In [63]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sb
```

In [64]:

```
data = pd.read_csv("Algerian_forest_fires_cleaned.csv")
data.head()
```

Out[64]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Class
0	1	6	2012	29	57	18	0.0	65.7	3.4	7.6	1.3	3.4	0.5	not f
1	2	6	2012	29	61	13	1.3	64.4	4.1	7.6	1.0	3.9	0.4	not f
2	3	6	2012	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	not f
3	4	6	2012	25	89	13	2.5	28.6	1.3	6.9	0.0	1.7	0.0	not f
4	5	6	2012	27	77	16	0.0	64.8	3.0	14.2	1.2	3.9	0.5	not f

In [65]:

```
#checking the missing values
data.isna().sum()
```

Out[65]:

```
day            0
month          0
year           0
Temperature    0
RH             0
Ws             0
Rain           0
FFMC           0
DMC            0
DC             0
ISI            0
BUI            0
FWI            0
Classes        0
Region         0
dtype: int64
```

In [66]:

```
data.duplicated().sum()
```

Out[66]:

```
0
```

In [67]:

```
#to find out the no.of categories in classes column
data['Classes'].value_counts()
data['Classes'].value_counts().count()
```

Out[67]:

```
8
```

In [68]:

```
data.describe()
```

Out[68]:

	day	month	year	Temperature	RH	Ws	Rain	
count	243.000000	243.000000	243.0	243.000000	243.000000	243.000000	243.000000	24
mean	15.761317	7.502058	2012.0	32.152263	62.041152	15.493827	0.762963	7
std	8.842552	1.114793	0.0	3.628039	14.828160	2.811385	2.003207	1
min	1.000000	6.000000	2012.0	22.000000	21.000000	6.000000	0.000000	2
25%	8.000000	7.000000	2012.0	30.000000	52.500000	14.000000	0.000000	7
50%	16.000000	8.000000	2012.0	32.000000	63.000000	15.000000	0.000000	8
75%	23.000000	8.000000	2012.0	35.000000	73.500000	17.000000	0.500000	8
max	31.000000	9.000000	2012.0	42.000000	90.000000	29.000000	16.800000	9

In [69]:

```
data.dtypes
```

Out[69]:

```
day              int64
month            int64
year             int64
Temperature      int64
RH               int64
Ws               int64
Rain           float64
FFMC           float64
DMC            float64
DC             float64
ISI            float64
BUI            float64
FWI            float64
Classes         object
Region           int64
dtype: object
```

In [70]:

```
#cleaning
data['Classes']=np.where(data['Classes'].str.contains('not fire'),0,1)
```

In [71]:

```
data['Classes'].value_counts()
```

Out[71]:

```
1    137
0    106
Name: Classes, dtype: int64
```

In [76]:

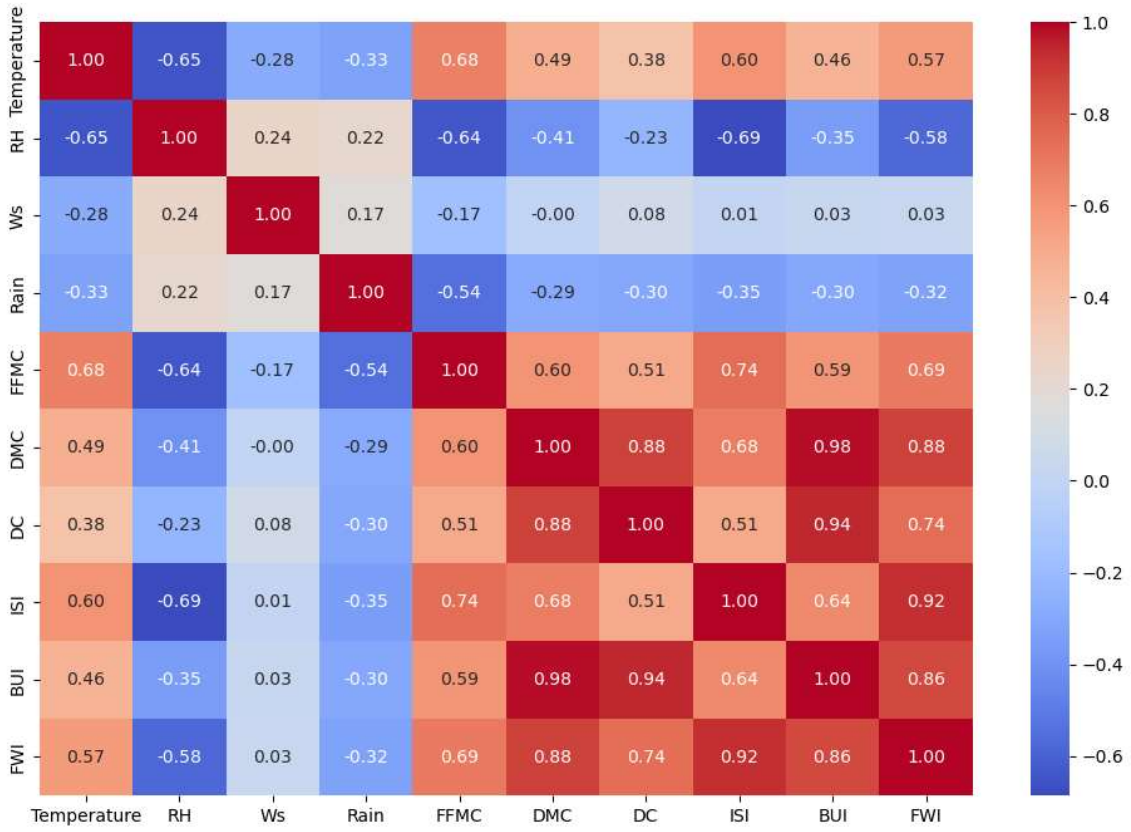
```
#for the correlation between columns
corr_matrix = data[['Temperature', 'RH', 'Ws', 'Rain', 'FFMC', 'DMC', 'DC', 'ISI', 'BUI'
```

In [78]:

```
plt.figure(figsize=(12, 8))
sb.heatmap(corr_matrix, annot=True, cmap="coolwarm", fmt=".2f")
```

Out[78]:

```
<Axes: >
```



In [82]:

```
X = data[['Temperature',  'Ws', 'FFMC', 'DMC', 'DC', 'ISI', 'BUI',  'Classes']]
y=data['FWI']
```

In [81]:

```
from sklearn.model_selection import train_test_split
```

In [88]:

```
X_test,X_train, y_test, y_train = train_test_split(X,y, train_size=0.2, random_state = 4
```

In [102]:

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
X_train_sc = scaler.fit_transform(X_train)
X_test_sc = scaler.fit_transform(X_test)
X_train_sc
```

Out[102]:

```
array([[-0.34969583, -0.16963419,  0.59734144, ...,  0.17931845,
         0.13695365,  0.86991767],
       [ 0.20924423, -0.87343564,  0.70212876, ...,  0.34174026,
        -0.39145309,  0.86991767],
       [-1.18810592,  0.88606798, -1.00939741, ..., -0.8648218 ,
        -0.9341411 , -1.14953407],
       ...,
       [-0.62916586, -0.16963419, -0.4086168 , ..., -0.81841557,
        -0.39145309, -1.14953407],
       [ 2.72447449, -2.28103854,  1.2470228 , ...,  2.49963011,
         1.00097009,  0.86991767],
       [-0.62916586, -0.52153492,  0.07340486, ..., -0.65599375,
        -0.69850025, -1.14953407]])
```

In [97]:

```
from sklearn.linear_model import LinearRegression
lr = LinearRegression()


#Fitting the Multiple Linear Regression model
lr = LinearRegression().fit(X_train, y_train)

#Predicting the Test and Train set result
y_pred= lr.predict(X_test)
x_pred= lr.predict(X_train)
```

In [98]:

```
lr.intercept_
```

Out[98]:

```
0.5987006607902172
```

In [99]:

```
lr.coef_
```

Out[99]:

```
array([ 0.02655436,  0.01730123, -0.06273795, -0.01280272, -0.01332251,
        1.12994273,  0.31948606,  0.71962023])
```

In [103]:

```
y_pred = lr.predict(X_test_sc)
```

```
C:\Users\vaish\anaconda3\Lib\site-packages\sklearn\base.py:464: UserWarni
ng: X does not have valid feature names, but LinearRegression was fitted
with feature names
  warnings.warn(
```

In [104]:

```
from sklearn.metrics import r2_score,mean_absolute_error, mean_squared_error
```

In [105]:

```
print("mse: ", mean_squared_error(y_test, y_pred))
print("mae: ", mean_absolute_error(y_test, y_pred))
print("r2: ", r2_score(y_test, y_pred))
```

```
mse:  52.6579082682083
mae:  5.763799339209783
r2:  -0.35827661318763004
```

In [106]:

```
score = r2_score(y_test, y_pred)
```

In [107]:

```
r2_adjusted = 1-((1-score)*(len(y)-1))/(len(y)-X.shape[1]-1)
r2_adjusted
```

Out[107]:

```
-0.40471342047609604
```

In [108]:

```
import pickle
```

In [117]:

```
pickle.dump(scaler, open("scaler_assignment.pkl", "wb"))
pickle.dump(lr, open("regression_assignment.pkl", "wb"))
```

In [119]:

```
#opening pickle file
model_regressor=pickle.load(open("regression_assignment.pkl", "rb"))
model_scaler=pickle.load(open("scaler_assignment.pkl", "rb"))
```

In [123]:

```
X_new = pd.DataFrame({'Temperature':[27,29,30,34,35],
                      'Ws':[22,13,16,18,20],
                      'FFMC':[28,35.5,45.5,78.5,88.6],
                      'DMC':[0.7,65,7.8,8.9,35.4],
                      'DC':[6.9,88.5,220,100,68],
                      'ISI':[1.5,1.7,2.5,2.9,2.5],
                      'BUI':[37.856,35.889,37.4,37.56,38],
                      'Classes':[0,1,1,1,0]})
```

In [124]:

```
X_new_sc=model_scaler.transform(X_new)
```

In [125]:

```
y_new_predict=model_regressor.predict(X_new_sc)
y_new_predict
```

```
C:\Users\vaish\anaconda3\Lib\site-packages\sklearn\base.py:464: UserWarni
ng: X does not have valid feature names, but LinearRegression was fitted
with feature names
  warnings.warn(
```

Out[125]:

```
array([-0.36188168,  0.94375198,  1.25816512,  1.32508523, -0.29029895])
```