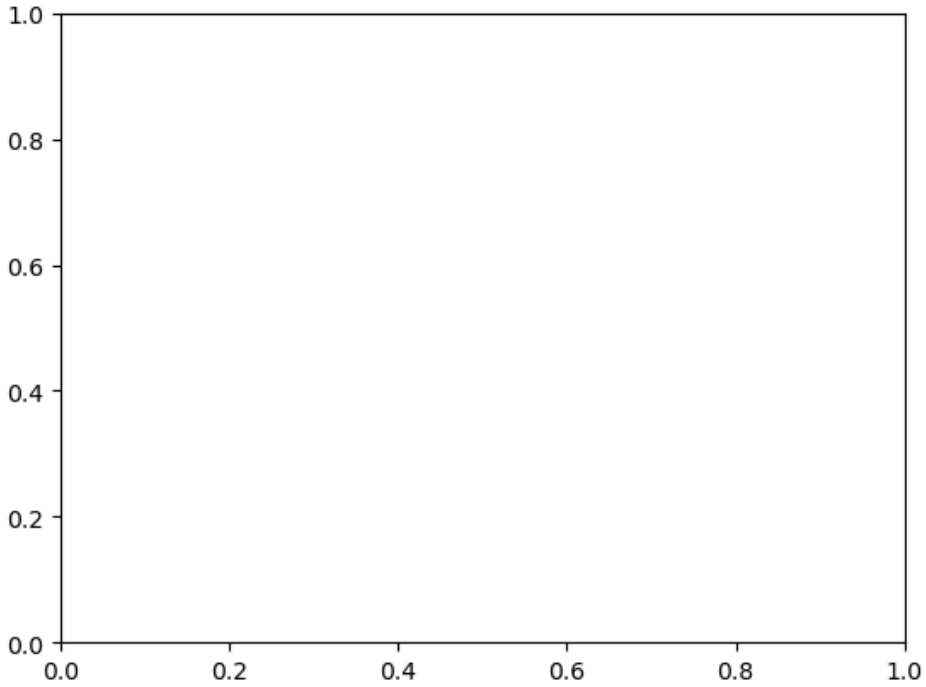

In [79]:
```
sns.scatterplot(x='BC', y='FIMS', data=df)
plt.show()
```



In [80]:
```
sns.lineplot(x='BC', y='DV', data=df, color = 'green')
plt.show()
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3802, in Index.get_loc(self, ke
y, method, tolerance)
   3801 try:
-> 3802     return self._engine.get_loc(casted_key)
   3803 except KeyError as err:

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:138, in pandas._libs.index.IndexEngi
ne.get_loc()

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:165, in pandas._libs.index.IndexEngi
ne.get_loc()

File pandas\_libs\hashtable_class_helper.pxi:5745, in pandas._libs.hashtable.PyObjectHashTabl
e.get_item()

File pandas\_libs\hashtable_class_helper.pxi:5753, in pandas._libs.hashtable.PyObjectHashTabl
e.get_item()

KeyError: 'x'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
Cell In[80], line 1
----> 1 sns.lineplot(x='BC', y='DV', data=df, color = 'green')
      2 plt.show()

File ~\anaconda3\lib\site-packages\seaborn\relational.py:645, in lineplot(data, x, y, hue, siz
e, style, units, palette, hue_order, hue_norm, sizes, size_order, size_norm, dashes, markers,
style_order, estimator, errorbar, n_boot, seed, orient, sort, err_style, err_kws, legend, ci,
ax, **kwargs)
    642 color = kwargs.pop("color", kwargs.pop("c", None))
    643 kwargs["color"] = _default_color(ax.plot, hue, color, kwargs)
--> 645 p.plot(ax, kwargs)
    646 return ax

File ~\anaconda3\lib\site-packages\seaborn\relational.py:432, in _LinePlotter.plot(self, ax, k
ws)
    427     sort_cols = [var for var in sort_vars if var in self.variables]
    428     sub_data = sub_data.sort_values(sort_cols)
    430 if (
    431     self.estimator is not None
--> 432     and sub_data[orient].value_counts().max() > 1
    433 ):
    434     if "units" in self.variables:
    435         # TODO eventually relax this constraint
    436         err = "estimator must be None when specifying units"

File ~\anaconda3\lib\site-packages\pandas\core\frame.py:3807, in DataFrame.__getitem__(self, k
ey)
   3805 if self.columns.nlevels > 1:
   3806     return self._getitem_multilevel(key)
-> 3807 indexer = self.columns.get_loc(key)
   3808 if is_integer(indexer):
   3809     indexer = [indexer]

File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3804, in Index.get_loc(self, ke
y, method, tolerance)
   3802     return self._engine.get_loc(casted_key)
   3803 except KeyError as err:
-> 3804     raise KeyError(key) from err
   3805 except TypeError:
   3806     # If we have a listlike key, _check_indexing_error will raise
   3807     #  InvalidIndexError. Otherwise we fall through and re-raise
   3808     #  the TypeError.
```

```
   3809     self._check_indexing_error(key)

KeyError: 'x'
```



In [81]:
```
sns.lineplot(x='BC', y='PP', data=df, color = 'red')
plt.show()
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3802, in Index.get_loc(self, ke
y, method, tolerance)
   3801 try:
-> 3802     return self._engine.get_loc(casted_key)
   3803 except KeyError as err:

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:138, in pandas._libs.index.IndexEngi
ne.get_loc()

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:165, in pandas._libs.index.IndexEngi
ne.get_loc()

File pandas\_libs\hashtable_class_helper.pxi:5745, in pandas._libs.hashtable.PyObjectHashTabl
e.get_item()

File pandas\_libs\hashtable_class_helper.pxi:5753, in pandas._libs.hashtable.PyObjectHashTabl
e.get_item()

KeyError: 'x'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
Cell In[81], line 1
----> 1 sns.lineplot(x='BC', y='PP', data=df, color = 'red')
      2 plt.show()

File ~\anaconda3\lib\site-packages\seaborn\relational.py:645, in lineplot(data, x, y, hue, siz
e, style, units, palette, hue_order, hue_norm, sizes, size_order, size_norm, dashes, markers,
style_order, estimator, errorbar, n_boot, seed, orient, sort, err_style, err_kws, legend, ci,
ax, **kwargs)
    642 color = kwargs.pop("color", kwargs.pop("c", None))
    643 kwargs["color"] = _default_color(ax.plot, hue, color, kwargs)
--> 645 p.plot(ax, kwargs)
    646 return ax

File ~\anaconda3\lib\site-packages\seaborn\relational.py:432, in _LinePlotter.plot(self, ax, k
ws)
    427     sort_cols = [var for var in sort_vars if var in self.variables]
    428     sub_data = sub_data.sort_values(sort_cols)
    430 if (
    431     self.estimator is not None
--> 432     and sub_data[orient].value_counts().max() > 1
    433 ):
    434     if "units" in self.variables:
    435         # TODO eventually relax this constraint
    436         err = "estimator must be None when specifying units"

File ~\anaconda3\lib\site-packages\pandas\core\frame.py:3807, in DataFrame.__getitem__(self, k
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   3805 if self.columns.nlevels > 1:
   3806     return self._getitem_multilevel(key)
-> 3807 indexer = self.columns.get_loc(key)
   3808 if is_integer(indexer):
   3809     indexer = [indexer]

File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3804, in Index.get_loc(self, ke
y, method, tolerance)
   3802     return self._engine.get_loc(casted_key)
   3803 except KeyError as err:
-> 3804     raise KeyError(key) from err
   3805 except TypeError:
   3806     # If we have a listlike key, _check_indexing_error will raise
   3807     #  InvalidIndexError. Otherwise we fall through and re-raise
   3808     #  the TypeError.
```
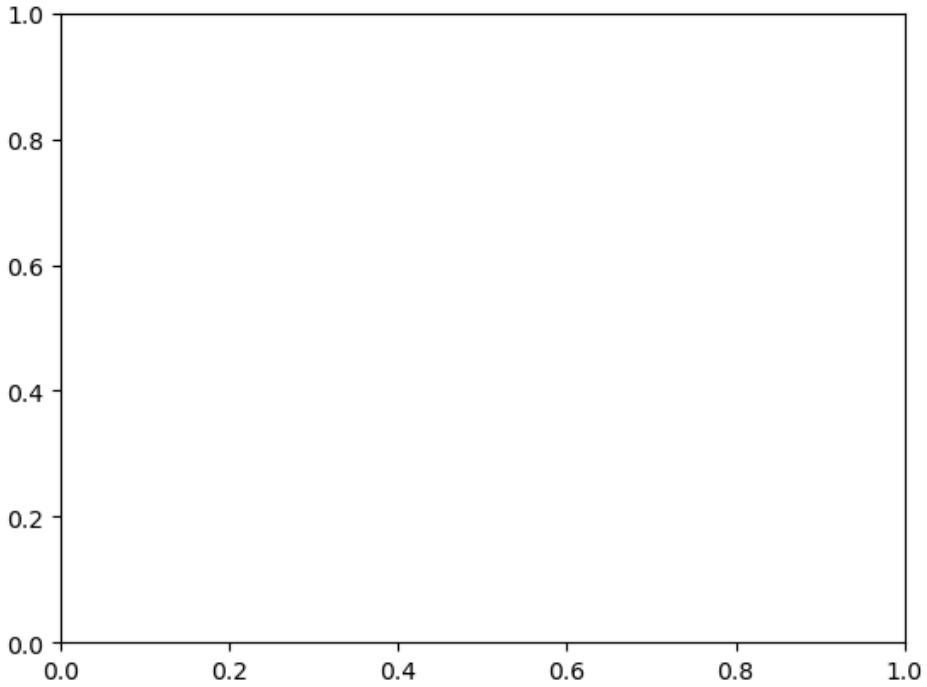

```
    3809     self._check_indexing_error(key)

KeyError: 'x'
```




In [ ]:
```
sns.lineplot(x='BC', y='BEEE', data=df, color = 'orange')
plt.show()
```

In [ ]:
```
sns.lineplot(x='BC', y='M2', data=df, color = 'violet')
plt.show()
```

In [ ]:
```
sns.lineplot(x='BC', y='FL', data=df, color = 'purple')
plt.show()
```

In [ ]:
```
sns.lineplot(x='BC', y='FIMS', data=df)
plt.show()
```

In [ ]:
```
sns.barplot(x='BC', y='DV', data=df)
plt.show()
```

In [ ]:
```
sns.barplot(x='BC', y='BEEE', data=df, color = 'red')
plt.show()
```

In [ ]:
```
sns.barplot(x='BC', y='PP', data=df, color = 'green')
plt.show()
```

In [ ]:
```
sns.barplot(x='BC', y='M2', data=df, color = 'yellow')
plt.show()
```

In [ ]:
```
sns.histplot(data=df['BC'], bins=30,color = 'red')
plt.show()
```

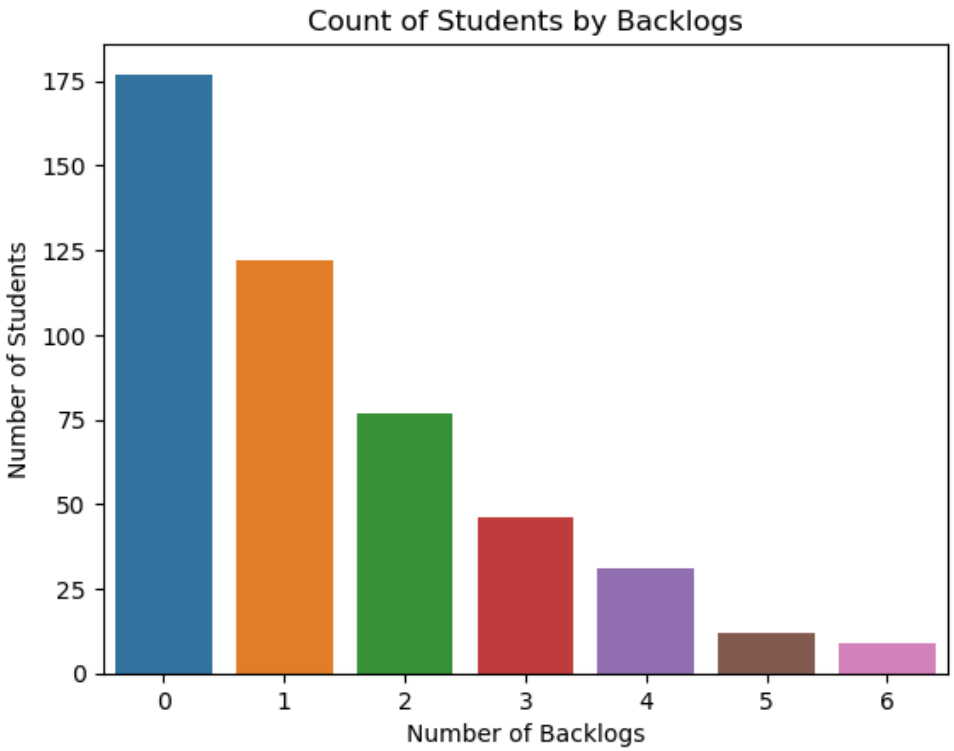
In [ ]:
```
sns.histplot(data=df['DV'], bins=30, color = 'green')
plt.show()
```

In [ ]:
```
sns.histplot(data=df['BEEE'], bins=30, color = 'blue')
plt.show()
```

In [ ]:
```
sns.histplot(data=df['FL'], bins=30, color = 'yellow')
plt.show()
```

In [ ]:
```

```

In [82]:
```
sns.countplot(x='backlogs', data=df)
plt.title('Count of Students by Backlogs')
plt.xlabel('Number of Backlogs')
plt.ylabel('Number of Students')
plt.show()
```




# Bar chart for backlogs and students and some of the students has 6 backlogs also

In [83]:
```
h = df[
    (df['DV'] == 20.0) |
    (df['PP'] == 20.0) |
    (df['M2'] == 20.0) |
    (df['BEEE'] == 20.0) |
    (df['FL'] == 20.0) |
    (df['FIMS'] == 20.0)
]
h
```

Out[83]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | None |
| **6** | 7 | ALPHA | 15.0 | 10.0 | 20 | 20.0 | 15.0 | 14 | 94.0 | 78 | B | 0 | None |
| **7** | 8 | ALPHA | 17.0 | 17.0 | 19 | 20.0 | 19.0 | 13 | 105.0 | 88 | B+ | 0 | None |
| **8** | 9 | ALPHA | 10.0 | 18.0 | 0 | 20.0 | 19.0 | 15 | 82.0 | 68 | C+ | 1 | None |
| **9** | 10 | ALPHA | 18.0 | 19.0 | 20 | 20.0 | 20.0 | 15 | 112.0 | 93 | A | 0 | None |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **472** | 473 | ZETA | 20.0 | 18.0 | 20 | 20.0 | 20.0 | 19 | 117.0 | 98 | A | 0 | None |
| **473** | 474 | ZETA | 20.0 | 20.0 | 20 | 20.0 | 20.0 | 20 | 120.0 | 100 | A | 0 | None |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | None |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | None |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | None |

182 rows × 13 columns

In [84]:
```
h.value_counts("BC")
```

Out[84]:
```
Series([], dtype: int64)
```

In [85]:
```
h[h["BC"] == 4]
```

Out[85]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

In [86]:
```
h[h["BC"] == 3]
```

Out[86]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

In [87]:
```
h.value_counts("DV")
```

Out[87]:
```
DV
20.0    51
18.0    28
17.0    25
19.0    24
16.0    19
12.0     7
15.0     7
13.0     6
14.0     6
11.0     4
10.0     3
0.0      1
5.0      1
dtype: int64
```

In [88]:
```
h.value_counts("M2")
```

Out[88]:
```
M2
20.0    44
17.0    19
18.0    15
15.0    15
19.0    10
11.0    10
8.0      8
12.0     7
9.0      6
10.0     6
6.0      5
14.0     5
5.0      5
16.0     5
4.0      5
3.0      4
1.0      3
7.0      3
13.0     3
0.0      3
2.0      1
dtype: int64
```

In [89]:
```
h.value_counts("BEEE")
```

Out[89]:
```
BEEE
20.0    76
19.0    24
17.0    17
18.0    14
16.0    10
14.0    10
15.0     5
13.0     4
12.0     4
10.0     4
11.0     3
9.0      3
4.0      2
0.0      2
8.0      1
7.0      1
6.0      1
5.0      1
dtype: int64
```

In [90]:
```
h.value_counts("FIMS")
```

Out[90]:
```
FIMS
18    45
16    26
19    21
17    20
15    17
14    16
20    12
13    11
9      5
11     3
0      2
12     2
8      1
10     1
dtype: int64
```

In [91]:
```
h.value_counts("PP")
```

Out[91]:
```
PP
20    69
19    20
18    15
16    13
14    11
17     8
15     7
12     7
11     6
13     6
10     4
9      4
0      4
8      2
7      2
5      2
1      1
6      1
dtype: int64
```

In [92]:
```
h.value_counts("FL")
```

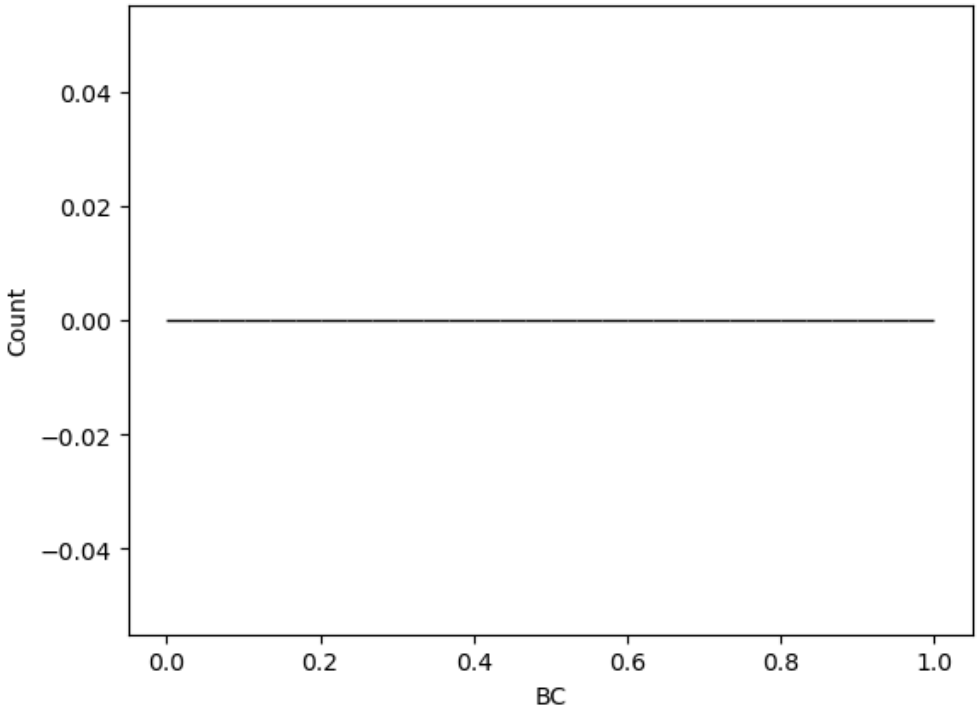
Out[92]:
```
FL
20.0    118
18.0     17
15.0     14
19.0     13
13.0      8
10.0      5
17.0      3
16.0      2
12.0      1
14.0      1
dtype: int64
```

In [93]:
```
h.describe()
```

Out[93]:

| | S.NO | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage |
|---|---|---|---|---|---|---|---|---|---|
| **count** | 182.000000 | 182.000000 | 182.000000 | 182.000000 | 182.000000 | 182.000000 | 182.000000 | 182.000000 | 182.000000 |
| **mean** | 233.824176 | 17.247253 | 14.076923 | 16.395604 | 17.175824 | 18.604396 | 16.192308 | 99.692308 | 83.082418 |
| **std** | 147.962000 | 3.035584 | 5.771392 | 4.648719 | 4.023669 | 2.495871 | 3.081104 | 14.027355 | 11.690239 |
| **min** | 5.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 10.000000 | 0.000000 | 48.000000 | 40.000000 |
| **25%** | 97.250000 | 16.000000 | 10.000000 | 14.000000 | 16.000000 | 18.000000 | 15.000000 | 91.250000 | 76.250000 |
| **50%** | 221.500000 | 18.000000 | 16.000000 | 18.000000 | 19.000000 | 20.000000 | 17.000000 | 103.000000 | 86.000000 |
| **75%** | 367.500000 | 20.000000 | 19.000000 | 20.000000 | 20.000000 | 20.000000 | 18.000000 | 111.000000 | 92.000000 |
| **max** | 480.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 120.000000 | 100.000000 |

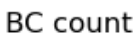
In [94]:
```
sns.histplot(data=df['BC'], bins=30, color = 'red')
plt.show()
```




In [95]:
```
z=df.loc[(df['BC'] >= 3) & (df['BC'] <= 6)]
z=z.reset_index()
y = z.value_counts('BC')
y
```

Out[95]:
```
Series([], dtype: int64)
```

In [96]:
```
def number_format(pct, all_values):
    absolute = int(round(pct / 100. * sum(all_values)))
    return f"{absolute}"

plt.figure(figsize=(8, 8))
y.plot.pie(
    autopct=lambda pct: number_format(pct, y),
    startangle=90,
    cmap="viridis"
)
plt.title("BC count")
plt.ylabel("")
plt.show()
```



In [97]:
```
df[df["SECTION"] == "ALPHA"].count()
```

Out[97]:
```
S.NO          60
SECTION       60
DV            60
M2            60
PP            60
BEEE          60
FL            60
FIMS          60
Total         60
Percentage    60
Grade         60
backlogs      60
BC             0
dtype: int64
```

In [98]:
```
df['DV'] = pd.to_numeric(df['DV'], errors='coerce')
df['M2'] = pd.to_numeric(df['M2'], errors='coerce')
df['PP'] = pd.to_numeric(df['PP'], errors='coerce')
df['BEEE'] = pd.to_numeric(df['BEEE'], errors='coerce')
df['FL'] = pd.to_numeric(df['FL'], errors='coerce')
df['FIMS'] = pd.to_numeric(df['FIMS'], errors='coerce')
df.fillna(0, inplace=True)
```

In [99]:
```
df.isnull().sum()
```

Out[99]:
```
S.NO          0
SECTION       0
DV            0
M2            0
PP            0
BEEE          0
FL            0
FIMS          0
Total         0
Percentage    0
Grade         0
backlogs      0
BC            0
dtype: int64
```

In [100]:
```
df
```

Out[100]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | 0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | 0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | 0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | 0 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | 0 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | 0 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | 0 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | 0 |

474 rows × 13 columns

In [101]:
```
df['SECTION'] = df['SECTION'].fillna('SIGMA')
df['SECTION'] = df['SECTION'].replace('', 'SIGMA')
df
```

Out[101]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | 0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | 0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | 0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 475 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | 0 |
| **475** | 476 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | 0 |
| **476** | 477 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | 0 |
| **478** | 479 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | 0 |
| **479** | 480 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | 0 |

474 rows × 13 columns

In [102]:
```
df['S.NO'] = range(1, len(df) + 1)
df
```

Out[102]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | 0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | 0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | 0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 470 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | 0 |
| **475** | 471 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | 0 |
| **476** | 472 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | 0 |
| **478** | 473 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | 0 |
| **479** | 474 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | 0 |

474 rows × 13 columns

In [103]:
```
df['FL'] = df['FL'].fillna(0)
df=df.dropna()
df
```

Out[103]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | 0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | 0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | 0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 470 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | 0 |
| **475** | 471 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | 0 |
| **476** | 472 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | 0 |
| **478** | 473 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | 0 |
| **479** | 474 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | 0 |

474 rows × 13 columns

In [104]:
```
df.shape
```

Out[104]: (474, 13)

In [105]:
```
df['S.NO'] = range(1, len(df) + 1)
df
```

Out[105]:

| | S.NO | SECTION | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage | Grade | backlogs | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | ALPHA | 12.0 | 0.0 | 17 | 9.0 | 19.0 | 15 | 72.0 | 60 | C+ | 2 | 0 |
| **1** | 2 | ALPHA | 19.0 | 12.0 | 16 | 16.0 | 18.0 | 3 | 84.0 | 70 | B | 1 | 0 |
| **2** | 3 | ALPHA | 18.0 | 14.0 | 18 | 18.0 | 18.0 | 16 | 102.0 | 85 | B+ | 0 | 0 |
| **3** | 4 | ALPHA | 15.0 | 9.0 | 19 | 17.0 | 19.0 | 15 | 94.0 | 78 | B | 1 | 0 |
| **4** | 5 | ALPHA | 18.0 | 17.0 | 19 | 19.0 | 20.0 | 18 | 111.0 | 92 | A | 0 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **474** | 470 | ZETA | 11.0 | 4.0 | 2 | 2.0 | 8.0 | 10 | 37.0 | 31 | F | 4 | 0 |
| **475** | 471 | ZETA | 18.0 | 2.0 | 12 | 3.0 | 17.0 | 15 | 67.0 | 56 | C | 2 | 0 |
| **476** | 472 | ZETA | 20.0 | 6.0 | 16 | 11.0 | 20.0 | 14 | 87.0 | 72 | B | 1 | 0 |
| **478** | 473 | ZETA | 20.0 | 20.0 | 5 | 19.0 | 18.0 | 14 | 96.0 | 80 | B+ | 1 | 0 |
| **479** | 474 | ZETA | 20.0 | 16.0 | 18 | 19.0 | 20.0 | 19 | 112.0 | 93 | A | 0 | 0 |

474 rows × 13 columns

In [106]:
```
df.shape
```

Out[106]:
```
(474, 13)
```

In [107]:
```
df.isnull().sum()
```

Out[107]:
```
S.NO          0
SECTION       0
DV            0
M2            0
PP            0
BEEE          0
FL            0
FIMS          0
Total         0
Percentage    0
Grade         0
backlogs      0
BC            0
dtype: int64
```

In [108]:
```
df.info
```

Out[108]:
```
<bound method DataFrame.info of      S.NO SECTION    DV    M2  PP  BEEE    FL  FIMS  Total  Pe
rcentage Grade  \
0       1   ALPHA  12.0   0.0  17   9.0  19.0    15   72.0          60     C+
1       2   ALPHA  19.0  12.0  16  16.0  18.0     3   84.0          70      B
2       3   ALPHA  18.0  14.0  18  18.0  18.0    16  102.0          85     B+
3       4   ALPHA  15.0   9.0  19  17.0  19.0    15   94.0          78      B
4       5   ALPHA  18.0  17.0  19  19.0  20.0    18  111.0          92      A
..    ...     ...   ...   ...  ..   ...   ...   ...    ...         ...    ...
474   470    ZETA  11.0   4.0   2   2.0   8.0    10   37.0          31      F
475   471    ZETA  18.0   2.0  12   3.0  17.0    15   67.0          56      C
476   472    ZETA  20.0   6.0  16  11.0  20.0    14   87.0          72      B
478   473    ZETA  20.0  20.0   5  19.0  18.0    14   96.0          80     B+
479   474    ZETA  20.0  16.0  18  19.0  20.0    19  112.0          93      A

     backlogs  BC
0           2   0
1           1   0
2           0   0
3           1   0
4           0   0
..        ...  ..
474         4   0
475         2   0
476         1   0
478         1   0
479         0   0

[474 rows x 13 columns]>
```

In [109]:
```
df.describe()
```

Out[109]:

| | S.NO | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage |
|---|---|---|---|---|---|---|---|---|---|
| **count** | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 |
| **mean** | 237.500000 | 14.405063 | 10.139241 | 12.875527 | 13.289030 | 15.523207 | 13.632911 | 79.864979 | 66.535865 |
| **std** | 136.976275 | 4.602653 | 6.380270 | 5.870998 | 5.853642 | 4.277935 | 4.693598 | 24.718857 | 20.609420 |
| **min** | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **25%** | 119.250000 | 12.000000 | 4.000000 | 9.000000 | 9.000000 | 13.000000 | 11.000000 | 64.000000 | 53.000000 |
| **50%** | 237.500000 | 15.500000 | 10.000000 | 14.000000 | 15.000000 | 15.000000 | 15.000000 | 83.000000 | 69.000000 |
| **75%** | 355.750000 | 18.000000 | 16.000000 | 18.000000 | 18.000000 | 19.000000 | 17.000000 | 98.000000 | 82.000000 |
| **max** | 474.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 120.000000 | 100.000000 |

In [110]:
```
from scipy.stats import ttest_ind
from scipy.stats import ttest_rel
```

In [111]:
```
ttest_ind(df[df['SECTION'] == 'ALPHA']['DV'], df[df['SECTION']== 'BETA']['DV'])
```

Out[111]:
```
Ttest_indResult(statistic=2.3418185924318102, pvalue=0.020866453244001094)
```

In [112]:
```
ttest_rel(df[df['SECTION'] == 'ALPHA']['DV'], df[df['SECTION']== 'BETA']['DV'])
```

Out[112]:
```
TtestResult(statistic=2.3172456109384103, pvalue=0.023979527821469917, df=59)
```

In [113]:
```
from scipy.stats import chi2_contingency
```

In [114]:
```
data = (df[df['SECTION'] == 'ALPHA']['DV'], df[df['SECTION']== 'BETA']['DV'])
stat, p, dof, expected = chi2_contingency(data)
print(stat)
print(p)
print(dof)
```

```
113.91846891456558
2.3496708155645757e-05
59
```

In [115]:
```
data = (df[df['SECTION'] == 'ALPHA']['DV'], df[df['SECTION']== 'BETA']['DV'])
stat, p, dof, expected = chi2_contingency(data)
chi2_contingency(data)
```

Out[115]:
```
Chi2ContingencyResult(statistic=113.91846891456558, pvalue=2.3496708155645757e-05, dof=59, exp
ected_freq=array([[16.65730696, 14.50797703, 16.11997447, 13.97064454, 16.11997447,
        13.97064454, 14.50797703, 15.58264199, 13.97064454, 20.41863433,
        11.28398213, 19.88130185, 12.3586471 , 14.50797703, 19.34396937,
         9.67198468, 17.19463944, 12.89597958, 17.73197192, 20.41863433,
        12.3586471 , 17.19463944, 10.20931717, 16.11997447, 14.50797703,
         4.83599234, 18.2693044 ,  9.67198468, 11.28398213,  9.67198468,
        15.04530951, 13.97064454, 15.04530951, 15.04530951, 15.58264199,
        12.89597958, 10.20931717, 12.3586471 , 13.43331206, 15.58264199,
        15.04530951, 15.58264199, 13.97064454, 11.82131461, 18.80663689,
        12.3586471 , 12.3586471 , 14.50797703, 13.97064454, 15.04530951,
         4.83599234,  8.59731972, 17.73197192, 12.3586471 , 13.43331206,
        18.80663689, 12.3586471 ,  7.52265475, 10.20931717, 18.2693044 ],
       [14.34269304, 12.49202297, 13.88002553, 12.02935546, 13.88002553,
        12.02935546, 12.49202297, 13.41735801, 12.02935546, 17.58136567,
         9.71601787, 17.11869815, 10.6413529 , 12.49202297, 16.65603063,
         8.32801532, 14.80536056, 11.10402042, 15.26802808, 17.58136567,
        10.6413529 , 14.80536056,  8.79068283, 13.88002553, 12.49202297,
         4.16400766, 15.7306956 ,  8.32801532,  9.71601787,  8.32801532,
        12.95469049, 12.02935546, 12.95469049, 12.95469049, 13.41735801,
        11.10402042,  8.79068283, 10.6413529 , 11.56668794, 13.41735801,
        12.95469049, 13.41735801, 12.02935546, 10.17868539, 16.19336311,
        10.6413529 , 10.6413529 , 12.49202297, 12.02935546, 12.95469049,
         4.16400766,  7.40268028, 15.26802808, 10.6413529 , 11.56668794,
        16.19336311, 10.6413529 ,  6.47734525,  8.79068283, 15.7306956 ]]))
```

In [116]:
```
df[df['SECTION'] == 'ALPHA'].DV.mean()
```

Out[116]:
```
14.033333333333333
```

In [117]:
```
import scipy.stats as stats
```

In [118]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'ALPHA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
-0.618692845981171 0.5385001708772008
```

In [119]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'BETA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
-4.0271887976567315 0.0001634927314623452
```

In [120]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'GAMMA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
5.360516566254314 1.4453792736728807e-06
```

In [121]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'DELTA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
-1.672647664892037 0.09969192507810967
```

In [122]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'SIGMA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
2.02737462602529 0.04722782875442706
```

In [123]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'ZETA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
0.8920612807760117 0.37604618564503456
```

In [124]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'OMEGA']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
0.7039164464119071 0.48430139497653446
```

In [125]:
```
t_statistic, p_value = stats.ttest_1samp(df[df['SECTION'] == 'EPSILON']['DV'] , df.DV.mean())
print(t_statistic, p_value)
```

```
-0.26190775637361224 0.7943535438301653
```

In [126]:
```
df.describe()
```

Out[126]:

| | S.NO | DV | M2 | PP | BEEE | FL | FIMS | Total | Percentage |
|---|---|---|---|---|---|---|---|---|---|
| **count** | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 | 474.000000 |
| **mean** | 237.500000 | 14.405063 | 10.139241 | 12.875527 | 13.289030 | 15.523207 | 13.632911 | 79.864979 | 66.535865 |
| **std** | 136.976275 | 4.602653 | 6.380270 | 5.870998 | 5.853642 | 4.277935 | 4.693598 | 24.718857 | 20.609420 |
| **min** | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **25%** | 119.250000 | 12.000000 | 4.000000 | 9.000000 | 9.000000 | 13.000000 | 11.000000 | 64.000000 | 53.000000 |
| **50%** | 237.500000 | 15.500000 | 10.000000 | 14.000000 | 15.000000 | 15.000000 | 15.000000 | 83.000000 | 69.000000 |
| **75%** | 355.750000 | 18.000000 | 16.000000 | 18.000000 | 18.000000 | 19.000000 | 17.000000 | 98.000000 | 82.000000 |
| **max** | 474.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 120.000000 | 100.000000 |

In [ ]:
```
```