Employee Details and Sentiment Analysis

In [27]:

```python
import mysql.connector as sql
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import squarify
import random
import warnings
warnings.filterwarnings("ignore")
connection = sql.connect(user='root', host='localhost', port=3306, password='rahul@SQL', database='employees_dataset')
emp_details = 'SELECT * FROM employee_details'
emp = pd.read_sql(emp_details, con=connection)
connection.close()
emp.head(5)
```

Out[27]:

	EmpID	Gender	Age	MaritalStatus	JobLevel	Experience	Dept	EmpType	EduLevel
0	1	Female	37	Married	Senior	5	Operations	Full-Time	Bachelor
1	2	Female	32	Single	Senior	10	HR	Full-Time	Bachelor
2	3	Male	31	Married	Senior11111212121	6	Legal	Contract	Master
3	4	Male	31	Married	Mid	2	Finance	Full-Time	Bachelor
4	5	Male	22	Single	Intern/Fresher	0	IT	Contract	High School

Cleaning and Structuring DataFrame

In [28]:

```python
emp.info()
print("\n NULL VALUES")
emp.isnull().sum()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3029 entries, 0 to 3028
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   EmpID          3029 non-null   int64 
 1   Gender         3029 non-null   object
 2   Age            3029 non-null   int64 
 3   MaritalStatus  3029 non-null   object
 4   JobLevel       3029 non-null   object
 5   Experience     3029 non-null   int64 
 6   Dept           3028 non-null   object
 7   EmpType        3023 non-null   object
 8   EduLevel       3029 non-null   object
dtypes: int64(3), object(6)
memory usage: 213.1+ KB

 NULL VALUES
```

Out[28]:

```
EmpID            0
Gender           0
Age              0
MaritalStatus    0
JobLevel         0
Experience       0
Dept             1
EmpType          6
EduLevel         0
dtype: int64
```

In [29]:

```python
emp["Dept"].ffill(inplace=True)
emp.head(5)
emp["EmpType"].ffill(inplace=True)
emp.head(5)
```

Out[29]:

	EmpID	Gender	Age	MaritalStatus	JobLevel	Experience	Dept	EmpType	EduLevel
0	1	Female	37	Married	Senior	5	Operations	Full-Time	Bachelor
1	2	Female	32	Single	Senior	10	HR	Full-Time	Bachelor
2	3	Male	31	Married	Senior11111212121	6	Legal	Contract	Master
3	4	Male	31	Married	Mid	2	Finance	Full-Time	Bachelor
4	5	Male	22	Single	Intern/Fresher	0	IT	Contract	High School

In [30]:

```python
emp.info()
print("\n NULL VALUES")
emp.isnull().sum()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3029 entries, 0 to 3028
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   EmpID          3029 non-null   int64 
 1   Gender         3029 non-null   object
 2   Age            3029 non-null   int64 
 3   MaritalStatus  3029 non-null   object
 4   JobLevel       3029 non-null   object
 5   Experience     3029 non-null   int64 
 6   Dept           3029 non-null   object
 7   EmpType        3029 non-null   object
 8   EduLevel       3029 non-null   object
dtypes: int64(3), object(6)
memory usage: 213.1+ KB

 NULL VALUES
```

Out[30]:

```
EmpID            0
Gender           0
Age              0
MaritalStatus    0
JobLevel         0
Experience       0
Dept             0
EmpType          0
EduLevel         0
dtype: int64
```

In [31]:

```python
emp.drop_duplicates(inplace=True)
```

In [32]:

```python
jl = emp['JobLevel'].unique()
emp['JobLevel'].replace('Senior11111212121','Senior',inplace=True)
emp.head(5)
ms = emp['MaritalStatus'].unique()
gd = emp['Gender'].unique()
dt = emp['Dept'].unique()
jb = emp['JobLevel'].unique()
et = emp['EmpType'].unique()
ed = emp['EduLevel'].unique()
print(ms, gd, dt, et, ed, jb)
```

```
['Married' 'Single' 'Divorced' 'Widowed'] ['Female' 'Male' 'Other'] ['Operations' 'HR' 'Legal' 'Finance' 'IT' 'Marketing' 'Customer Service'
 'Sales'] ['Full-Time' 'Contract' 'Part-Time'] ['Bachelor' 'Master' 'High School' 'PhD' 'Bachelor7'] ['Senior' 'Mid' 'Intern/Fresher' 'Junior' 'Lead']
```

In [33]:

```python
emp['EduLevel'].replace('Bachelor7','Bachelor',inplace=True)
```

In [34]:

```python
#Getting total employee count by gender
emp_countbygender = emp.groupby('Gender')['EmpID'].count().reset_index()
print(emp_countbygender)
```

```
   Gender  EmpID
0  Female   1240
1    Male   1528
2   Other    257
```

In [35]:

```python
#getting count of employee by gender in each department
emp_countbygender_dept = emp.groupby(['Gender','Dept'])['EmpID'].count()
emp_countbygender_dept
```

Out[35]:

```
Gender  Dept            
Female  Customer Service     72
        Finance             291
        HR                   80
        IT                  134
        Legal               122
        Marketing           202
        Operations          207
        Sales               132
Male    Customer Service     65
        Finance             275
        HR                   50
        IT                  590
        Legal               127
        Marketing            90
        Operations          203
        Sales               128
Other   Customer Service     10
        Finance              71
        HR                   13
        IT                   50
        Legal                23
        Marketing            24
        Operations           45
        Sales                21
Name: EmpID, dtype: int64
```

In [36]:

```python
#employee count by Experience
emp_countbyexp = emp.groupby('Experience', as_index=False)['EmpID'].count()
emp_countbyexp
```

Out[36]:

	Experience	EmpID
0	0	159
1	1	246
2	2	254
3	3	186
4	4	171
5	5	151
6	6	170
7	7	154
8	8	134
9	9	134
10	10	135
11	11	122
12	12	115
13	13	111
14	14	108
15	15	99
16	16	90
17	17	79
18	18	63
19	19	41
20	20	37
21	21	42
22	22	40
23	23	40
24	24	38
25	25	33
26	26	25
27	27	23
28	28	15
29	29	10

In [37]:

```python
#Count of employess type in each department
emp_countby_emptype_in_each_dept = emp.groupby(['EmpType'])['Dept'].count().reset_index()
emp_countby_emptype_in_each_dept
```

Out[37]:

	EmpType	Dept
0	Contract	308
1	Full-Time	2077
2	Part-Time	640

In [38]:

```python
emp_countby_joblevel = emp.groupby(['JobLevel'])['EmpID'].count().reset_index()
clr = ['#'+''.join(random.choices('ABCDEF0123456789',k=6)) for i in range(len(emp_countby_joblevel))]
emp_countby_joblevel
```

Out[38]:

	JobLevel	EmpID
0	Intern/Fresher	202
1	Junior	602
2	Lead	386
3	Mid	766
4	Senior	1069

Employee Sentiment Analysis

In [39]:

```python
connection = sql.connect(user='root', host='localhost', port=3306, password='rahul@SQL', database='employees_dataset')
emp_sentiment = 'SELECT * FROM employee_sentiment'
emp_senti = pd.read_sql(emp_sentiment, con=connection)
connection.close()
emp_senti

#ensuring both csv emp and empsenti files have same number or rows
print(emp.info())
print("\n NULL VALUES")
print(emp.isnull().sum())

print(emp_senti.info())
print("\n NULL VALUES")
print(emp_senti.isnull().sum())
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 3025 entries, 0 to 3028
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   EmpID          3025 non-null   int64 
 1   Gender         3025 non-null   object
 2   Age            3025 non-null   int64 
 3   MaritalStatus  3025 non-null   object
 4   JobLevel       3025 non-null   object
 5   Experience     3025 non-null   int64 
 6   Dept           3025 non-null   object
 7   EmpType        3025 non-null   object
 8   EduLevel       3025 non-null   object
dtypes: int64(3), object(6)
memory usage: 236.3+ KB
None

 NULL VALUES
EmpID            0
Gender           0
Age              0
MaritalStatus    0
JobLevel         0
Experience       0
Dept             0
EmpType          0
EduLevel         0
dtype: int64
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3025 entries, 0 to 3024
Data columns (total 17 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   EmpID                  3025 non-null   int64  
 1   WLB                    3025 non-null   int64  
 2   WorkEnv                3025 non-null   int64  
 3   PhysicalActivityHours  3025 non-null   float64
 4   Workload               3025 non-null   int64  
 5   Stress                 3025 non-null   int64  
 6   SleepHours             3025 non-null   float64
 7   CommuteMode            3025 non-null   object 
 8   CommuteDistance        3025 non-null   int64  
 9   NumCompanies           3025 non-null   int64  
 10  TeamSize               3025 non-null   int64  
 11  NumReports             3025 non-null   int64  
 12  haveOT                 3025 non-null   object 
 13  TrainingHoursPerYear   3025 non-null   float64
 14  JobSatisfaction        3025 non-null   int64  
 15  EmpID_[0]              3025 non-null   int64  
 16  Gender                 3025 non-null   object 
dtypes: float64(3), int64(11), object(3)
memory usage: 401.9+ KB
None

 NULL VALUES
EmpID                    0
WLB                      0
WorkEnv                  0
PhysicalActivityHours    0
Workload                 0
Stress                   0
SleepHours               0
CommuteMode              0
CommuteDistance          0
NumCompanies             0
TeamSize                 0
NumReports               0
haveOT                   0
TrainingHoursPerYear     0
JobSatisfaction          0
EmpID_[0]                0
Gender                   0
dtype: int64
```

In [40]:

```python
#Joining two dataframe emp and emp_senti
emp_sentiment=pd.merge(emp,emp_senti)

emp_sentiment.head(5)
```

Out[40]:

	EmpID	Gender	Age	MaritalStatus	JobLevel	Experience	Dept	EmpType	EduLevel	WLB	...	SleepHours	CommuteMode	CommuteDistance	NumCompanies	TeamSize	NumReports	haveOT
0	1	Female	37	Married	Senior	5	Operations	Full-Time	Bachelor	5	...	8.2	Motorbike	18	5	24	7	FALSE
1	2	Female	32	Single	Senior	10	HR	Full-Time	Bachelor	5	...	6.7	Motorbike	13	3	16	5	FALSE
2	3	Male	31	Married	Senior	6	Legal	Contract	Master	3	...	7.4	Public Transport	7	3	21	7	FALSE
3	4	Male	31	Married	Mid	2	Finance	Full-Time	Bachelor	5	...	7.0	Car	14	3	15	0	FALSE
4	5	Male	22	Single	Intern/Fresher	0	IT	Contract	High School	1	...	5.5	Car	22	0	27	0	TRUE

5 rows × 24 columns

In [41]:

```python
#Employee Job stafication
empjobstatis=emp_sentiment.groupby('Gender')['JobSatisfaction'].mean().reset_index()
empjobstatis
```

Out[41]:

	Gender	JobSatisfaction
0	Female	3.405738
1	Male	3.304462
2	Other	3.333333

In [42]:

```python
#Employee Job stafication by Gender
empjobstatis=emp_sentiment.groupby('Gender')['JobSatisfaction'].mean().reset_index()
empjobstatis
```

Out[42]:

	Gender	JobSatisfaction
0	Female	3.405738
1	Male	3.304462
2	Other	3.333333

In [43]:

```python
## Employee stress rating by gender
#filtered_emp_age31_40 = emp_sentiment[(emp_sentiment['Age'] >= 31) & (emp_sentiment['Age'] <= 40)]
empstress = emp_sentiment.groupby('Gender')['Stress'].mean().reset_index()
empstress
```

Out[43]:

	Gender	Stress
0	Female	1.741803
1	Male	1.744094
2	Other	2.000000

In [44]:

```python
#WLB rating
empwlb = emp_sentiment.groupby('Gender')['WLB'].mean().reset_index()
empwlb
```

Out[44]:

	Gender	WLB
0	Female	3.057377
1	Male	3.030184
2	Other	3.222222

In [45]:

```python
#work Environment Rating
empenv = emp_sentiment.groupby('Gender')['WorkEnv'].mean().reset_index()
empenv
```

Out[45]:

	Gender	WorkEnv
0	Female	3.032787
1	Male	2.992126
2	Other	3.277778

In [47]:

```python
#workload Rating
empworkload = emp_sentiment.groupby('Gender')['Workload'].mean().reset_index()
empworkload

#merging three rating
merged_df1 = pd.merge(empwlb, empenv, on='Gender', how='inner')
merged_df2 = pd.merge(merged_df1, empworkload, on='Gender', how='inner')
merged_df3 = pd.merge(merged_df2, empstress, on='Gender', how='inner')
merged_df = pd.merge(merged_df3, empjobstatis, on='Gender', how='inner')
merged_df

df = pd.DataFrame(merged_df)
df
```

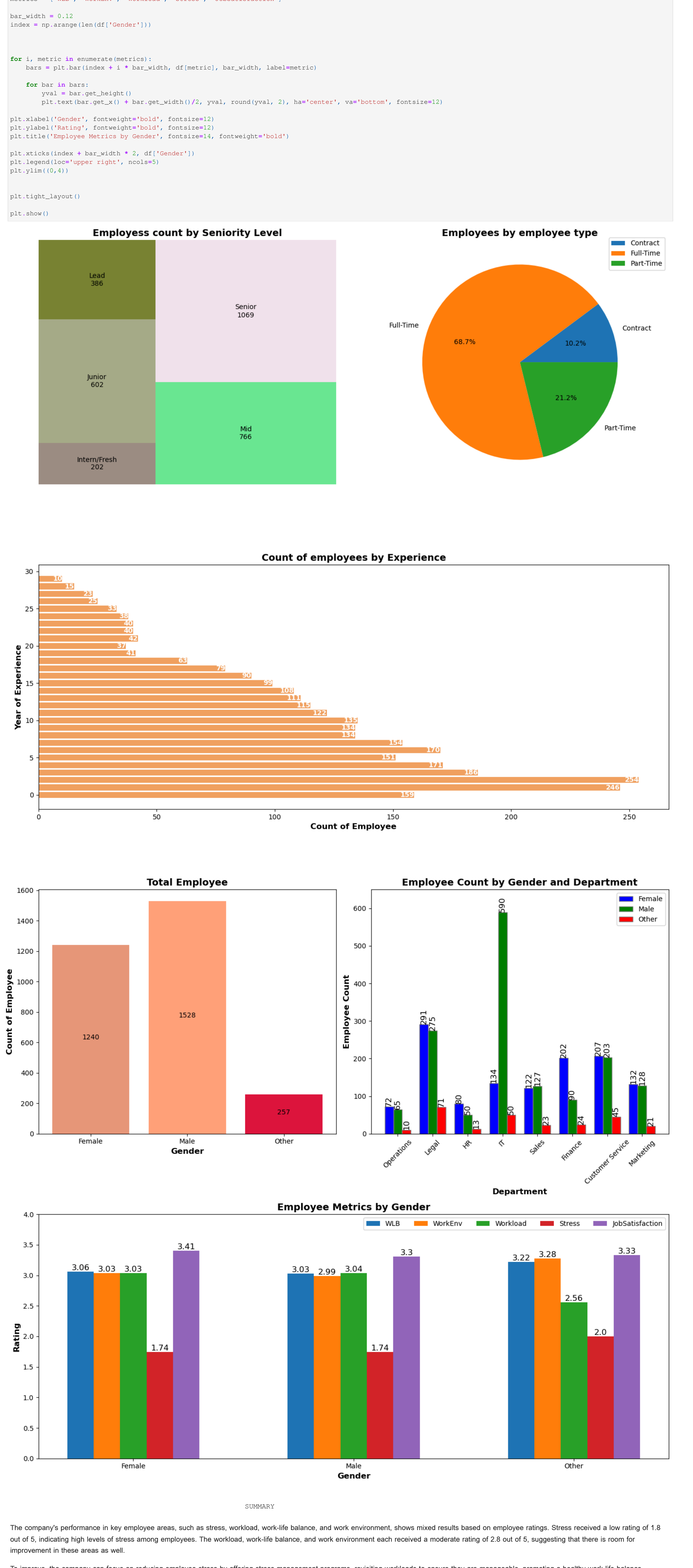
Out[47]:

	Gender	WLB	WorkEnv	Workload	Stress	JobSatisfaction
0	Female	3.057377	3.032787	3.034836	1.741803	3.405738
1	Male	3.030184	2.992126	3.036745	1.744094	3.304462
2	Other	3.222222	3.277778	2.555556	2.000000	3.333333

Visualizing the result

In [48]:

```python
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import squarify
import random


plt.figure(figsize=(14,26))
clr = ['#'+''.join(random.choices('ABCDEF0123456789',k=6)) for i in range(len(emp_countby_joblevel))]
#TreeMap Chart employess by Seniority Level

plt.subplot2grid((4, 2), (0, 0))
emp_countby_joblevel

squarify.plot(sizes=emp_countby_joblevel['EmpID'], label = ['Intern/Fresh\n202','Junior\n602','Lead\n386','Mid\n766','Senior\n1069'],color=clr, alpha=.8 )
plt.axis('off')
plt.title("Employess count by Seniority Level", fontsize=14, fontweight='bold')

#==========================================================================================
#Pie Chart employees by employee type

plt.subplot2grid((4, 2), (0, 1))
plt.pie(emp_countby_emptype_in_each_dept['Dept'], labels = emp_countby_emptype_in_each_dept['EmpType'],autopct='%1.1f%%')
plt.legend(labels = emp_countby_emptype_in_each_dept['EmpType'], bbox_to_anchor=(0.85,1.025), loc="upper left")
plt.title("Employees by employee type", fontsize=14, fontweight='bold')
#==========================================================================================
#Bar chart employees by experience

plt.subplot2grid((4, 2), (1, 0), colspan=2)
emp_countbyexp
exp = [i for i in emp_countbyexp['Experience'].unique()]
exp_count = [i for i in emp_countbyexp['EmpID']]

plt.barh(exp, exp_count, color='#F4A460')
plt.title("Count of employees by Experience", fontsize=14, fontweight='bold')
plt.xlabel("Count of Employee", fontweight='bold', fontsize=12)
plt.ylabel("Year of Experience", fontweight='bold', fontsize=12)
for index, value in enumerate(exp_count):
    plt.text(value, index, str(value), va='center', ha='right', fontweight='bold', fontsize=10, color='white')
plt.tight_layout()
#==========================================================================================
# Column chart employees by Gender
plt.subplot2grid((4, 2), (2, 0))

emp_countbygender
emp_countbygender = emp.groupby('Gender', as_index=False)['EmpID'].count()
clr = ['#E9967A', '#FFA07A', '#DC143C']

plt.bar(emp_countbygender['Gender'], emp_countbygender['EmpID'], color=clr)
plt.title("Total Employee", fontsize=14, fontweight='bold')
plt.xlabel("Gender", fontweight='bold', fontsize=12)
plt.ylabel("Count of Employee", fontweight='bold', fontsize=12)
for i in range(len(emp_countbygender['EmpID'])):
    plt.text(i, emp_countbygender['EmpID'][i]//2, emp_countbygender['EmpID'][i], ha = 'center')

#==========================================================================================
# Clustered column chart employees in each department and gender_wise

plt.subplot2grid((4, 2), (2, 1))
emp_countbygender_dept = emp.groupby(['Gender', 'Dept'], as_index=False)['EmpID'].count()

gender_list = emp_countbygender_dept['Gender'].tolist()
dept = emp_countbygender_dept['Dept'].tolist()
values = emp_countbygender_dept['EmpID'].tolist()
data = {'Gender_list': gender_list, 'Dept': dept, 'value': values}
df = pd.DataFrame(data)

bar_width = 0.25
r1 = np.arange(len(set(dept)))
r2 = [x + bar_width for x in r1]
r3 = [x + bar_width for x in r2]


female_values = df[df['Gender_list'] == 'Female']['value'].values
male_values = df[df['Gender_list'] == 'Male']['value'].values
other_values = df[df['Gender_list'] == 'Other']['value'].values

bars1 = plt.bar(r1, female_values, color='blue', width=bar_width, edgecolor='grey', label='Female')
bars2 = plt.bar(r2, male_values, color='green', width=bar_width, edgecolor='grey', label='Male')
bars3 = plt.bar(r3, other_values, color='red', width=bar_width, edgecolor='grey', label='Other')

plt.xlabel('Department', fontweight='bold', fontsize=12)
plt.ylabel('Employee Count', fontweight='bold', fontsize=12)
plt.title('Employee Count by Gender and Department', fontsize=14, fontweight='bold')
plt.xticks([r + bar_width for r in range(len(set(dept)))], set(dept), rotation=45)

for bar in bars1:
    yval = bar.get_height()
    plt.text(bar.get_x() + bar.get_width() / 2, yval, int(yval), ha='center', va='bottom', fontsize=12, rotation=90)

for bar in bars2:
    yval = bar.get_height()
    plt.text(bar.get_x() + bar.get_width() / 2, yval, int(yval), ha='center', va='bottom', fontsize=12, rotation=90)

for bar in bars3:
    yval = bar.get_height()
    plt.text(bar.get_x() + bar.get_width() / 2, yval, int(yval), ha='center', va='bottom', fontsize=12, rotation=90)

plt.ylim((0,650))
plt.legend()
#==========================================================================================
# Clustered column chart on employees sentiment rating over Stress, Work Environment, Work Load, Job Satisfaction and Work Life Balance

plt.subplot2grid((4, 2), (3, 0), colspan=2)
#workload Rating
empworkload = emp_sentiment.groupby('Gender')['Workload'].mean().reset_index()
empworkload

#merging three rating
merged_df1 = pd.merge(empwlb, empenv, on='Gender', how='inner')
merged_df2 = pd.merge(merged_df1, empworkload, on='Gender', how='inner')
merged_df3 = pd.merge(merged_df2, empstress, on='Gender', how='inner')
merged_df = pd.merge(merged_df3, empjobstatis, on='Gender', how='inner')
merged_df

df = pd.DataFrame(merged_df)

metrics = ['WLB', 'WorkEnv', 'Workload', 'Stress', 'JobSatisfaction']

bar_width = 0.12
index = np.arange(len(df['Gender']))



for i, metric in enumerate(metrics):
    bars = plt.bar(index + i * bar_width, df[metric], bar_width, label=metric)

    for bar in bars:
        yval = bar.get_height()
        plt.text(bar.get_x() + bar.get_width()/2, yval, round(yval, 2), ha='center', va='bottom', fontsize=12)

plt.xlabel('Gender', fontweight='bold', fontsize=12)
plt.ylabel('Rating', fontweight='bold', fontsize=12)
plt.title('Employee Metrics by Gender', fontsize=14, fontweight='bold')

plt.xticks(index + bar_width * 2, df['Gender'])
plt.legend(loc='upper right', ncols=5)
plt.ylim((0,4))


plt.tight_layout()

plt.show()
```



SUMMARY

The company's performance in key employee areas, such as stress, workload, work-life balance, and work environment, shows mixed results based on employee ratings. Stress received a low rating of 1.8 out of 5, indicating high levels of stress among employees. The workload, work-life balance, and work environment each received a moderate rating of 2.8 out of 5, suggesting that there is room for improvement in these areas as well.

To improve, the company can focus on reducing employee stress by offering stress management programs, revisiting workloads to ensure they are manageable, promoting a healthy work-life balance through flexible scheduling or remote work options, and enhancing the work environment by encouraging open communication and support systems.