Mini Project-Mental Disorder Classification

In [16]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier, GradientBoostingClassifier
from sklearn.metrics import confusion_matrix, classification_report, accuracy_score, precision_score, recall_sc
from sklearn.model_selection import cross_val_score
import warnings
warnings.filterwarnings("ignore")
```

In [38]:

```
df=pd.read_csv(r"C:\Users\mohha\OneDrive\Desktop\MLDS\Project\Dataset-Mental-Disorders.csv")
df.head(10)
```

Out[38]:

	Patient Number	Sadness	Euphoric	Exhausted	Sleep dissorder	Mood Swing	Suicidal thoughts	Anorxia	Authority Respect	Try-Explanation	Aggressive Response	Ignore & Move-On
0	Patiant-01	Usually	Seldom	Sometimes	Sometimes	YES	YES	NO	NO	YES	NO	NO
1	Patiant-02	Usually	Seldom	Usually	Sometimes	NO	YES	NO	NO	NO	NO	NO
2	Patiant-03	Sometimes	Most-Often	Sometimes	Sometimes	YES	NO	NO	NO	YES	YES	NO
3	Patiant-04	Usually	Seldom	Usually	Most-Often	YES	YES	YES	NO	YES	NO	NO
4	Patiant-05	Usually	Usually	Sometimes	Sometimes	NO	NO	NO	NO	NO	NO	NO
5	Patiant-06	Usually	Sometimes	Sometimes	Most-Often	NO	YES	YES	YES	NO	NO	NO
6	Patiant-07	Seldom	Usually	Seldom	Sometimes	YES	YES	YES	NO	YES	YES	NO
7	Patiant-08	Usually	Sometimes	Sometimes	Sometimes	NO	NO	NO	NO	YES	NO	NO
8	Patiant-09	Most-Often	Seldom	Most-Often	Usually	YES	YES	YES	NO	YES	YES	NO
9	Patiant-10	Usually	Seldom	Most-Often	Sometimes	NO	NO	NO	NO	YES	NO	NO

In [39]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 120 entries, 0 to 119
Data columns (total 19 columns):
 #   Column               Non-Null Count  Dtype 
---  ------               --------------  ----- 
 0   Patient Number       120 non-null    object
 1   Sadness              120 non-null    object
 2   Euphoric             120 non-null    object
 3   Exhausted            120 non-null    object
 4   Sleep dissorder      120 non-null    object
 5   Mood Swing           120 non-null    object
 6   Suicidal thoughts    120 non-null    object
 7   Anorxia              120 non-null    object
 8   Authority Respect    120 non-null    object
 9   Try-Explanation      120 non-null    object
 10  Aggressive Response  120 non-null    object
 11  Ignore & Move-On     120 non-null    object
 12  Nervous Break-down   120 non-null    object
 13  Admit Mistakes       120 non-null    object
 14  Overthinking         120 non-null    object
 15  Sexual Activity      120 non-null    object
 16  Concentration        120 non-null    object
 17  Optimisim            120 non-null    object
 18  Expert Diagnose      120 non-null    object
dtypes: object(19)
memory usage: 17.9+ KB
```

Treat Null Values

In [40]:

```
df.duplicated().sum()
```

Out[40]:

```
np.int64(0)
```

In [41]:

```
df.isnull().sum()
```

Out[41]:

```
Patient Number         0
Sadness                0
Euphoric               0
Exhausted              0
Sleep dissorder        0
Mood Swing             0
Suicidal thoughts      0
Anorxia                0
Authority Respect      0
Try-Explanation        0
Aggressive Response    0
Ignore & Move-On       0
Nervous Break-down     0
Admit Mistakes         0
Overthinking           0
Sexual Activity        0
Concentration          0
Optimisim              0
Expert Diagnose        0
dtype: int64
```

In [42]:

```
df['Patient Number']=df['Patient Number'].str.split('-').str[1]
df['Patient Number']=df['Patient Number'].astype(int)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 120 entries, 0 to 119
Data columns (total 19 columns):
 #   Column               Non-Null Count  Dtype 
---  ------               --------------  ----- 
 0   Patient Number       120 non-null    int64 
 1   Sadness              120 non-null    object
 2   Euphoric             120 non-null    object
 3   Exhausted            120 non-null    object
 4   Sleep dissorder      120 non-null    object
 5   Mood Swing           120 non-null    object
 6   Suicidal thoughts    120 non-null    object
 7   Anorxia              120 non-null    object
 8   Authority Respect    120 non-null    object
 9   Try-Explanation      120 non-null    object
 10  Aggressive Response  120 non-null    object
 11  Ignore & Move-On     120 non-null    object
 12  Nervous Break-down   120 non-null    object
 13  Admit Mistakes       120 non-null    object
 14  Overthinking         120 non-null    object
 15  Sexual Activity      120 non-null    object
 16  Concentration        120 non-null    object
 17  Optimisim            120 non-null    object
 18  Expert Diagnose      120 non-null    object
dtypes: int64(1), object(18)
memory usage: 17.9+ KB
```

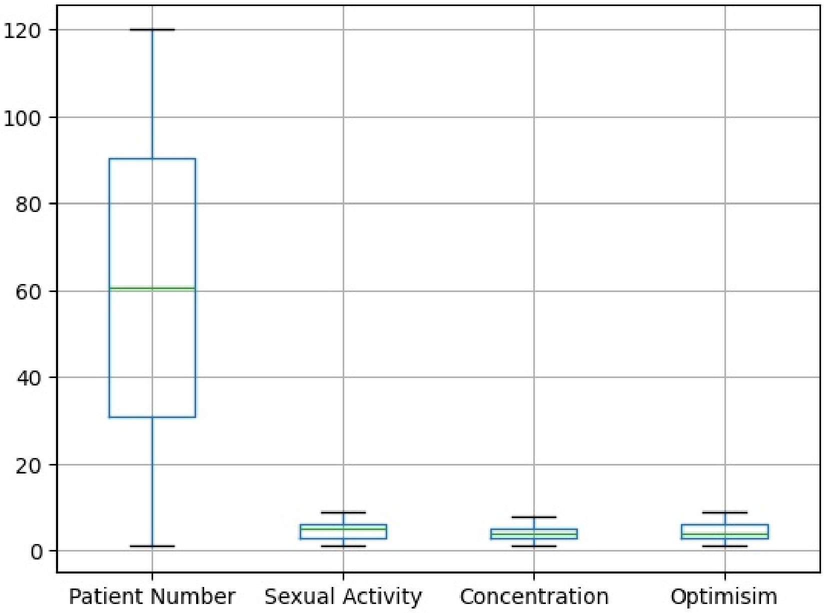
In [43]:

```
col_from=df[["Sexual Activity","Concentration","Optimisim"]]
for i in col_from:
    df[i]=df[i].str.split(' ').str[0]
    df[i]=df[i].astype(int)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 120 entries, 0 to 119
Data columns (total 19 columns):
 #   Column               Non-Null Count  Dtype 
---  ------               --------------  ----- 
 0   Patient Number       120 non-null    int64 
 1   Sadness              120 non-null    object
 2   Euphoric             120 non-null    object
 3   Exhausted            120 non-null    object
 4   Sleep dissorder      120 non-null    object
 5   Mood Swing           120 non-null    object
 6   Suicidal thoughts    120 non-null    object
 7   Anorxia              120 non-null    object
 8   Authority Respect    120 non-null    object
 9   Try-Explanation      120 non-null    object
 10  Aggressive Response  120 non-null    object
 11  Ignore & Move-On     120 non-null    object
 12  Nervous Break-down   120 non-null    object
 13  Admit Mistakes       120 non-null    object
 14  Overthinking         120 non-null    object
 15  Sexual Activity      120 non-null    int64 
 16  Concentration        120 non-null    int64 
 17  Optimisim            120 non-null    int64 
 18  Expert Diagnose      120 non-null    object
dtypes: int64(4), object(15)
memory usage: 17.9+ KB
```

In [44]:

```
df.boxplot()
plt.show()
```



In [45]:

```
df.head()
```

Out[45]:

	Patient Number	Sadness	Euphoric	Exhausted	Sleep dissorder	Mood Swing	Suicidal thoughts	Anorxia	Authority Respect	Try-Explanation	Aggressive Response	Ignore & Move-On	N
0	1	Usually	Seldom	Sometimes	Sometimes	YES	YES	NO	NO	YES	NO	NO	
1	2	Usually	Seldom	Usually	Sometimes	NO	YES	NO	NO	NO	NO	NO	
2	3	Sometimes	Most-Often	Sometimes	Sometimes	YES	NO	NO	NO	YES	YES	NO	
3	4	Usually	Seldom	Usually	Most-Often	YES	YES	YES	NO	YES	NO	NO	
4	5	Usually	Usually	Sometimes	Sometimes	NO	NO	NO	NO	NO	NO	NO	

Encode Categorical Data

In [46]:

```
cat_col=df.select_dtypes(include='object').columns
cat_col
```

Out[46]:

```
Index(['Sadness', 'Euphoric', 'Exhausted', 'Sleep dissorder', 'Mood Swing',
       'Suicidal thoughts', 'Anorxia', 'Authority Respect', 'Try-Explanation',
       'Aggressive Response', 'Ignore & Move-On', 'Nervous Break-down',
       'Admit Mistakes', 'Overthinking', 'Expert Diagnose'],
      dtype='object')
```

In [47]:

```
from sklearn.preprocessing import LabelEncoder
label_encoder = LabelEncoder()
for column in cat_col:
# Fit and transform the column
    df[column] = label_encoder.fit_transform(df[column])
    df[column]=df[column].astype(int)
# Print the mapping for each category
    categories = df[column].unique()
    print(f"{column} - ")
    for category in categories:
        print(f"{category} : {label_encoder.inverse_transform([category])[0]}")
df.info()
```

```
Sadness -
3 : Usually
2 : Sometimes
1 : Seldom
0 : Most-Often
Euphoric -
1 : Seldom
0 : Most-Often
3 : Usually
2 : Sometimes
Exhausted -
2 : Sometimes
3 : Usually
1 : Seldom
0 : Most-Often
Sleep dissorder -
2 : Sometimes
0 : Most-Often
3 : Usually
1 : Seldom
Mood Swing -
1 : YES
0 : NO
Suicidal thoughts -
2 : YES
1 : YES
0 : NO
Anorxia -
0 : NO
1 : YES
Authority Respect -
0 : NO
1 : YES
Try-Explanation -
1 : YES
0 : NO
Aggressive Response -
0 : NO
1 : YES
Ignore & Move-On -
0 : NO
1 : YES
Nervous Break-down -
1 : YES
0 : NO
Admit Mistakes -
1 : YES
0 : NO
Overthinking -
1 : YES
0 : NO
Expert Diagnose -
1 : Bipolar Type-2
2 : Depression
0 : Bipolar Type-1
3 : Normal
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 120 entries, 0 to 119
Data columns (total 19 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   Patient Number       120 non-null    int64
 1   Sadness              120 non-null    int64
 2   Euphoric             120 non-null    int64
 3   Exhausted            120 non-null    int64
 4   Sleep dissorder      120 non-null    int64
 5   Mood Swing           120 non-null    int64
 6   Suicidal thoughts    120 non-null    int64
 7   Anorxia              120 non-null    int64
 8   Authority Respect    120 non-null    int64
 9   Try-Explanation      120 non-null    int64
 10  Aggressive Response  120 non-null    int64
 11  Ignore & Move-On     120 non-null    int64
 12  Nervous Break-down   120 non-null    int64
 13  Admit Mistakes       120 non-null    int64
 14  Overthinking         120 non-null    int64
 15  Sexual Activity      120 non-null    int64
 16  Concentration        120 non-null    int64
 17  Optimisim            120 non-null    int64
 18  Expert Diagnose      120 non-null    int64
dtypes: int64(19)
memory usage: 17.9 KB
```

In [48]:

```
df["Suicidal thoughts"].value_counts()
```

Out[48]:

```
Suicidal thoughts
0    63
1    56
2     1
Name: count, dtype: int64
```

In [49]:

```
df.loc[df["Suicidal thoughts"]>1,"Suicidal thoughts"]=1
df["Suicidal thoughts"].value_counts()
```

Out[49]:

```
Suicidal thoughts
0    63
1    57
Name: count, dtype: int64
```

In [50]:

```
df.head(10)
```

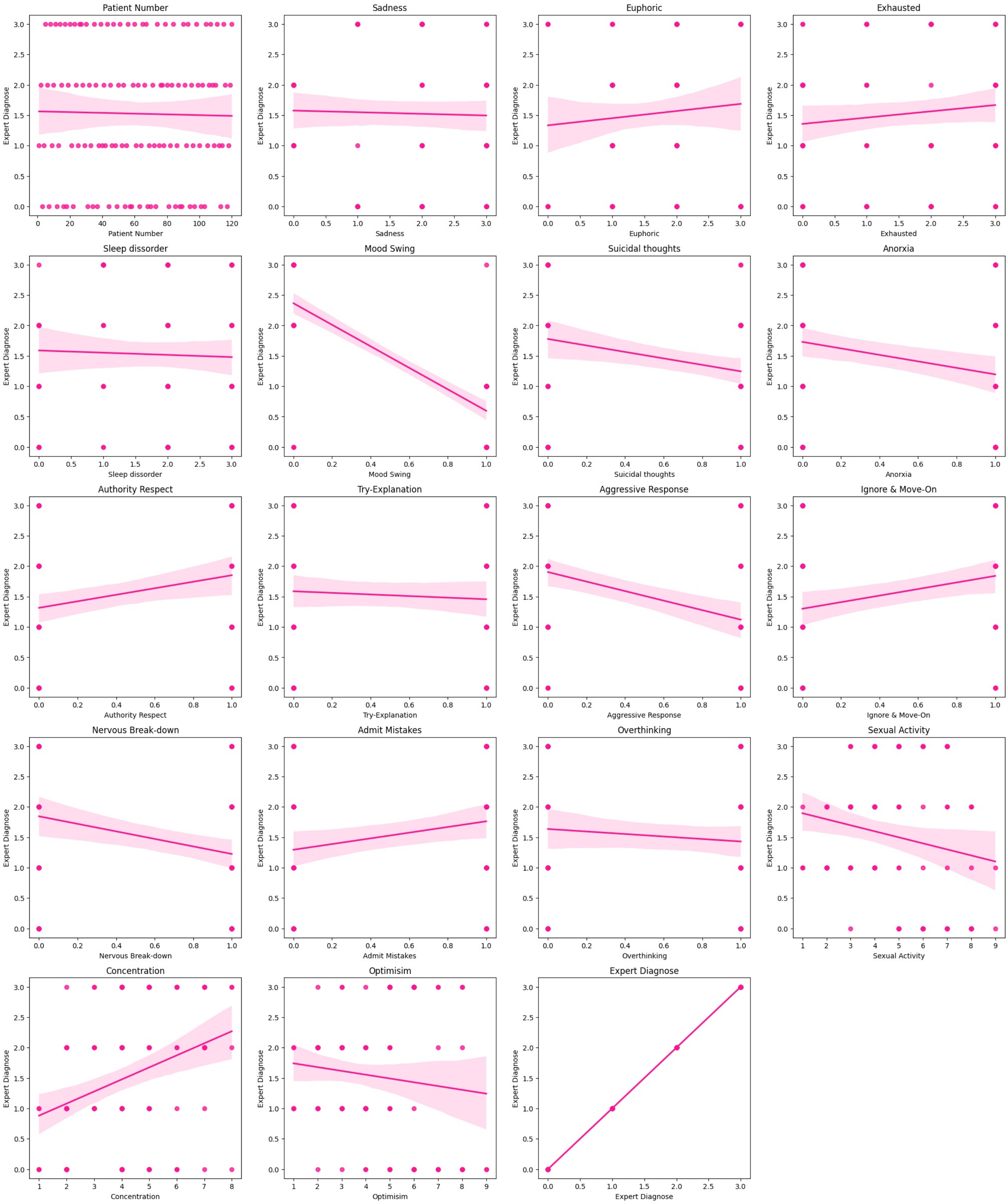
Out[50]:

	Patient Number	Sadness	Euphoric	Exhausted	Sleep dissorder	Mood Swing	Suicidal thoughts	Anorxia	Authority Respect	Try-Explanation	Aggressive Response	Ignore & Move-On	Nerv Br d
0	1	3	1	2	2	1	1	0	0	1	0	0	
1	2	3	1	3	2	0	1	0	0	0	0	0	
2	3	2	0	2	2	1	0	0	0	1	1	0	
3	4	3	1	3	0	1	1	1	0	1	0	0	
4	5	3	3	2	2	0	0	0	0	0	0	0	
5	6	3	2	2	0	0	1	1	1	0	0	0	
6	7	1	3	1	2	1	1	1	0	1	1	0	
7	8	3	2	2	2	0	0	0	0	1	0	0	
8	9	0	1	0	3	1	1	1	0	1	1	0	
9	10	3	1	0	2	0	0	0	0	1	0	0	

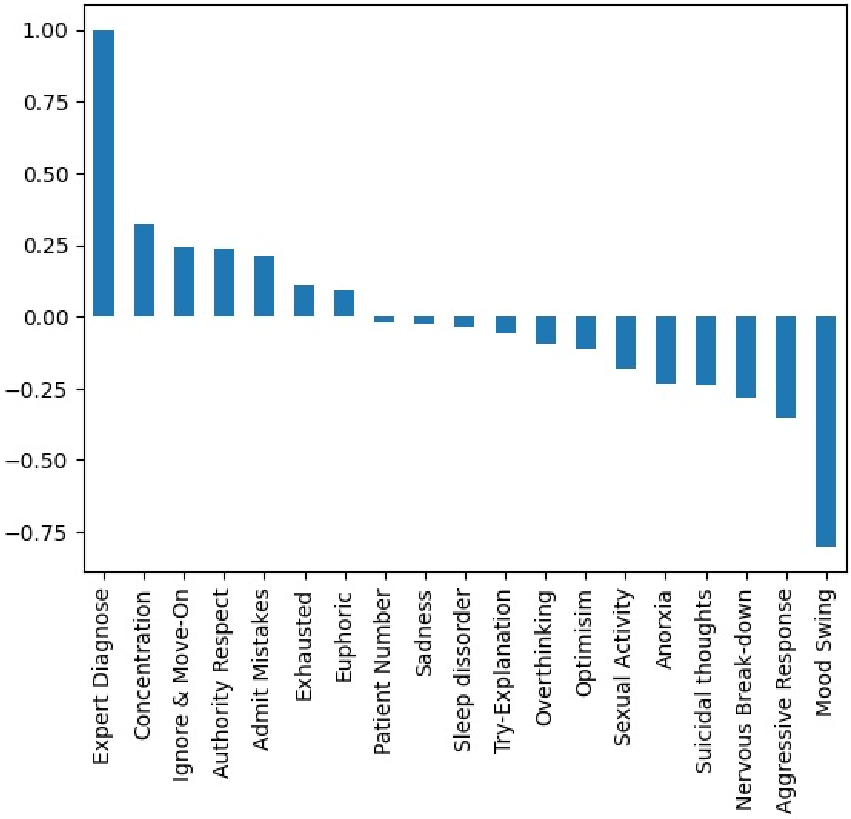
Check Correlation

In [51]:

```
num_col=df.select_dtypes(include=['number']).columns
plt.figure(figsize=(25, 30))
for idx, i in enumerate(num_col, 1):  # Use enumerate for indexing
    plt.subplot(5, 4, idx)  # Correct subplot indexing
    sns.regplot(df, x=i, y="Expert Diagnose",color="deeppink")
    plt.title(i)  # Add title to each subplot
plt.show()
```



```
In [52]: df.corr()["Expert Diagnose"].sort_values(ascending=False).plot(kind="bar")
         plt.show()
```



Split DataSet

In [53]:

```
# Split DataSet into Training 80% & testing 20%
X=df[["Mood Swing","Concentration","Aggressive Response"]]
y=df["Expert Diagnose"]
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(X,y,test_size=0.10,random_state=49)
```

In [54]:

```
y.value_counts()
```

Out[54]:

```
Expert Diagnose
1    31
2    31
3    30
0    28
Name: count, dtype: int64
```

Apply ML Models

In [55]:

```
# Create Classification Models
LR = LogisticRegression(random_state=49)
KNN = KNeighborsClassifier()
DT = DecisionTreeClassifier(random_state=49)
RF = RandomForestClassifier(random_state=49)
GBR = GradientBoostingClassifier(random_state=49)
Models = {'LR': LR, 'KNN': KNN, 'DT': DT, 'RF': RF, 'GBR': GBR}
# Apply Models
for Model_name, Model in Models.items():
    Model.fit(x_train, y_train)
    y_pred = Model.predict(x_test)  # Now y_pred will have discrete class labels
    train = Model.score(x_train, y_train)
    test = Model.score(x_test, y_test)  # Fixed variable name to lowercase
    # Classification Metrics
    accuracy = accuracy_score(y_test, y_pred)
    f1 = f1_score(y_test, y_pred, average='macro')
    cm = confusion_matrix(y_test, y_pred)
    print(Model_name)
    print(f"Training Score : {train:.2f}")  # Fixed indentation
    print(f"Testing  Score : {test:.2f}")   # Fixed indentation
    print(f"Accuracy: {accuracy:.2f}")
    print(f"F1 Score: {f1:.2f}")
    print("Confusion Matrix:")
    print(cm)
    print('----------------------------------------------------')
```

```
LR
Training Score : 0.56
Testing  Score : 0.42
Accuracy: 0.42
F1 Score: 0.42
Confusion Matrix:
[[1 1 0 1]
 [1 1 0 0]
 [0 0 2 0]
 [0 0 4 1]]
--------------------------------------------------
KNN
Training Score : 0.60
Testing  Score : 0.58
Accuracy: 0.58
F1 Score: 0.56
Confusion Matrix:
[[1 1 1 0]
 [1 1 0 0]
 [0 0 2 0]
 [0 0 2 3]]
--------------------------------------------------
DT
Training Score : 0.66
Testing  Score : 0.67
Accuracy: 0.67
F1 Score: 0.69
Confusion Matrix:
[[3 0 0 0]
 [0 2 0 0]
 [0 0 2 0]
 [1 0 3 1]]
--------------------------------------------------
RF
Training Score : 0.66
Testing  Score : 0.92
Accuracy: 0.92
F1 Score: 0.94
Confusion Matrix:
[[3 0 0 0]
 [0 2 0 0]
 [0 0 2 0]
 [1 0 0 4]]
--------------------------------------------------
GBR
Training Score : 0.66
Testing  Score : 0.83
Accuracy: 0.83
F1 Score: 0.85
Confusion Matrix:
[[2 0 0 1]
 [0 2 0 0]
 [0 0 2 0]
 [0 0 1 4]]
--------------------------------------------------
```

Manual Predictions

In [56]:

```
df.head()[["Mood Swing","Concentration","Aggressive Response","Expert Diagnose"]]
```

Out[56]:

	Mood Swing	Concentration	Aggressive Response	Expert Diagnose
0	1	3	0	1
1	0	2	0	2
2	1	5	1	0
3	1	2	0	1
4	0	5	0	3

In [57]:

```
# Random Forest Perform well
y_pred1=RF.predict([[1,3,0]]) # "Mood Swing" b,"Concentration" 1-5,"Aggressive Response"b
print("1:",y_pred1)
y_pred2=RF.predict([[0,2,0]])
print("2:",y_pred2)
y_pred3=RF.predict([[1,5,1]])
print("3:",y_pred3)
y_pred4=RF.predict([[1,2,0]]) #
print("4:",y_pred4)
y_pred5=RF.predict([[0,5,0]]) #
print("5:",y_pred5)
```

```
1: [1]
2: [2]
3: [0]
4: [1]
5: [3]
```

Got 100 % correct predections